



High level of endemism in Haiti's last remaining forests: a revision of *Modisimus* (Araneae: Pholcidae) on Hispaniola, using morphology and molecules

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This study describes the remarkable radiation of *Modisimus* on Hispaniola. During two short trips to the island, more species have been collected than are known from any comparable area on the mainland. We redescribe three of the four previously known Hispaniolan species, and describe 22 new species. Most Haitian species are local endemics, either of the severely threatened forests in one of the two national parks (La Visite National Park and Macaya Biosphere Reserve) or of their surrounding areas. Phylogenetic analysis indicates that most of these species together represent a species group that is restricted to the paleogeographically distinct southern 'paleoisland', and that is otherwise known neither from Hispaniola nor from any other island. Two mitochondrial markers, *16S* and *cytochrome oxidase I (COI)*, were sequenced in 21 species to test for their performance as barcoding genes within this group of partly closely related species. Both markers unambiguously corroborated the morphospecies, with small but distinct gaps between the intra- and interspecific genetic distances. The absence of *Modisimus* in South America argues against colonization of the West Indies over a 'landspan' connecting South America to the Greater Antilles. Overwater dispersal is supported by two lines of evidence (unusual radiation and reduced higher-level diversity), but further data (especially time estimates for the separation of mainland and island taxa) are needed to evaluate the third major model, continent–island vicariance as a result of plate tectonics. The species diversity of the genus, combined with the presence of habitat specialists, suggests that this system may have the potential to complement the classic studies on adaptive radiation in Caribbean *Anolis* lizards.

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INTRODUCTION

Combining high levels of diversity and endemism, the Greater Antilles are considered to be a major biodiversity hotspot (Myers *et al.*, 2000; Santiago-Valentin & Olmstead, 2004; Smith *et al.*, 2005). Compared with tropical Central and South America, however, the percentage of forest cover is alarmingly low (Hedges & Woods, 1993). This is especially true for the western part of Hispaniola, the second largest island in the range. For historical and current political and socioeconomic reasons, this part of the island, the

Republic of Haiti, is almost entirely devoid of forests. Only about 1% of the original forest cover remains (Paryski, Woods & Sergile, 1989), with drastic direct and indirect consequences not only for the country's flora and fauna, but also for a society that is largely dependent on agriculture (Sergile & Woods, 2001; Diamond, 2005). Two national parks harbour most of the country's biodiversity: both face intense human pressures and lack effective conservation plans (Paryski *et al.*, 1989; Hedges & Woods, 1993; Sergile & Woods, 2001; Rimmer, Gomez & Brocca, 2005a; Rimmer *et al.*, 2005b; Hedges, 2006b). By 2060, more than 50% of Haiti may be exposed to desertification (UNFCCC, 2002), which will inevitably have a dramatic impact on the remaining biodiversity.

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The West Indies have been called a 'laboratory of biogeography and evolution' (Ricklefs & Bermingham, 2008), with a complex geological history (Iturralde-Vinent & MacPhee, 1999) resulting in complex biogeographic patterns. However, most of our knowledge about Caribbean biogeography comes from vertebrates (Woods, 1989; Hedges, 1996, 2001, 2006a, b; Santiago-Valentin & Olmstead, 2004). Studies on Caribbean *Anolis* lizards, for example, have highlighted the interplay between ecology and geology in allowing diversification to occur and have revealed an intriguing case of replicated adaptive radiation (Losos *et al.*, 1998; Losos, 2004). Vertebrates have also been used widely as models for testing alternative hypotheses concerning the origins of the Caribbean biota. The last decades have seen a lively debate on the relative importance of different colonization mechanisms, including continent–island vicariance resulting from plate tectonics (Rosen, 1975, 1985; Hall, Robbins & Harvey, 2004; Chakrabarty, 2006), more recent (Tertiary) overwater dispersal (Hedges, Hass & Maxson, 1992; Hedges, 1996, 2001, 2006a, b; Bell, 2001; Hass, Maxson & Hedges, 2001; Hedges & Heinicke, 2007; Heinicke, Duellman & Hedges, 2007), and dispersal over a short-lived 'landspan' from South America, during the Eocene–Oligocene transition (Iturralde-Vinent & MacPhee, 1999; Woods, Paéz & Kilpatrick, 2001). Certain taxa may have had a much more complex evolutionary history, not reflecting any particular biogeographic pattern (Roncal, Zona & Lewis, 2008).

Invertebrates have played a minor role in these debates, mostly because their basic taxonomy is still rather fragmentary (see references in Hedges, 2001, 2006a for some exceptions; and also Hollocher, 1996; Liebherr, 1998; Bell, 2001; Miller & Miller, 2001; Wilder & Hollocher, 2003; Penney, 2008). The spider genus *Modisimus* (Pholcidae: daddylongleg spiders) exemplifies this situation. With currently 58 extant nominal species, it is widely distributed from Panama to the south-western USA, Florida, and the Caribbean, but the genus has never been revised, and many (probably most) species remain uncollected or undescribed. Hispaniola is of particular interest, first because the type species *Modisimus glaucus* Simon, 1893 originates from this island, and second because five nominal species of *Modisimus* have been described from Dominican Amber (Wunderlich, 1988). However, only four extant species have been described previously, based on no more than seven specimens. The fact that two 3-week trips resulted in the collection of over 700 adult specimens representing 30 species, highlights the immensity of unknown diversity present on this island. As noted by Hedges (2006a), studying the historical biogeography of a group is difficult when

the majority of the living species has yet to be discovered.

The first aim of the current study is thus to provide an approximation of the actual diversity of *Modisimus* on Hispaniola. A sound taxonomy will serve as a basis for any future revision of the genus, and for biogeographic analyses. In particular, the species diversity of the genus, combined with the presence of habitat specialists, suggests that this system may have the potential to complement the classic studies on adaptive radiation in *Anolis* lizards (Losos *et al.*, 1998; Losos, 2004).

Second, after hypothesizing species boundaries through morphological data, we will test molecular barcodes in closely related pholcid species. A previous study demonstrated the ability of *16S* and, to a lesser degree, *COI* barcodes to separate morphologically unambiguous pholcid species (Astrin *et al.*, 2006). In the present study, we apply this method to a 'real world' scenario, including putative sister species with often ambiguous morphological species limits in a limited geographical area, asking how many species would be recognized by sequencing short gene sequences and analysing them using particular threshold values for inter- vs. intraspecific distances. We agree that mitochondrial DNA (mtDNA) divergence is neither necessary nor sufficient as a criterion for delineating species (Moritz & Cicero, 2004), and crude numbers may be ineffectual compared with detailed taxonomic descriptions (cf. Prendini, 2005). However, they are potentially highly useful for quick biodiversity estimates, and in many groups and geographic areas the shortage of funds and experts (the 'taxonomic impediment'; cf. Environment Australia, 1998; Hebert *et al.*, 2003; Gaston & O'Neill, 2004; Janzen, 2004; Wheeler, Raven & Wilson, 2004) may leave no other option.

MATERIAL AND METHODS

Most of the material studied herein was collected during two trips to the Dominican Republic (DR; November 2005) and to Haiti (November–December 2007). The trips were designed to cover as much of each country as possible. A total of 47 localities were visited (33 in DR and 14 in Haiti), resulting in about 530 and 200 adult specimens, respectively. Of these, 15% were fixed in pure ethanol, and all others were fixed in 80% ethanol. The absence of species from the molecular data set usually indicates that it was not available in pure ethanol. All new material is currently deposited in the Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, but will later be partly transferred to the Museo de Historia Natural, Santo Domingo. Further material (about 70 specimens, including types) was borrowed from the

American Museum of Natural History (AMNH), New York, and the Museum of Comparative Zoology (MCZ), Cambridge, MA. The type specimen of the type species *M. glaucus* has been investigated previously (Huber, 1996), and was restudied in Paris in August 2008.

Morphological descriptions follow the style of recent publications (e.g. Huber, 2000, 2005). Measurements are given in mm (± 0.02 mm if two decimals are given), unless otherwise noted. Eye measurements are ± 5 μ m. Drawings were carried out with a camera lucida on either a Leitz Dialux 20 or an Olympus BX41 compound microscope. Photographs were taken with a Nikon Coolpix 995 digital camera (2048 \times 1536 pixels), mounted on a Nikon SMZ 1500 dissecting microscope. For SEM photos, specimens were dried in hexamethyldisilazane (HMDS; Brown, 1993), and then imaged with a Hitachi S-2460 electron microscope. Cleared epigyna were stained with chlorazol black. Geographic coordinates are given in round brackets when copied from labels, and are given in square brackets when taken from gazetteers.

The numerical cladistic analysis of morphological data was performed using NONA v2.0 (Goloboff, 1999) and Pee-Wee v2.8 (Goloboff, 1997). The morphological data matrix (Tables 1, 2) includes 24 Hispaniolan *Modisimus* species treated below and two out-group species from Costa Rica (*Modisimus guatuso* Huber, 1998, from San José Prov., Bajo La Hondura) and Cuba (*Modisimus elevatus* Bryant, 1940, from Cienfuegos Prov., Soledad). *Modisimus cienaga* sp. nov. is excluded, because preliminary analyses showed that it introduced considerable homoplasy into the analysis, and because it is quite obviously part of a distinct species group (formerly *Hedypsilus*), widely distributed in Central America, the Caribbean, and Florida (with many undescribed species).

Amber material was borrowed from the Senckenberg Museum, Frankfurt (SMF) (holotypes of *Modisimus calcar* Wunderlich, 1988, *Modisimus crasifemoralis* Wunderlich, 1988, *Modisimus calcaroides* Wunderlich, 1988, and *Modisimus oculatus* Wunderlich, 1988), and from the private collection of Günther Herrling (ambra'dor, Hamburg) (holotype of *Modisimus tuberosus* Wunderlich, 1988). We could not locate the paratype of *M. calcaroides*. Two further specimens were borrowed from the private collection of Jorge Caridad (Museo Mundo de Ambar, Santo Domingo). Two specimens were studied with X-ray computed tomography at the UGCT ('Centre for X-ray Tomography' at Ghent University, <http://www.ugct.ugent.be>) using a nanofocus transmission type X-ray tube set at 50–80 keV and the program VGStudio MAX 1.2 for 3D visualization of the projections (Volume Graphics, <http://www.volumegraphics.com>).

Table 1. Morphological data matrix

Taxa	Characters
	0000000001 1111111112
	1234567890 1234567890
<i>Modisimus guatuso</i>	0000110000 00010000??
<i>Modisimus elevatus</i>	0000100000 00010000??
<i>Modisimus femoratus</i>	0000110000 0000001001
<i>Modisimus jima</i> sp. nov.	0000100000 0000001001
<i>Modisimus angulatus</i> sp. nov.	0000110000 0000001001
<i>Modisimus kiskeya</i> sp. nov.	0000110000 0000001001
<i>Modisimus toma</i> sp. nov.	0000100000 0000000001
<i>Modisimus vittatus</i>	0000100000 0001000000
<i>Modisimus makandal</i> sp. nov.	0000100000 0001000000
<i>Modisimus fuscus</i>	0010300001 1100010110
<i>Modisimus epepye</i> sp. nov.	0010300001 1110010010
<i>Modisimus seguin</i> sp. nov.	1000201010 0010010100
<i>Modisimus roumaini</i> sp. nov.	1000201010 0010010100
<i>Modisimus enriquillo</i> sp. nov.	1000200000 0010010000
<i>Modisimus tiburon</i> sp. nov.	1000200000 0010010000
<i>Modisimus leprete</i> sp. nov.	1000200000 0010010000
<i>Modisimus macaya</i> sp. nov.	1000200000 0010010000
<i>Modisimus mariposas</i> sp. nov.	1000100100 0000000000
<i>Modisimus bachata</i> sp. nov.	0000100100 0010000000
<i>Modisimus cuadro</i> sp. nov.	1000100000 0000000000
<i>Modisimus pelejil</i> sp. nov.	0000100000 0000000000
<i>Modisimus mango</i> sp. nov.	1000100000 00000?0000
<i>Modisimus palvet</i> sp. nov.	0101010100 0020100000
<i>Modisimus berac</i> sp. nov.	0101010100 0020100000
<i>Modisimus miri</i> sp. nov.	0101010100 0020100000
<i>Modisimus paraiso</i> sp. nov.	0100010000 0020010000

DNA was extracted from prosoma, legs, or entire specimens using the Nucleo Spin Tissue Extraction Kit (Macherey-Nagel, <http://www.macherey-nagel.com>), following the protocol for cells and tissues. The primer sets used for amplification and sequencing are given in Table 3. Two different sets of primers for 16S rRNA were used because those used in a previous study (Astrin *et al.*, 2006) did not work in all species. PCR reactions for a 50- μ L final volume contained 5 μ L of undiluted DNA, 125 nmol MgCl₂, 5 μ L 10 \times PCR buffer, 5 pmol deoxyribonucleotide triphosphates (dNTPs), 25 pmol of each primer, and 1.75 U *Taq*-polymerase. The *COI* program consisted of a single cycle set of 30 repeats, in which each cycle included 20 s of denaturation at 94 °C, 20 s of annealing at 48 °C, and a 40-s extension at 72 °C. The 16S program encompassed two cycle sets. The first cycle

Table 2. Morphological characters used for phylogenetic analysis

1.	Carapace lateral marks: (0) absent; (1) present (Fig. 27).
2.	Anterior median eyes: (0) present, with at least pigment spots; (1) missing.
3.	Ocular area: (0) high (at least about as high as wide in lateral view); (1) low (lower than wide in lateral view).
4.	Clypeus dark margin: (0) absent; (1) present.
5.	Sternum pattern: (0) monochromous white; (1) laterally brown (Fig. 20); (2) medially brown (Fig. 29); (3) monochromous brown.
6.	Male abdomen: (0) not elongated (length < 1.6 × height); (1) elongated (length > 1.6 × height).
7.	Male abdomen callus-like area: (0) absent; (1) present (Figs 27, 28).
8.	Male cheliceral modified hairs: (0) absent or elongated; (1) roundish or cone-shaped.
9.	Male cheliceral modified hairs of variable length: (0) absent; (1) present (Figs 88, 149, 152).
10.	Thickened leg femora: (0) absent; (1) present.
11.	Tibia 1 length/diameter (L/d): (0) > 30; (1) < 30.
12.	Retrolateral trichobothrium tibia 1: (0) at > 20% of tibia length; (1) at < 20%.
13.	Tibia 2 vs. tibia 4 length: (0) tibia 2 = 1.0–1.2 × tibia 4; (1) tibia 2 < 1.0 × tibia 4; (2) tibia 2 > 1.2 × tibia 4.
14.	Male palpal femur retrolateral ‘step’: (0) absent; (1) present (Figs 136, 139).
15.	Procursus shape: (0) very short and wide (Fig. 185); (1) longer and more slender.
16.	Procursus dorsal spine-like process: (0) present (e.g. Figs 94–96, 130, 136); (1) absent.
17.	Epigynal frontal sclerite: (0) absent; (1) present (Figs 38–41).
18.	Epigynum scape: (0) absent; (1) present (Figs 151, 153).
19.	Pore plates: (0) separate; (1) contiguous (Figs 144, 147).
20.	Internal female genitalia, membranous frontal sac: (0) absent, (1) present (Figs 126, 132, 135).

set (with between seven and nine repeats) included 30 s of denaturation at 94 °C, 30 s of annealing at 55 °C (–1 °C per cycle), and a 50-s extension at 72 °C. The second cycle set (23 repeats) encompassed 30 s of denaturation at 94 °C, 30 s of annealing at 50 °C, and a 50-s extension at 72 °C (Astrin *et al.*, 2006). The length of the sequenced region was 470 bp for *16S* (of these, 97 positions were excluded from the phylogenetic analysis, but not from the barcoding approach, see below) and 423 bp for *COI*. Amplification was performed with a TGradient Block (Biometra, <http://www.biometra.de>), and the PCR products were cleaned with the Nucleo Spin Extract II Kit (Macherey-Nagel) for direct sequencing. The sequencing of PCR products was performed by MacroGen (<http://www.macrogen.com>). Information on the sequenced specimens and GenBank accession numbers are given in Table 4.

Consensus sequences from the complementary DNA strands were obtained with Seqman II (LaserGene software; DNA Star, <http://www.dnastar.com>). Alignments were obtained with MUSCLE v3.52 (Edgar, 2004a, b); *16S* alignments were additionally improved using the Refine option (max. 400 000 repetitions). Alignments were checked with BioEdit v7.0.4.1 (Hall, 1999), and were truncated to avoid terminal gaps: obvious misalignments were corrected manually. The final alignment can be obtained from the first author (or Appendix S1). Further analyses were performed with PAUP* v4.0b10 (Swofford, 1998). Neighbour-joining trees (Saitou & Nei, 1987) were generated in order to visualize species distances. This method is widely used in molecular taxonomy, mainly because it is quick and straightforward (e.g. Dalebout *et al.*, 1998; Hebert *et al.*, 2003, 2004b; Wilder & Hollocher, 2003; Blaxter, Elsworth & Daub, 2004; Paquin & Hedin, 2004; Armstrong & Ball, 2005; Markmann & Tautz, 2005; Vences *et al.*, 2005; Smith *et al.*, 2006). By itself, this fact may not justify the method, but it does enable comparisons to be made across taxa and studies; however, it also generates a single untested tree that does not imply a hypothesis of phylogenetic relationships (see Prendini, 2005,

Table 3. Primer sets used for gene amplification

Genes	Primer names	Primer sequences	References
<i>16S</i> rRNA	16s1471-mod	5'-GCCTGTTTAWCAAAAACAT-3'	Astrin <i>et al.</i> (2006)
	16sbr-H-mod	5'-CCGGTYTGAACCTCARATCAYGT-3'	
	16sar-5'	5'-CGCCTGTTTATCAAAAACAT-3'	Hillis, Moritz & Mable, 1996
	16sbr-3'	5'-CCGGTCTGAACCTCAGATCACGT-3'	
<i>COI</i>	LCO1490	5'-GGTCAACAAATCATAAAGATATTGG-3'	Folmer <i>et al.</i> (1994)
	HCO2198	5'-TAAACTTCAGGGTGACCAAAAATCA-3'	

Table 4. Specimens sequenced, GenBank accession numbers, and DNA voucher numbers

Species	Locality	Vial Nr.	DNA voucher	Acc. # 16S	Acc. # COI
<i>Modisimus berac</i> sp. nov.	Haiti: La Visite, 'Berac'	HAITI-69	DNA07-NF69	FJ227995	FJ228030
<i>Modisimus cienaga</i> sp. nov.	DR: nr La Ciénaga	DR100-13	DNA07-NF13	FJ227982	FJ228018
<i>Modisimus cuadro</i> sp. nov.	DR: nr La Toma	DR100-3	DNA07-NF3	FJ227981	FJ228017
<i>Modisimus culicinus</i>	DR: Juan Dolio	DR100-43	DNA07-NF43	FJ227971*	FJ228007
<i>Modisimus enriqueillo</i> sp. nov.	DR: NW Paraiso	HAITI-101	DNA07-NF101	FJ227973	FJ228008
<i>Modisimus epepeye</i> sp. nov.	Haiti: nr Seguin	HAITI-80	DNA07-NF80	FJ227976*	FJ228011
<i>Modisimus femoratus</i>	DR: nr Yamasa	DR100-20	DNA07-NF20	FJ227963*	FJ228001
<i>Modisimus fuscus</i>	DR: nr Salto Limón	DR100-27	DNA07-NF27	FJ227965*	FJ228031 (417 bp)
<i>Modisimus kiskeya</i> sp. nov.	DR: nr Sánchez	DR100-30	DNA07-NF30	FJ227969*	FJ228006
	Haiti: La Visite, Case Dent	HAITI-66	DNA07-NF66	FJ227970*	FJ228005
	DR: nr La Toma	DR100-4	DNA07-NF4	–	FJ228015
	DR: nr Jima	DR100-9	DNA07-NF9	FJ227978*	FJ228013
	DR: nr La Ciénaga	DR100-14	DNA07-NF14	FJ227958*	FJ227996
	DR: nr Yamasa	DR100-17	DNA07-NF17	FJ227961*	FJ227999
<i>Modisimus leprete</i> sp. nov.	Haiti: nr Le Prete	HAITI-87	DNA07-NF87	FJ227959	FJ227997
<i>Modisimus macaya</i> sp. nov.	Haiti: Macaya B.R.	HAITI-62	DNA07-NF62	–	FJ228028
	Haiti: Macaya B.R.	HAITI-84	DNA07-NF84	FJ227993	FJ228027
	Haiti: Macaya B.R.	HAITI-77	DNA07-NF77	FJ227994	FJ228029
<i>Modisimus makandal</i> sp. nov.	DR: nr Cana	DR100-37	DNA07-NF37	FJ227987	FJ228021
	Haiti: nr Plaisance	HAITI-105	DNA07-NF105	FJ227990	FJ228024
	Haiti: nr Labadie	HAITI-90	DNA07-NF90	FJ227989	FJ228023
<i>Modisimus mango</i> sp. nov.	Haiti: NE Gonaives	HAITI-92	DNA07-NF92	FJ227988	FJ228022
<i>Modisimus miri</i> sp. nov.	Haiti: nr Le Prete	HAITI-89	DNA07-NF89	FJ227960*	FJ227998
<i>Modisimus palvet</i> sp. nov.	DR: Loma Quita Esp.	DR100-24	DNA07-NF24	FJ227964*	FJ228032 (340 bp)
<i>Modisimus paraiso</i> sp. nov.	Haiti: Macaya B.R.	HAITI-64	DNA07-NF64	FJ227962	FJ228000
<i>Modisimus roumaini</i> sp. nov.	DR: NW Paraiso	HAITI-98	DNA07-NF53	FJ227974	FJ228009
<i>Modisimus seguin</i> sp. nov.	Haiti: Léogâne – Jacmel	HAITI-71	DNA07-NF71	FJ227983	FJ228019
<i>Modisimus tiburon</i> sp. nov.	Haiti: nr Seguin	HAITI-81	DNA07-NF81	FJ227992	FJ228026
	Haiti: La Visite, Case Dent	HAITI-67	DNA07-NF67	FJ227968*	FJ228004
	Haiti: La Visite, 'Berac'	HAITI-68	DNA07-NF68	FJ227967* (460 bp)	FJ228003
	Haiti: nr Kenscoff	HAITI-74	DNA07-NF74	FJ227966	FJ228002
<i>Modisimus toma</i> sp. nov.	DR: nr La Toma	DR100-5	DNA07-NF5	FJ227984	–
	DR: nr La Toma	DR100-1	DNA07-NF1	FJ227980	FJ228016
<i>Modisimus vittatus</i>	DR: nr Cabral	DR100-41	DNA07-NF41	FJ227991	FJ228025
	DR: Los Patos	HAITI-94	DNA07-NF94	FJ227975	FJ228010
<i>Modisimus</i> sp. 1	Haiti: Port-au-Prince	HAITI-73	DNA07-NF73	FJ227977*	FJ228012
<i>Modisimus</i> sp. 2	DR: Loma Quita Esp.	DR100-23	DNA07-NF23	FJ227979	FJ228014
<i>Modisimus</i> sp. 3	DR: S Puerto Plata	DR100-39	DNA07-NF39	FJ227986	–
<i>Modisimus</i> sp. 4	DR: S Las Galeras	DR100-33	DNA07-NF33	FJ227985	FJ228020
	Haiti: Macaya B.R.	HAITI-79	DNA07-NF79	FJ227972	–

*Sequences only obtained with primers 16sar/16sbr.
DR, Dominican Republic.

and references therein). The resulting trees were edited in TreeView v1.6.6 (Page, 1996). Uncorrected p-distances (proportions of differing sequence positions) were analysed using SPSS v11.0 (SPSS, <http://www.spss.com>). For this molecular taxonomic approach, indels were included in the analysis (cf. Astrin *et al.*, 2006), whereas for phylogenetic reconstruction (demanding unambiguous homology), almost all indels were excluded (see below).

For a total evidence analysis of phylogenetic relationships, we conducted a Bayesian analysis for the concatenated mitochondrial partitions in combination with the morphological data (concatenation was performed in BioEdit). This was based on the best-fit model of evolution computed by Modeltest v3.7 (Posada & Crandall, 1998), using the Bayesian information criterion: for *COI* this was the TrN + I + Γ model, and for *16S* this was the GTR + I + Γ model; the Markov k model (Lewis, 2001) was used for morphological data. Ambiguous alignment positions of the ribosomal gene (as identified 'by eye') were excluded from the alignment to guarantee positional homology over the whole alignment (Wägele, 2005; Astrin, Misof & Huber, 2007). These were the positions 436–445, 478–486, 596–599, 632–641, 669–682, 715–764 (cf. concatenated alignment in Appendix S1). Of the mitochondrial characters used in the phylogenetic analysis, 314 positions were parsimony informative, whereas all 20 morphological characters were informative. We used MrBayes v3.1.2 (Huelsenbeck & Ronquist, 2001; Ronquist & Huelsenbeck, 2003) to infer Bayesian reconstructions. The parameters for the employed models of sequence evolution were calculated with MrBayes. We unlinked the parameters among partitions, and also between the third vs. first plus second codon positions in *COI* (assuming the same model for all *COI* positions). We ran two independent replicates for 5 million generations per analysis. Every 1000th tree was sampled (and 10 000 trees were retained). The negative log-likelihood score stabilization was determined in a separate visualization, and the 'burn-in' was discarded accordingly. We used the remaining 9868 trees for building a 50% majority rule consensus tree, on which posterior probabilities are shown.

RESULTS

RELATIONSHIPS

Using the NONA command string 'amb-; hold5000; hold/50; mult*100' for the morphological data matrix shown in Table 1 gave five most-parsimonious cladograms (length = 31 steps; consistency index, *CI* = 74; retention index, *RI* = 88). Successive weighting resulted in three most-parsimonious cladograms (identical to three of the five cladograms obtained

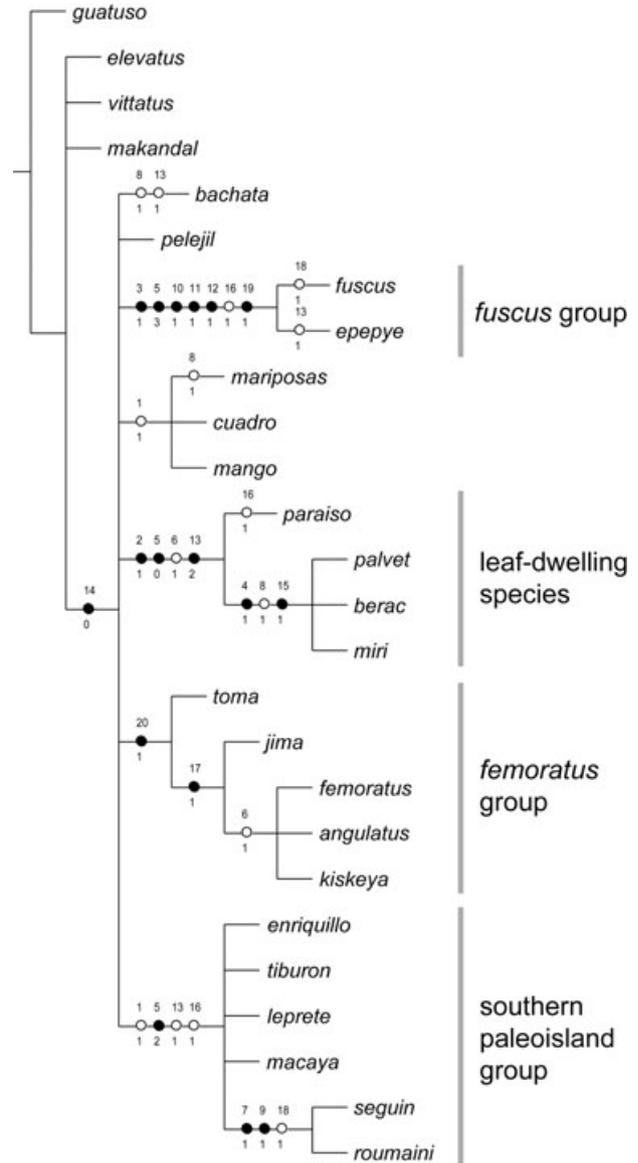


Figure 1. Strict consensus cladogram of three most-parsimonious cladograms obtained with NONA using successive weighting of morphological characters (Table 1); ○, homoplasies. Groups that are also recovered by molecular data are indicated on the right.

using equal weights), the strict consensus of which is shown in Figure 1. The only difference between these and the strict consensus of the equal-weights cladograms concerns the large polytomy that in the equal-weights cladograms included *M. elevatus*, *Modisimus vittatus* Bryant, 1948, and *Modisimus makandal* sp. nov. The implied weighting in Pee-Wee (which resolves character conflict in favour of the characters that have less homoplasy) resulted in the same consensus tree as shown in Figure 1 when using a constant of concavity (*k*) of 3 or higher. With *k* = 1

and 2, a single cladogram resulted, with the only difference being that *Modisimus mariposas* sp. nov., *Modisimus cuadro* sp. nov., and *Modisimus mango* sp. nov. did not form a group, but were instead placed in a tetrachotomy together with the southern paleoisland group.

The cladogram in Figure 1 identifies several species groups that are also supported by or are congruent with the molecular data (see below).

1. The *femoratus* group, characterized by a large membranous structure positioned frontally in the internal female genitalia (Figs 126, 132, 135); within this group, *Modisimus femoratus* Bryant, 1948 shares a small sclerite in front of the epigynum (Figs 38–41) with *Modisimusiskeya* sp. nov., *Modisimus jima* sp. nov., and *Modisimus angulatus* sp. nov.
2. The *fuscus* group, characterized by a low ocular area (Fig. 24), monochromous brown sternum, thickened femora, short tibiae, and contiguous pore plates (Figs 144, 147).
3. The leaf-dwelling species, characterized by a monochromous white sternum, long abdomen, tibia 2 considerably longer than tibia 4, and with no trace of anterior median eyes (AMEs); within this group, the three mountain-top species (*Modisimus palvet* sp. nov., *Modisimus berac* sp. nov., and *Modisimus miri* sp. nov.) share the shape of the procurus (Fig. 185), a dark clypeus margin, and short modified hairs on the male chelicerae (Figs 186, 188, 190).
4. The southern paleoisland group, restricted to the area of Hispaniola south of the Plaine du Cul de Sac and Valle de Neiba fault, characterized by the reduction of the dorsal process on the procurus (e.g. Figs 98, 148, 154), medially brown sternum (Fig. 29), tibia 4 longer than tibia 2; within this group, *Modisimus seguin* sp. nov. and *Modisimus roumaini* sp. nov. share a callous-like area positioned posteriorly on the male abdomen (Figs 27, 28), cheliceral hairs of different lengths (Figs 149, 152), and an epigynal scape (Figs 150, 151, 153).

Finally, a sister-group relationship between the southern paleoisland and the *fuscus* groups (both of which are restricted to the southern paleoisland) was not recovered in the consensus trees, but is supported by morphological (reduction of procurus spine-like process) and molecular (see below) data.

The combined analysis of morphological and molecular data resulted in a very similar phylogenetic hypothesis (Fig. 2). All four major species groups were recovered, three of them with high support. The sister-group relationship between the *fuscus* and paleoisland groups was also recovered (with modest support). The fact that even *M. mango* sp. nov. was

placed close to this clade (although with weak support) suggests that all southern paleoisland species may in fact form a monophylum (except for *M. vittatus* and the leaf-dwelling species).

The phylogenetic affinities of the other species remain largely unclear. The group [*M. mariposas* sp. nov. + *M. cuadro* sp. nov. + *M. mango* sp. nov.] in Figure 1 is poorly supported (with just a single homoplastic character), and is probably an artifact (the genitalia differ considerably). It is not recovered in the combined analysis. Instead, morphological data (that could not be coded unambiguously, and were thus not included in the data matrix) suggest that *M. cuadro* sp. nov. may be close to *Modisimus pelejil* sp. nov. (similar epigynum shape and unmodified male chelicerae) and that *M. mariposas* sp. nov. may be close to *Modisimus bachata* sp. nov. (similar male chelicerae); as three of these four species were not sequenced, their relationships are equally unresolved in the combined analysis. *Modisimus vittatus* and *M. makandal* sp. nov. may superficially seem to be closely related, but the main character uniting them (male palpal femur with retrolateral 'step'; Figs 136, 139) is a plesiomorphy, and the Cuban *M. elevatus* seems to be the closest known relative of these two species. Finally, *M. cienaga* sp. nov. (which was excluded from the morphological analysis, see above) is part of a species group around *Modisimus culicinus* (Simon, 1893) (originally *Hedypsilus*).

SPECIES LIMITS AND BARCODING

Individually, both molecular markers unambiguously separate the sequenced morphospecies, but two populations (the Los Patos population of *M. vittatus* and the Gonaïves population of *M. makandal* sp. nov.) make the gap between intra- and interspecific ranges of p-distances appear to be very narrow (Fig. 3). If these two populations are removed from the analysis, the gaps are wide: 3.5–5.5% for *16S*; 4.6–9.6% for *COI*. Setting the threshold value to 5% would thus result in perfectly congruent results, except that *COI* would suggest that the two populations above are both separate species (p-distances: 7.3–8.5%), and *16S* would suggest that the species status of the Los Patos populations is unresolved (p-distances: 4.9 and 5.1%, respectively).

The lowest interspecific distances are consistently found between species that are also similar morphologically: *M. roumaini* sp. nov. and *M. seguin* sp. nov. (*16S*, 5.6%; *COI*, 10.2%), *Modisimus tiburon* sp. nov. and *Modisimus enriquillo* sp. nov. (*16S*, 7.1%), *M.iskeya* sp. nov. and *Modisimus* sp. 1 (*16S*, 7.7–8.0%), *M. roumaini* sp. nov. and *Modisimus leprete* sp. nov. (*16S*, 8.3%; *COI*, 10.4%), *M. seguin* sp. nov. and *M. leprete* sp. nov. (*16S*, 8.1%; *COI*, 10.2%); leaf-dwelling species (*16S*, 6.1–10.7%; *COI*, 9.7–10.4%).

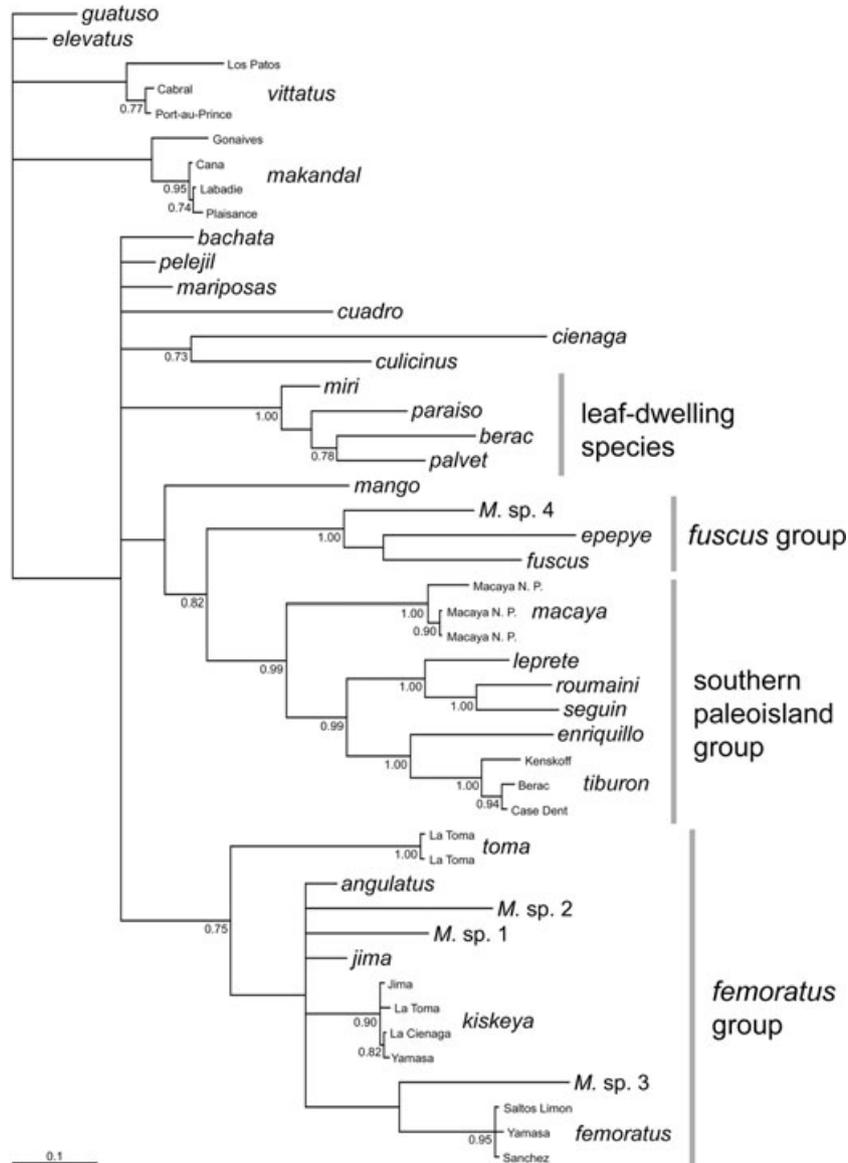


Figure 2. Bayesian consensus tree for combined molecular and morphological data. Posterior probability values of above 0.70 are indicated at the respective nodes. The major species groups are indicated on the right.

Figure 4 illustrates these distances for 16S rRNA. The *COI* tree was extremely similar, and is thus not shown. It grouped the two species of the 'vittatus group' (probably not a monophylum; see above) in a tetrachotomy, together with the leaf-dwelling species and *M. cienaga* sp. nov.; other than that, all major groupings were the same as in the 16S tree, and the relative distances were very similar. Within the southern paleoisland group, even the species were grouped identically in both the 16S and the *COI* trees; in the femoratus group, *M. kiskeya* sp. nov. was closer to *Modisimus toma* sp. nov. than to *M. femoratus*.

TAXONOMY

MODISIMUS SIMON, 1893

Type species: Modisimus glaucus Simon, 1893; *Modisimus dilutus* Gertsch, 1941 of *Modisimops*; *Hedypsilus culicinus* Simon, 1893 of *Hedypsilus*. *Modisimus* Simon, 1893b: 484–485; Gertsch, 1971: 66; Brignoli, 1973: 219–221 (synonymy of *Modisimops*); Gertsch & Peck, 1992: 1192–1193 (synonymy of *Modisimops* with *Hedypsilus*); Huber, 1996: 238–239 (synonymy of *Hedypsilus*); Huber, 1998: 21–33. *Hedypsilus* Simon, 1893b: 484–486. *Modisimops* Mello-Leitão, 1946: 50.

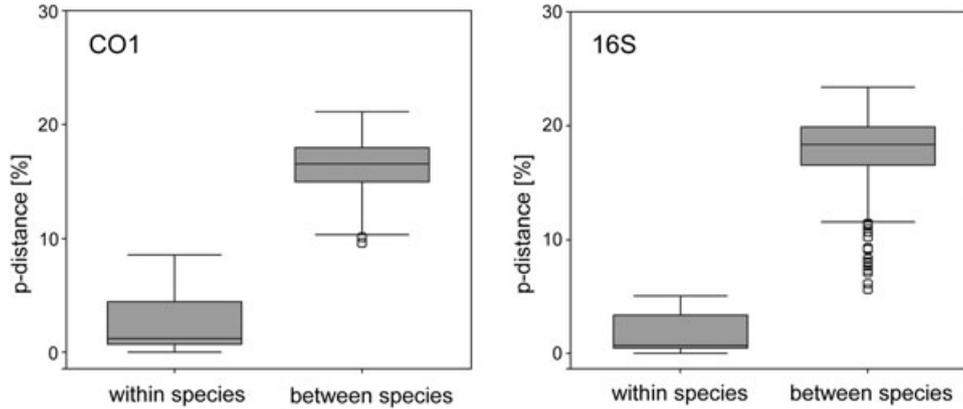


Figure 3. Box plots of p-distances. Boxes indicate interquartile ranges; black bars indicate medians; whiskers comprise values not surpassing 1.5 times the interquartile ranges; ○, outliers.

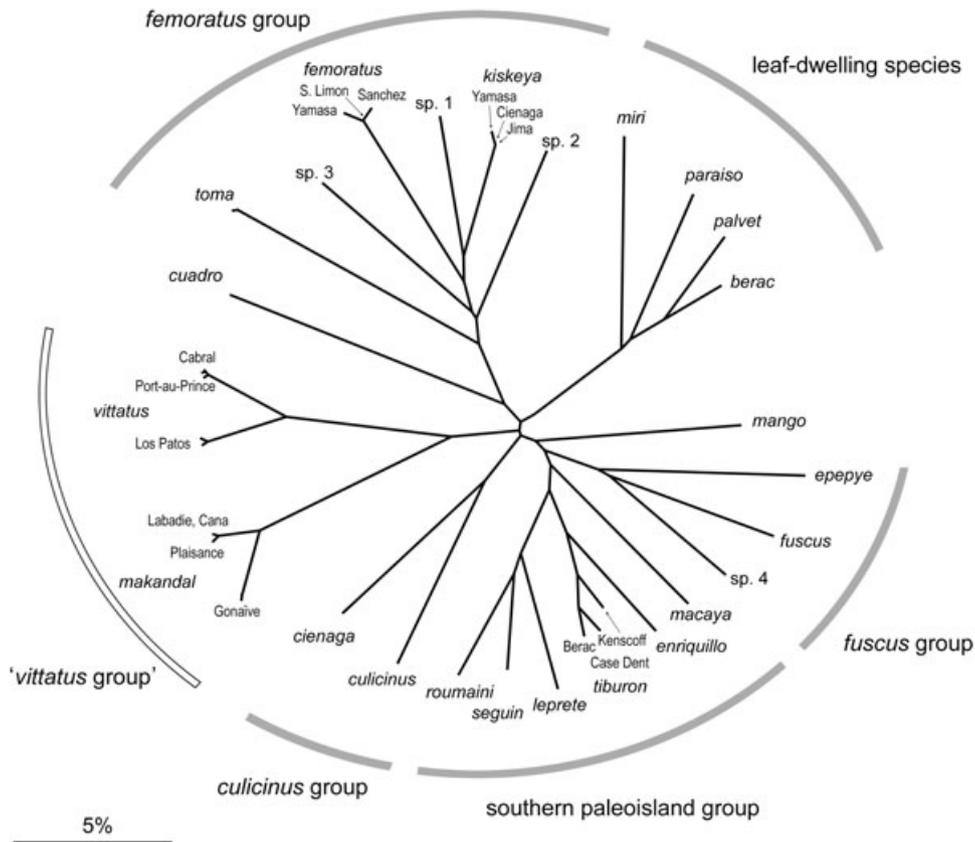


Figure 4. Neighbour-joining tree of 16S sequences. Scale bar: 5% p-distance. This tree illustrates genetic distances among species and populations, and does not aim at phylogenetic accuracy. Species groups also recovered by phylogenetic analyses are marked with grey bars for comparison; white bars indicate the ‘vittatus group’ that is probably not monophyletic.

Type species: The identity of the type species, *M. glaucus*, is problematic, but it is almost certainly part of the group referred to here as the *femoratus* group. The single available female type specimen (MNHN AR 10535) is in poor condition, and the type locality

is poorly specified. The original Latin description (Simon, 1893a) says ‘Ins. S.-Domingo et ins. S.-Thomas’; in the *Histoire Naturelle*, Simon (1893b) lists ‘Saint-Domingue’, Saint-Thomas, and Jamaica. Saint-Domingue was the name of the French colony

that is now Haiti, and the name continued to be used until the 20th century. Saint-Domingue and Santo Domingo have also sometimes been used to refer to all of Hispaniola, and even to the modern Dominican Republic (e.g. Fassig, 1929). Simon's 'Ins. S.-Domingo' suggests that he referred to the entire island of Hispaniola. In any case, the previous statement (Huber, 1996) that modern Santo Domingo (the capital of the Dominican Republic) is the type locality is mistaken.

Obviously, Simon (1893a, b, 1894) had specimens from various islands, and he considered them to be conspecific. The original description (Simon, 1893a) is based on females only, and the later drawings of the male (Simon, 1893b: figs 480, 485) do not resemble anything of what we have seen in Hispaniolan *Modisimus*. These drawings are thus probably based on specimens of other species, but the material seems to be lost. The only syntype specimen available at the MNHN, Paris, is a female, with Simon's original label '6840 Mod. glaucus E.S. S°. Domingo'. Habitus, colour pattern, and especially the epigynum of this specimen resemble *M. femoratus*, as well as the closely related *M. jima* sp. nov. Both species are widely distributed in the Dominican Republic (Fig. 195), and are thus likely to have been collected previously. In the type specimen, the distinctive sclerite in front of the epigynum is mostly hidden in a fold, and lies close to the epigynum (rather as in *M. jima* sp. nov., cf. Fig. 39). Further complicating the picture, specimens from near Puerto Plata, here assigned tentatively to *M. femoratus*, are also potential candidates for being *M. glaucus* (as suggested by Bryant, 1948). It may not be possible to finally resolve this problem, but the species of the *femoratus* group (especially the populations assigned tentatively herein) should be scrutinized in more detail before applying the type species name to one of them.

Diagnosis: *Modisimus* is traditionally diagnosed by the high elevation of the ocular area, the 'eye turret' (Simon, 1893b; Gertsch, 1971; Brignoli, 1973; Huber, 1996, 1998, 2000). In many species this elevation is quite distinct (Figs 28, 30, 32, 83–85), but other species have elevations that are no higher than those of other New World genera (Fig. 24). In the absence of a comprehensive cladistic analysis of the entire genus, the polarity of this character remains an open question. Adding to the confusion, an undescribed Cuban species (Sancti Spiritus: Escambray, Topes de Collantes; specimens in ZFMK and Instituto de Ecología y Sistemática, Habana) has a very high eye turret, but otherwise closely resembles the New World genus *Psilochorus* (especially in the male palps; B. Huber, unpubl. data).

Another character that unites most but not all *Modisimus* species is the high density of short vertical

hairs (Fig. 121) on the male leg femora, but not on the tibiae. Among the species described herein, only *M. cienaga* sp. nov. also lacks these hairs on the femora. The only other genus that shares such hairs on the femora (*Waunana* Huber, 2000) also has them on the tibiae (like several other New World genera; Huber, 2000). As with the eye turret above, the polarity of this character remains unclear.

Description: The description given here only covers Hispaniolan representatives. Total body length ranges from 1 mm (*M. mango* sp. nov. and *M. cienaga* sp. nov.) to over 4 mm (*Modisimus macaya* sp. nov.), but most species are within the range of 2–3 mm. Carapace with median furrow (Figs 86, 87), either with or without median and lateral marks (e.g. Figs 27, 31). Ocular area elevated, but ranging widely from slightly elevated (*Modisimus fuscus* Bryant, 1948 and *Modisimus epepye* sp. nov.; Fig. 24) to highly elevated (*M. vittatus*, Fig. 32). Distance between posterior median eyes (PME–PME), 40–180 µm; PME diameter, 55–170 µm; PME–anterior lateral eye (ALE), 45–210 µm, anterior median eyes (AME) mostly tiny (diameter about 20 µm), in some cases apparently with pigment, but without lenses, and entirely reduced in *M. cienaga* sp. nov. and the leaf-dwelling species. Clypeus unmodified. Sternum never with frontal humps, often with distinct brown bands laterally (Fig. 20), or medially (Fig. 29), in *M. toma* sp. nov. females with two bundles of strong hairs posteriorly (Fig. 118). Male chelicerae mostly provided with modified (short and strong) hairs, pointed or club-shaped (e.g. Figs 88–91), often on elevations (spectacular in *M. toma* sp. nov.; Figs 91, 134), rarely with apophyses (Figs 143, 193: *M. fuscus*, *Modisimus paraiso* sp. nov.), or unmodified (*M. epepye* sp. nov., *M. cuadro* sp. nov., *M. pelejil* sp. nov., and *M. cienaga* sp. nov.). Male palps with retrolateral coxa apophysis, ventral femur apophysis, procurus often with dorsal spine-like process (Figs 94–96), and bulb with strong apophysis.

Abdomen mostly oval and pointed at spinnerets (Figs 19, 28), rarely elongated (especially in *M. kiskeya* sp. nov., Fig. 20; also *M. femoratus* and leaf-dwelling species, Figs 17, 35–37), or globular (tiny leaf-litter species; Fig. 24–26); in *M. angulatus* sp. nov. distinctively angular dorsally (Fig. 21); in *M. roumaini* sp. nov. and *M. seguin* sp. nov. with callus-like posterior area in males only (Figs 27, 28). Often with many dark marks, both dorsally and laterally. White or pale-bluish spots often arranged in lines (Figs 30, 34), but variable within species. Epigynum very variable among species in size and shape (Figs 38–62), often with strong hairs in distinctive groups, and often with paired or unpaired protrusions (Figs 105–107, 110, 114; mating plugs?). Internal

female genitalia with highly diagnostic sclerites and pore plates (Figs 63–82), sometimes with large membranous frontal structure (Figs 126, 132, 135; *femoratus* group).

Most species are long-legged, with leg 1 between 7 and 14 times the body length; only *M. fuscus*, *M. epepye* sp. nov. and *M. cienaga* sp. nov. have considerably shorter legs (less than 5 times the body length). Tibia 1 length ranges from 1.4 mm (*M. cienaga* sp. nov.) to 10.5 (*M. macaya* sp. nov.), but is mostly between 4 and 8 mm. Tibia 2 can be slightly longer than tibia 4, but is shorter in all representatives of the southern paleoisland group, in *M. epepye* sp. nov., and in *M. bachata* sp. nov., and is considerably longer in *M. cienaga* sp. nov., and in the leaf-dwelling species. The length/diameter (L/d) of tibia 1 lies mostly between 40 and 80; only in *M. fuscus*, *M. epepye* sp. nov., and *M. cienaga* sp. nov., does it fall below 25. Spines are often present on femora 1 and 2, arranged in one to four rows, sometimes on elevated bases (Fig. 119; *M. femoratus*, *M. kiskeya* sp. nov.), and are highly variable within species (larger males tend to have more and stronger spines), and among close relatives. Retrolateral trichobothrium on tibia 1 mostly at 6–16%, positioned more distally in *M. fuscus* and *M. epepye* sp. nov. (23 and 25%, respectively), and in *M. cienaga* sp. nov. (31%). Prolateral trichobothrium usually missing on tibia 1, being present only in *M. leprete* sp. nov. (regained?). Curved hairs (Fig. 120) often present on tibiae and metatarsi. Short vertical hairs on male femora, usually in high density (Fig. 121), missing only in *M. cienaga* sp. nov.

Sexual dimorphism slight: females often smaller, always with shorter legs, chelicerae never modified, and few vertical hairs on legs (almost none on femora). In two species, the female sternum is sexually modified (*M. toma* sp. nov., with a pair of bundles of strong hairs posteriorly, Fig. 118; *M. enriquillo* sp. nov., with a pair of apophyses posteriorly, Figs 49, 50). In the leaf-dwelling species, the female clypeus is not darkened.

Diversity: In this study we redescribe three of the four previously described species and describe 22 new species. In addition, the AMNH and ZFMK collections contain seven further morphospecies from Hispaniola (five of them from Haiti). These are either poorly preserved or represented by a single female specimen only, and are therefore not described.

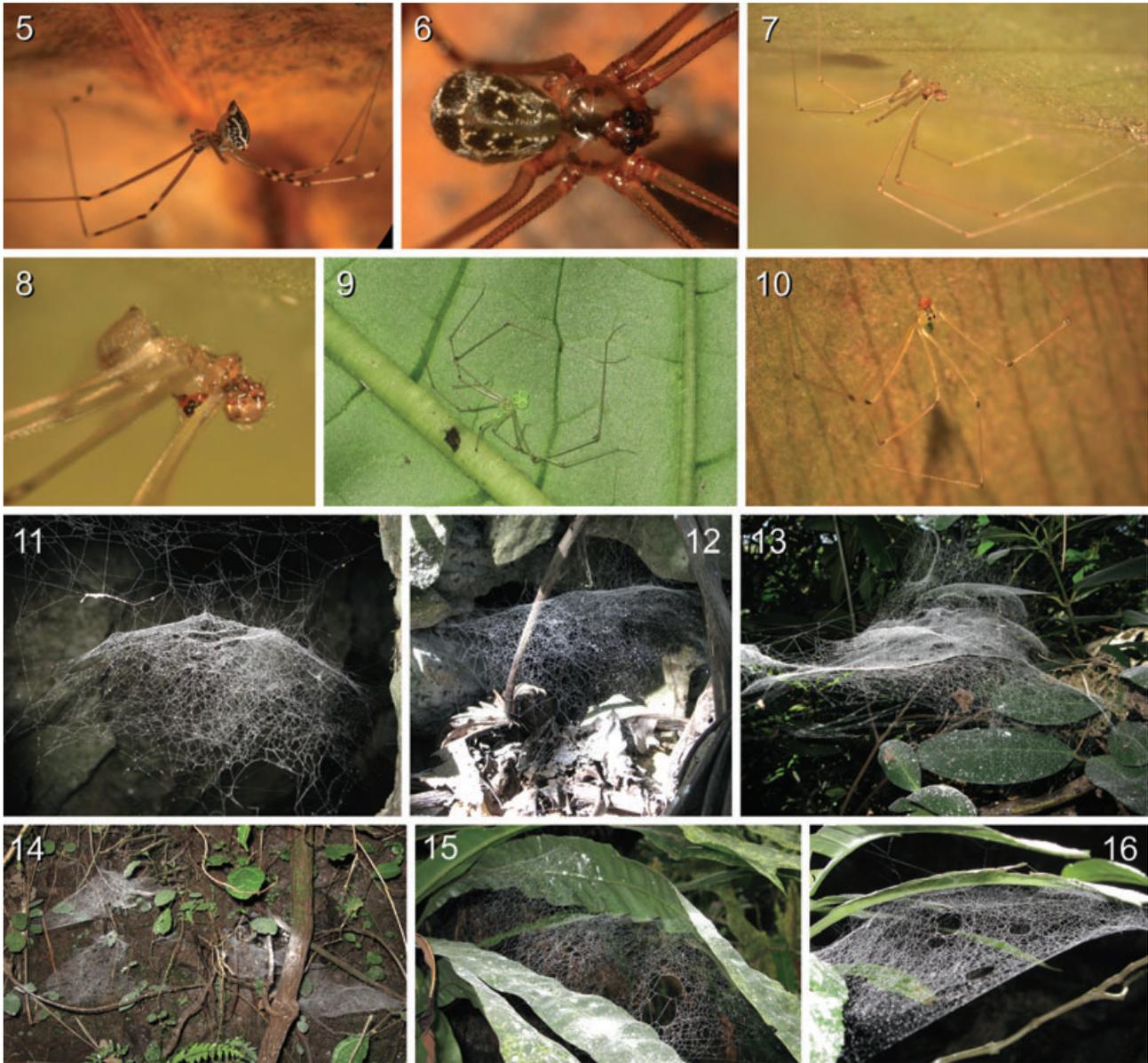
Habitat and web: Most species are restricted to forests, where they typically build dome-shaped webs, with a tangle of lines above (Figs 11–14), in sheltered spaces under logs and rocks, in cavities, or between

buttresses. Some species live close to the ground, under suitable leaves that are curved in a way to allow for web building. Among these, *M. cienaga* sp. nov. appears to differ from all known Hispaniolan congeners, in that it seems to build no or just a minimal web, and runs quickly when disturbed (cf. *M. culicinus*; Huber, 1996). Some species build their webs higher up in the vegetation, up to 2 m above the ground (especially *M. kiskeya* sp. nov., *M. vittatus*, and the leaf-dwelling species). Among these, the leaf-dwelling species are unique in building a sheet that lacks the tangle of lines above, and that is at one point connected to the underside of a leaf where the spider rests closely attached to the leaf surface (Figs 8, 15, 16). *Modisimus vittatus* seems to be the only species that tolerates (or prefers) considerable aridity, and that is thus found in city gardens, in exposed road embankments, and even among cacti and agaves in semi-arid scrubland.

Amber species: The results of our analyses using X-ray computed tomography were severely limited by low contrast for most specimens. This probably results from precipitations that often replace the original amber inclusion, and that negatively affect the contrast, thereby resulting in uneven surfaces. Major morphological characteristics were still partly visible, like humps on the chelicerae or palpal apophyses, but small relevant details like modified hairs on the chelicerae, or the morphology of the procurus, could not be resolved.

Our comparison of amber species with extant species is thus largely limited to characters that have either been described in the original publication (Wunderlich, 1988), or that can be observed with a light microscope. All amber species described seem to be close to, or part of, the *femoratus* group. They are all long-legged species, with a rather high ocular area (unlike the *fuscus* group), they all seem to have a dorsal process on the procurus (unlike the southern paleoisland group; however, in *M. oculatus* this cannot be seen clearly), and they all seem to have AMEs (unlike the leaf dwellers; not visible in *M. tuberosus*).

Other characters support this conclusion, but are not clearly visible in all species. The cheliceral armature of *M. oculatus* seems very close to that of *M. femoratus* and *M. angulatus* sp. nov. (frontal hump with stronger hairs). In *M. calcar* and *M. calcaroides* the cheliceral apophyses are more prominent (more like in *M. jima* sp. nov.), and at least in *M. calcaroides* they are also provided with stronger hairs. In *M. tuberosus*, the cheliceral prominence is again similar to *M. femoratus*, but is more conical; modified hairs might be present, but could not be seen. The abdomens of *M. crassifemoralis* and *M. calcaroides* are



Figures 5–16. Photos of spiders and their webs. 5. *M. vittatus*. 6. *M. macaya* sp. nov. 7–8. *M. mango* sp. nov. 9. *M. palvet* sp. nov. 10. *M. paraiso* sp. nov. Webs of *M. makandal* sp. nov. (11, 12), *M. vittatus* (13), *M. macaya* sp. nov. (14), *M. berac* sp. nov. (15), *M. palvet* sp. nov. (16).

very similar to that of *M. femoratus* (slightly elongated and pointed at the spinnerets). The sternum of *M. calcar* is laterally brown, and lighter medially (unlike the southern paleoisland group and the leaf-dwelling species).

The exact origin is not known for any of the amber specimens. However, Dominican amber has only been found in the Cordillera Septentrional and the Cordillera Oriental of the northern and north-eastern Dominican Republic (Poinar, 1992). It is noteworthy that this coincides closely with a large part of the present-day distribution of the *femoratus*

group. Apparently, the pholcids living in the northern Dominican Republic 15–20 Mya (Iturralde-Vinent & MacPhee, 1996) were not only congeneric with extant Hispaniolan species, but were even representatives of the same species group that today continues to dominate this area of the island. Alternatively, we cannot exclude the possibility that the resins are much younger. Ether tests, and the fact that the resins smear when ground, suggest that all specimens, except for *M. calcaroides*, might be preserved in copal rather than amber (J. Rust, pers. comm.).

MODISIMUS FEMORATUS BRYANT, 1948

(Figs 17, 18, 38, 63, 83, 94, 104–107, 124–126, 195)

Modisimus femoratus Bryant, 1948: 367–368, figs 39, 42.*M. glaucus* Simon: Bryant, 1948: 369–370, figs 38, 41, 56; misidentification? (See note below.)

Note: Two males from Puerto Plata identified by Bryant (1948) as *M. glaucus* Simon are here tentatively assigned to *M. femoratus* Bryant. However, they might indeed be *M. glaucus*; equally they might neither be *M. glaucus* nor *M. femoratus*, or *M. femoratus* could in fact be a junior synonym of *M. glaucus* (also see notes on type species above).

Type: Male holotype from Sánchez [–19°13.8'N, 69°36.8'W], Samaná Prov., Dominican Republic; with labels 'Dom. Rep.; Sánchez, July 1938, Darlington' and '*Modisimus femoratus* ♂ – holotype B.0023 Bryant', in MCZ, examined.

Diagnosis: Medium-sized species with slightly elongated abdomen (Figs 17, 18), male chelicerae with pair of small projections, with weakly modified hairs (Figs 83, 125; similar to *M. jima* sp. nov. and *M. angulatus* sp. nov.), and distinctive epigynum (Fig. 38; similar to *M. angulatus* sp. nov.). Distinguished from *M. angulatus* sp. nov. by pattern on sternum (lateral border not broken), dorsally evenly curved abdomen, and male cheliceral projections slightly closer together; distinguished from *M. jima* sp. nov. by longer abdomen, indistinct ventral procurus notch, and slightly different epigynum.

Male (near Sánchez): Total length, 2.6; carapace width, 1.1. Leg 1: 29.4 (7.8 + 0.4 + 7.3 + 12.0 + 1.9); tibia 2, 4.8; tibia 3, 4.0; tibia 4, 4.4. Tibia 1 L/d: 63. Habitus as in Figures 17 and 18: carapace ochre-yellow, ocular area posteriorly brown, clypeus laterally light brown; sternum with two brown longitudinal bands, medially whitish, lateral margins ochre-yellow; legs light brown, tips of femora and tibiae whitish; abdomen bluish grey, with dark spots dorsally and laterally; large light-brown genital area, dark brown in front of spinnerets, with blue mark between genital area and spinnerets. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 80 µm; PME diameter, 105 µm; PME–ALE, 115 µm; AME very tiny (Fig. 83), lenses not clearly visible in dissecting microscope. Sternum wider than long (0.7/0.5), unmodified. Chelicerae with indistinct round humps frontally set with a few basally thickened hairs (Figs 83, 125). Palps as in Figure 124, coxa with light retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses,

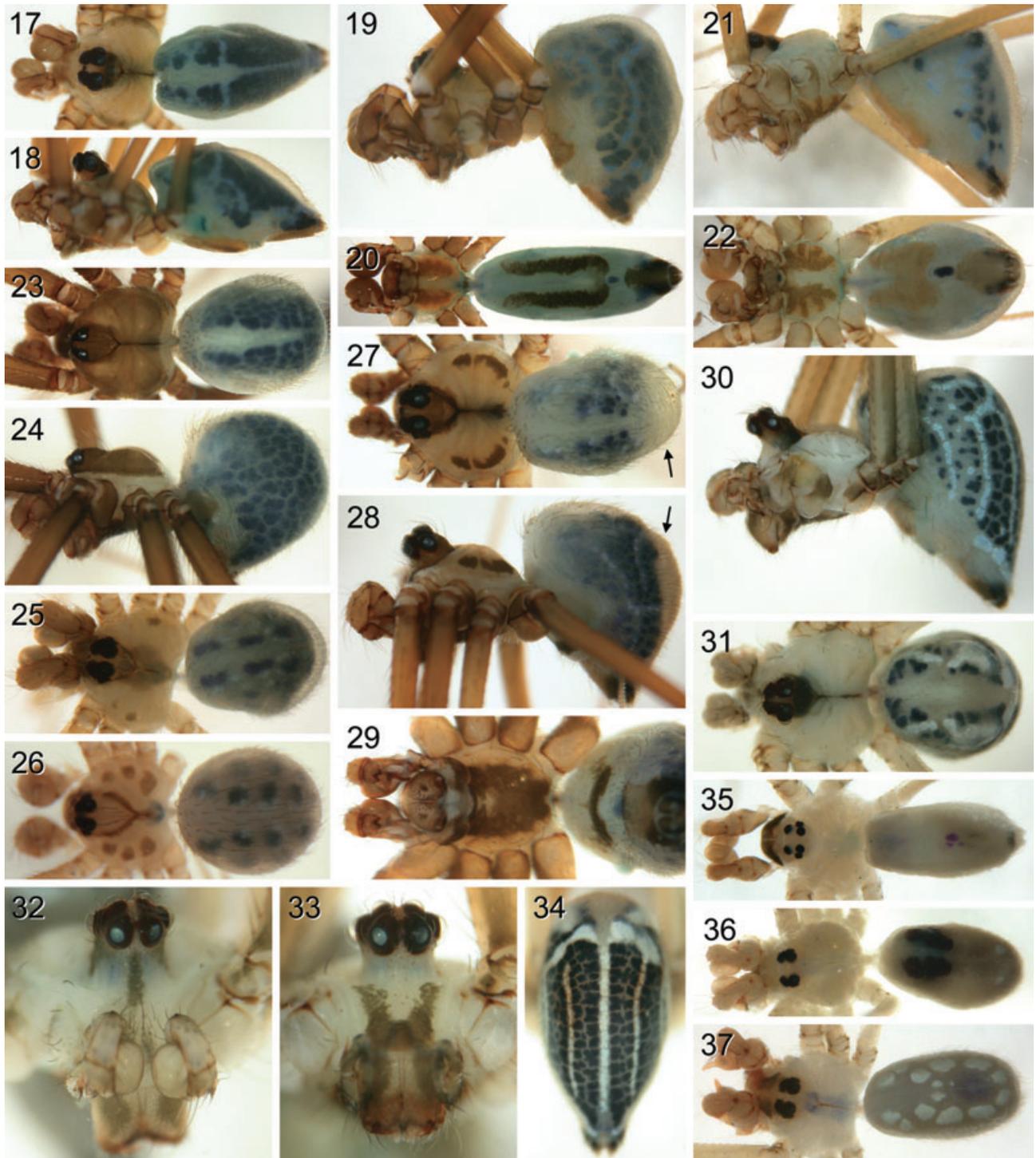
procurus with dark dorsal spine-like process (see also Fig. 94) and membranous structures distally, and bulb with large, weakly curved apophysis. Legs with spines in two ventral rows on femora 1 and 2 (–45–55 spines in each row on femur 1; 20–25 spines in each row on femur 2), some spines on elevated bases, retrolateral trichobothrium on tibia 1 at 8%; all femora with higher than usual density of short vertical hairs, but not very dense; curved hairs dorsally on tibiae and metatarsi 1–3; prolateral trichobothrium missing on tibia 1, but present on all other tibiae. Tarsus 1 with ~30 pseudosegments.

Variation: Tibia 1 in 53 other males: 5.8–8.8 (mean 7.3). Small males tend to have fewer and smaller spines on their femora; some males have curved hairs on tibiae only; some males also have white spots on their abdomen. The type is in poor condition, with legs fragmented, both palps and abdomen detached, and with legs 1 missing. Males from Loma Quita Espuela and Puerto Plata appear identical, but are smaller (tibia 1 in ten males, 5.0–6.4; mean, 5.5; cf. females from that locality); they are therefore only assigned tentatively. The material from Dajabón Prov. is assigned tentatively because the male cheliceral prominences are slightly more distal, the procurus tip differs slightly, and they are smaller (tibia 1: 5.1, 5.7).

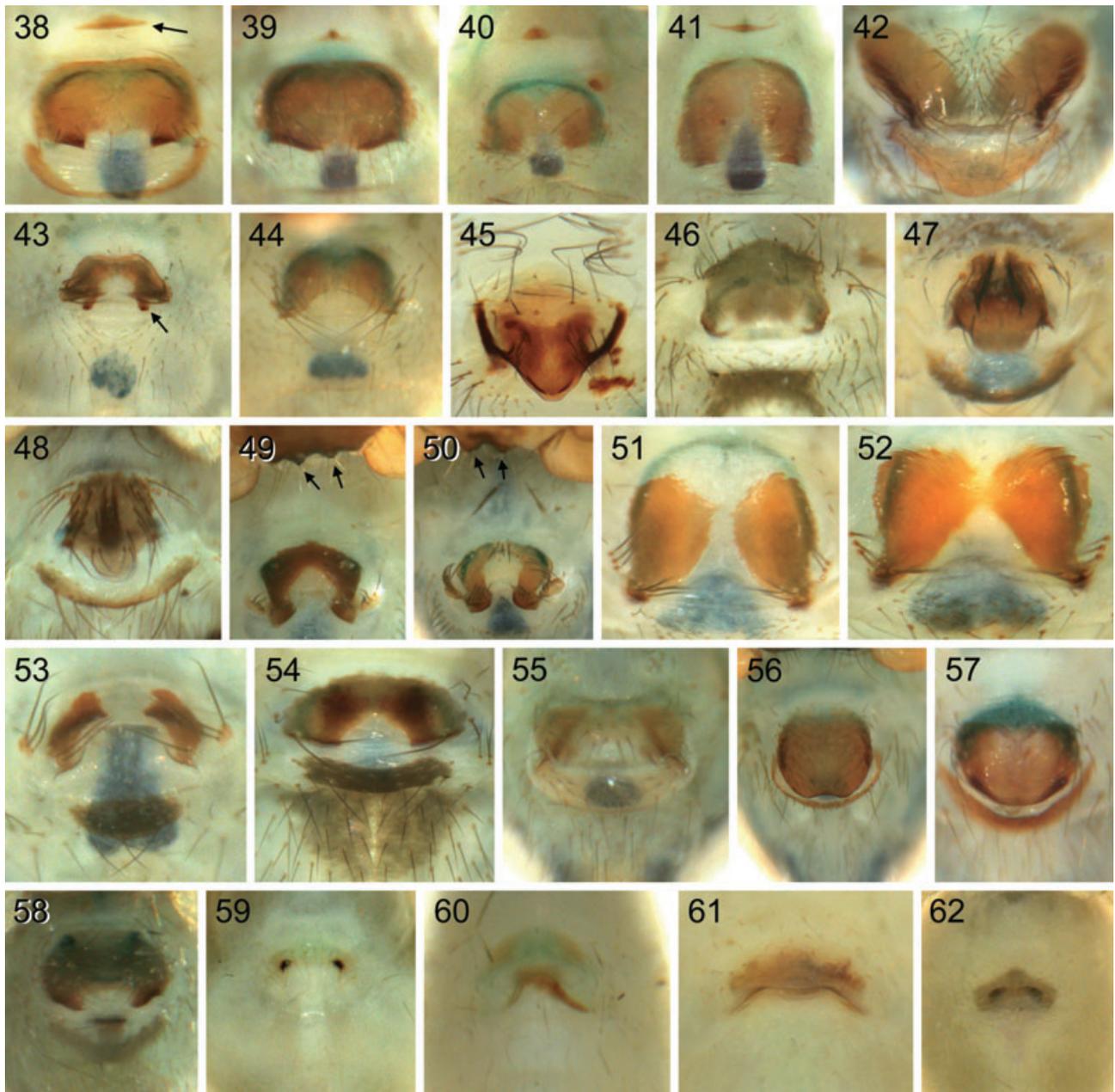
Female: In general similar to male, but with more distinctive brown lateral marks on clypeus. Tibia 1 in 37 females: 3.6–5.4 (mean 4.7). Epigynum, roughly rectangular, with posterior light area flanked by lateral sclerites (Fig. 38); frontally, a triangular sclerite; dorsal view as in Figures 63 and 126, with a prominent frontal membranous structure. Females from Loma Quita Espuela and Puerto Plata tend to be smaller: tibia 1 in 12 females: 3.5–4.3 (mean 3.95); in those from Loma Quita Espuela, the epigynum is slightly longer than usual. Females from Dajabón Prov. have extremely similar epigyna; tibia 1, 3.8 and 4.0.

Distribution and habitat: This species is widely distributed in the north-eastern Dominican Republic (Fig. 195). It was sometimes found to share its habitat with *M. kiskeya* sp. nov. (among vegetation), but lives closer to the ground, and also among rocks and under dead leaves.

Material examined: Dominican Republic: Samaná Prov., Sánchez, 1♂, holotype above; near Sánchez, degraded forest at road to Las Terrenas (19°14.5'N, 69°35.9'W), domed webs in vegetation, 290 m a.s.l., 11 November 2005 (B.A. Huber), 7♂ and 9♀ (ZFMK, DR 30); same data, 1♀, in pure ethanol (ZFMK, DR



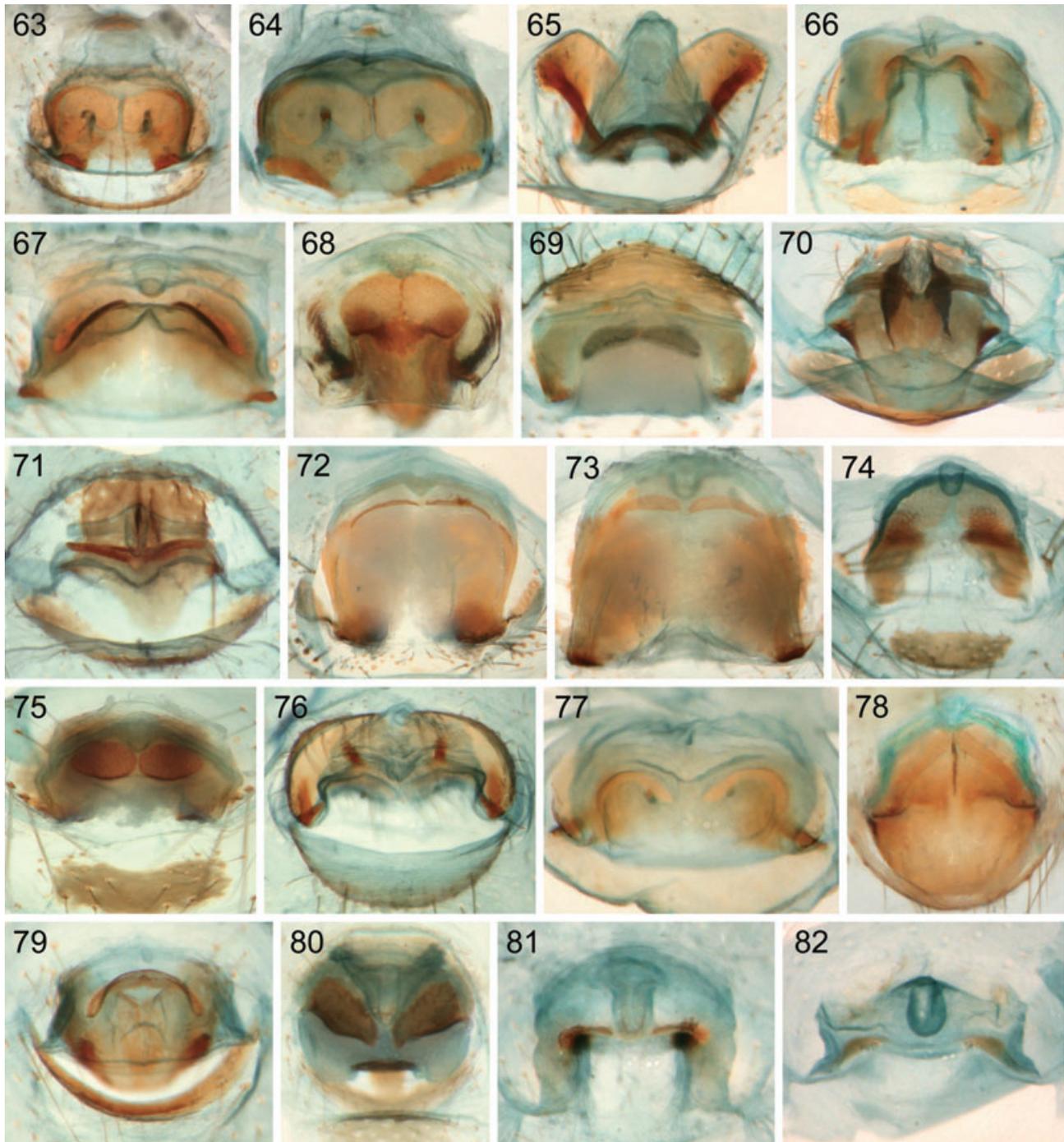
Figures 17–37. Habitus photos of males (except 33), showing typical and distinctive characters. 17, 18. *M. femoratus*. 19. *M. jima* sp. nov. 20. *M. kiskeya* sp. nov. 21, 22. *M. angulatus* sp. nov. 23, 24. *M. epepye* sp. nov. 25. *M. mango* sp. nov. 26. *M. cienaga* sp. nov. 27–29. *M. seguin* sp. nov. (arrows point to callus-like area). 30–34. *M. vittatus*. 35. *M. palvet* sp. nov. 36. *M. berac* sp. nov. 37. *M. paraiso* sp. nov.



Figures 38–62. Epigyna in ventral view. 38. *M. femoratus* (arrow points to frontal sclerite). 39. *M. jima* sp. nov. 40. *M. angulatus* sp. nov. 41. *M. kiskeya* sp. nov. 42. *M. toma* sp. nov. 43. *M. vittatus* (arrow points to distinctive posterior sclerite). 44. *M. makandal* sp. nov. 45. *M. fuscus*. 46. *M. epepye* sp. nov. 47. *M. seguin* sp. nov. 48. *M. roumaini* sp. nov. 49, 50. *M. enriquillo* sp. nov. from near Polo (49) and from south of Barahona (50) (arrows point to sternum apophyses). 51, 52. *M. tiburon* sp. nov. 53. *M. leprete* sp. nov. 54. *M. macaya* sp. nov. 55. *M. bachata* sp. nov. 56. *M. cuadro* sp. nov. 57. *M. pelejil* sp. nov. 58. *M. mango* sp. nov. 59. *M. berac* sp. nov. 60. *M. palvet* sp. nov. 61. *M. miri* sp. nov. 62. *M. paraiso* sp. nov.

100-30); degraded forest near Saltos de Limón (~19°16.6'N, 69°26.5'W), ~120 m a.s.l., in low vegetation, 11 November 2005 (B.A. Huber), 8♂, 7♀ and two juveniles (ZFMK, DR 33); same data, 1♂, 5♀ and one juvenile, in pure ethanol (ZFMK, DR 100-27); south of Las Gelaras (19°12.8'N, 69°13.1'W), forest

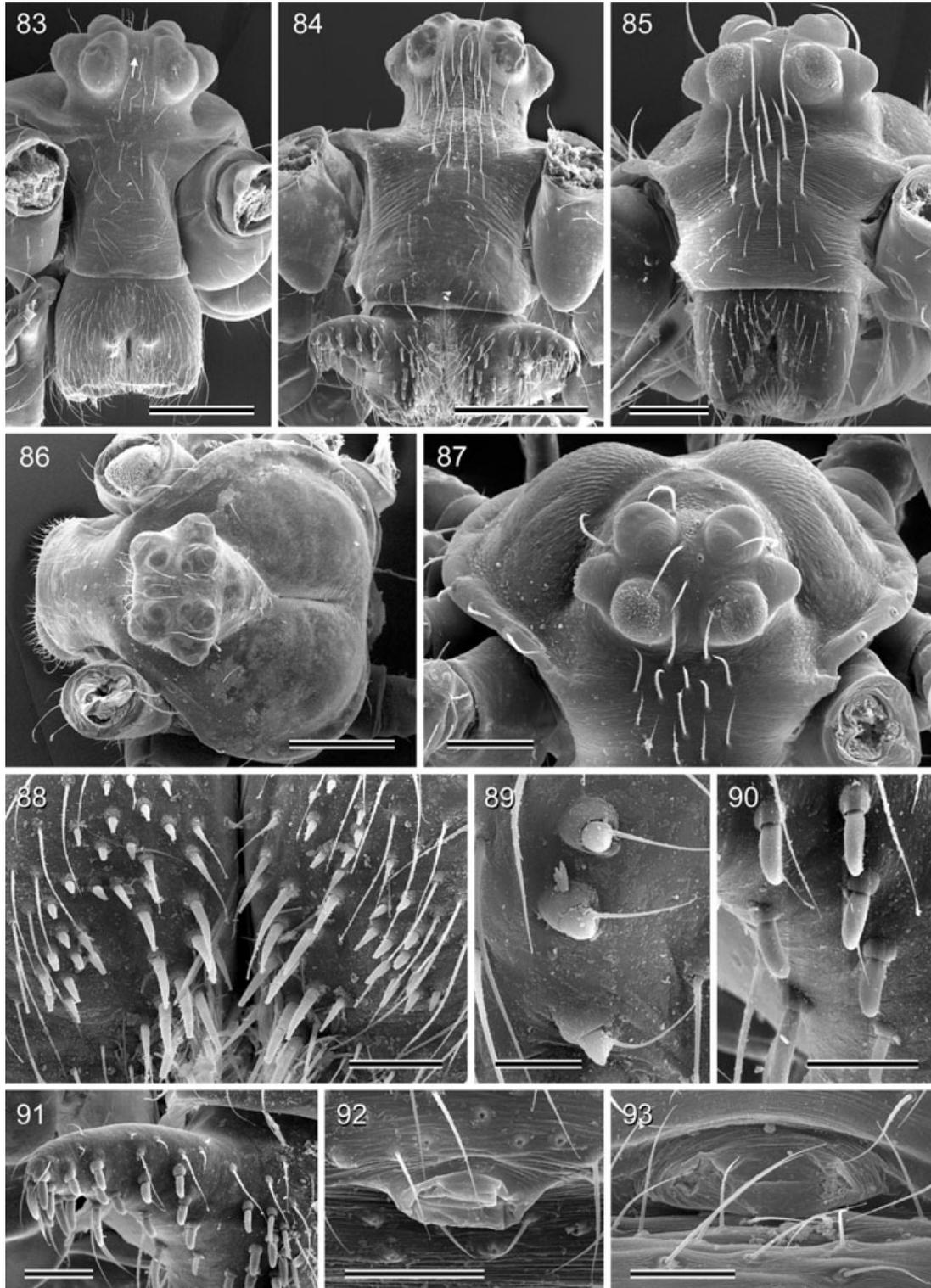
above rocks, low vegetation, near ground, 20 m a.s.l., 12 November 2005 (B.A. Huber), 11♂ and 7♀ (ZFMK, DR 36); same locality, 1♂, in pure ethanol, together with one juvenile of an unidentified species (*Modisimus* sp. 3; Table 4) (ZFMK, DR 100-33). María Trinidad Sánchez Prov., near La Entrada, forest above



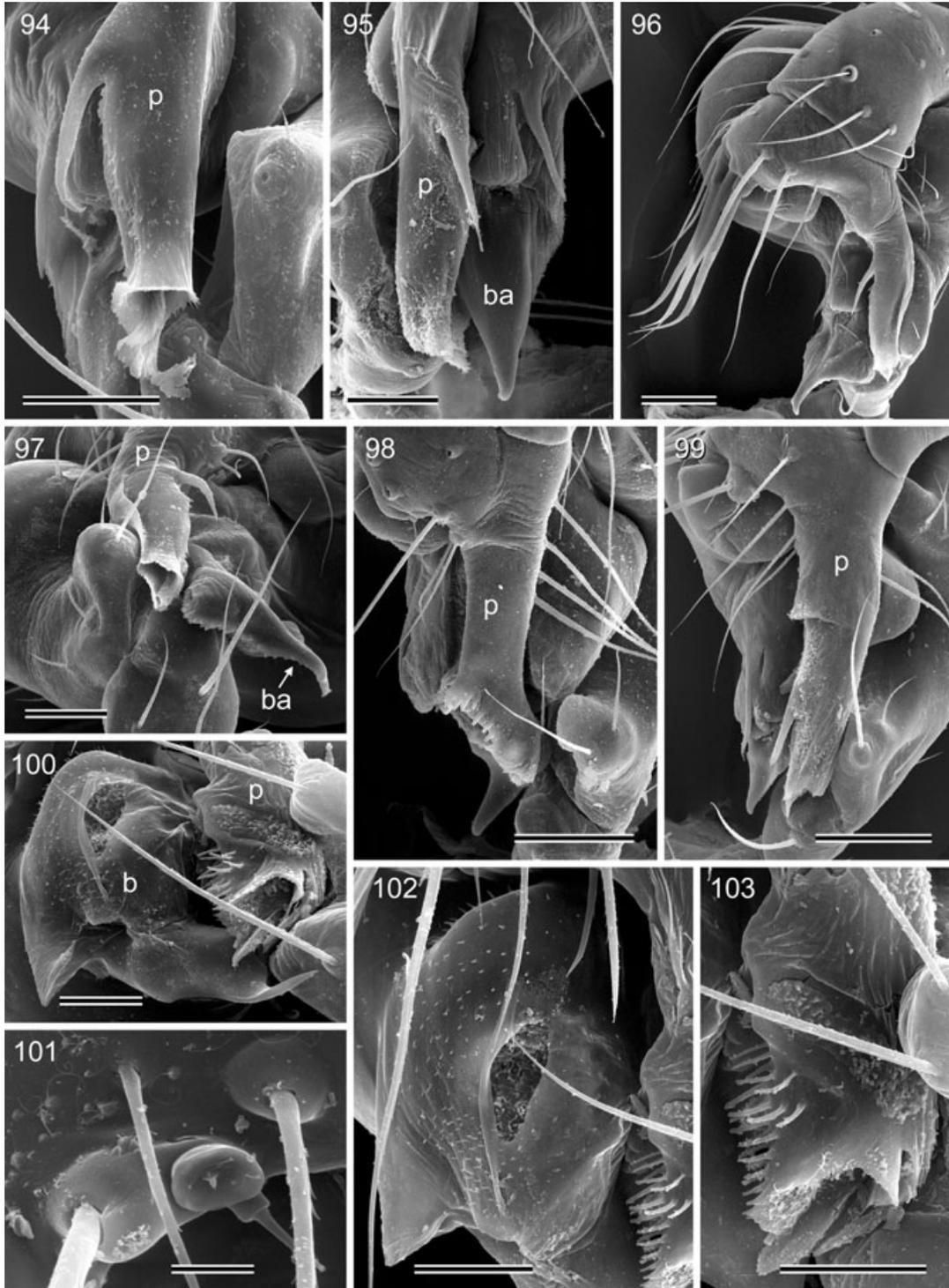
Figures 63–82. Cleared and stained epigyna in dorsal view. 63. *M. femoratus*. 64. *M. jima* sp. nov. 65. *M. toma* sp. nov. 66. *M. vittatus*. 67. *M. makandal* sp. nov. 68. *M. fuscus*. 69. *M. epepye* sp. nov. 70. *M. seguín* sp. nov. 71. *M. roumaini* sp. nov. 72. *M. enriquillo* sp. nov. 73. *M. tiburón* sp. nov. 74. *M. leprete* sp. nov. 75. *M. macaya* sp. nov. 76. *M. mariposas* sp. nov. 77. *M. bachata* sp. nov. 78. *M. cuadro* sp. nov. 79. *M. pelejil* sp. nov. 80. *M. mango* sp. nov. 81. *M. berac* sp. nov. 82. *M. miri* sp. nov.

rocks at Santuario de La Virgen (19°34.9'N, 69°54.0'W), 15 m a.s.l., 12 November 2005 (B.A. Huber), 6♂, 3♀ and one juvenile (ZFMK, DR 41). Monte Plata Prov., near Yamasá (18°45.9'N,

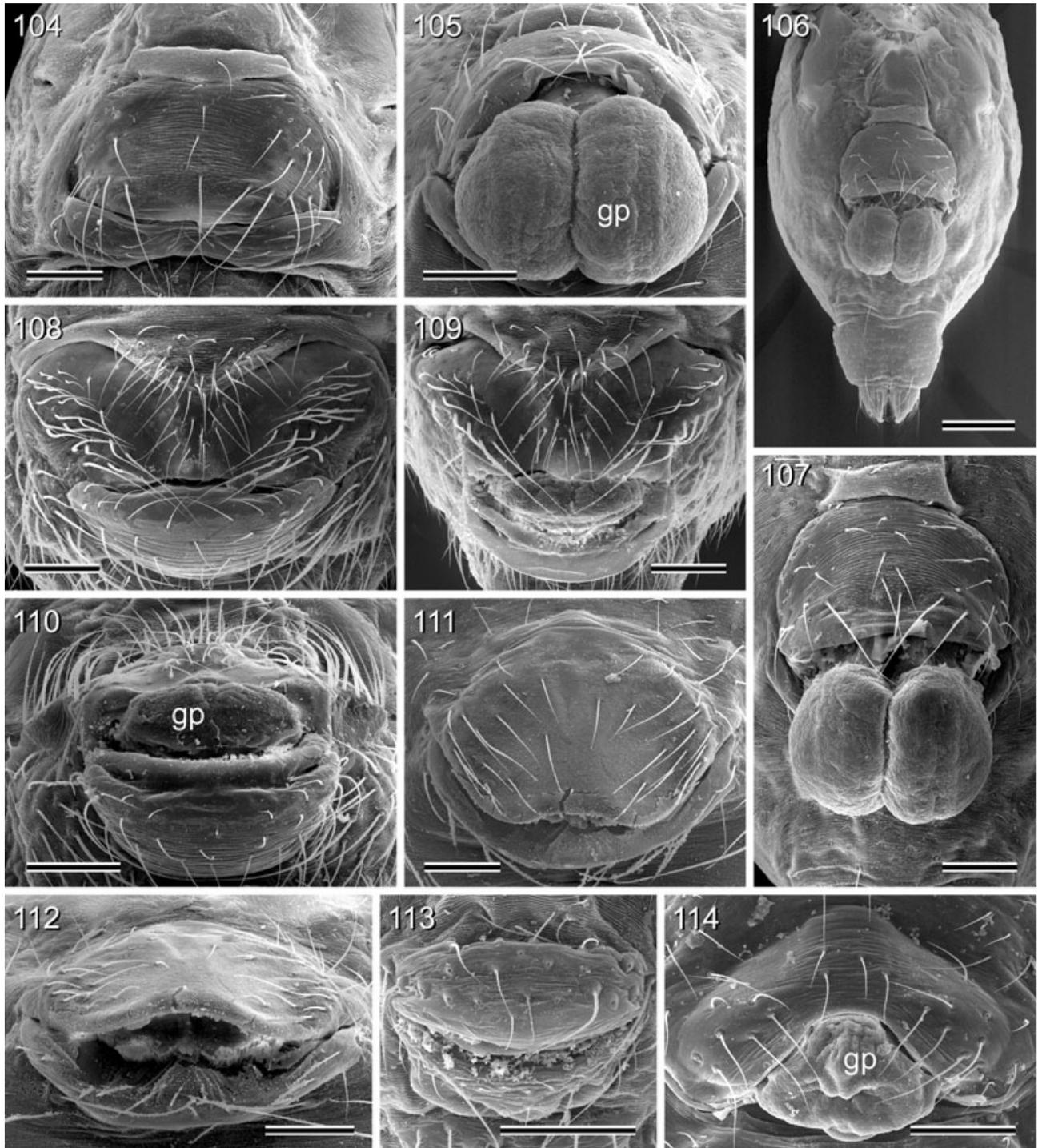
70°01.2'W), degraded forest along river, 70 m a.s.l., low vegetation, 20 November 2005 (B.A. Huber), 14♂, 3♀ and four juveniles (ZFMK, DR 84/85); same data, 1♀, in pure ethanol (ZFMK, DR 100-20); near Monte



Figures 83–93. SEM images of selected characters. 83–85. Male prosomata in frontal view: *M. femoratus* (83; arrow points to tiny anterior median eye, AME), *M. toma* sp. nov. (84), and *M. cienaga* sp. nov. (85). 86. Male prosoma, dorsal view (*M. kiskeya* sp. nov.). 87. Ocular area and carapace, frontodorsal view (*M. cienaga* sp. nov.). 88–91. Male cheliceral hairs: *M. seguin* sp. nov. (88), *M. palvet* sp. nov. (89), and *M. toma* sp. nov. (90, 91). 92, 93. Male gonopore, *M. cienaga* sp. nov. (92), *M. palvet* sp. nov. (93). Scale bars: 20 μ m (89); 40 μ m (90, 92, 93); 60 μ m (88, 91); 100 μ m (85, 87); 300 μ m (83, 84, 86).



Figures 94–103. SEM images of selected characters. 94. Left procurus, retrolateral view (*M. femoratus*). 95. Right procurus and distal bulb elements, retrolaterodorsal view (*M. kiskeya* sp. nov.). 96. Left palp, retrolateral view (*M. toma* sp. nov.). 97. Right procurus and distal bulb elements, distal view (*M. toma* sp. nov.). 98. Left procurus, retrolateral view (*M. seguin* sp. nov.). 99. Left procurus, retrolateral view (*M. cuadro* sp. nov.). 100. Right procurus and distal bulb elements, distal view (*M. cienaga* sp. nov.). 101. Palpal tarsal organ (*M. cienaga* sp. nov.). 102. Bulb with putative sperm duct opening (*M. cienaga* sp. nov.). 103. Left procurus tip, retrolateral view (*M. cienaga* sp. nov.). Abbreviations: b, genital bulb; ba, bulbular apophysis; p, procurus. Scale bars: 8 μm (101); 30 μm (100, 102, 103); 60 μm (94, 95, 97); 100 μm (96, 98, 99).



Figures 104–114. SEM images of selected characters. 104–107. Epigynum of *M. femoratus*, ventral view, without plug (104), ventroposterior view, with plug (105), and ventral views, with plug (106, 107). 108–110. Epigynum of *M. toma sp. nov.*, ventral view without plug (108), ventral view with plug (109), and ventroposterior view with plug (110). 111, 112. Epigynum of *M. cuadro sp. nov.*, ventral (111) and ventroposterior (112) views. 113, 114. Epigyna of *M. cienaga sp. nov.* (113) and *M. palvet sp. nov.* (114), ventral views. Abbreviation: gp, ‘genital plug’. Scale bars: 100 μm (104, 105, 107–114); 200 μm (106).

Plata (18°48.7'N, 69°47.1'W), degraded forest along river, 60 m a.s.l., near ground, 21 November 2005 (B.A. Huber), 4♂ and 1♀ (ZFMK, DR 91). Hato Mayor Prov., north of Manchado (18°50.2'N, 69°18.5'W), degraded forest near river, 150 m a.s.l., vegetation, 21 November 2005 (B.A. Huber), 2♂, 5♀ and four juveniles (ZFMK, DR 94); forest between Hato Mayor and Sabana de la Mar, 2 July 1935 (W. G. Hassler), 2 ♀ in poor condition (AMNH). El Seibo Prov., near Miches (18°56.8'N, 69°05.2'W), forest with plantations, ~300 m a.s.l., low vegetation, 22 November 2005 (B.A. Huber), 5♂, 5♀ and three juveniles (ZFMK, DR 99).

Assigned tentatively: Dajabón Prov., near El Pino (19°24.7'N, 71°29.9'W), degraded forest along river, 160 m a.s.l., 15 November 2005 (B.A. Huber), 1♂ and 2♀ (ZFMK, DR 54); south of Restauración (19°16.8'N, 71°42.1'W), degraded forest along brook, 630 m a.s.l., 16 November 2005 (B.A. Huber), 1♂ and one juvenile (ZFMK, DR 57). Puerto Plata Prov.: south of Puerto Plata, forest along path towards Isabel Torres National Park (19°46.4'N, 70°42.3'W), 350 m a.s.l., 14 November 2005 (B.A. Huber), 8♂ and 6♀ (ZFMK, DR 49); same data, 1♂ and 5♀, in pure ethanol, one of them sequenced and found to be considerably distant from *M. femoratus* (see *Modisimus* sp. 2 in Table 4) (ZFMK, DR 100–39); Puerto Plata, July–August 1941 (Hurst), 2♂ (MCZ 26.669). Duarte Prov., Reserva Científica Loma Quita Espuela at ~500 m a.s.l. (19°21.5'N, 70°09'W), 10 November 2005 (B.A. Huber), 2♂ and 6♀ (ZFMK, DR 25); same data, 4♀, in pure ethanol, one of them sequenced and found to be considerably distant from *M. femoratus* (see *Modisimus* sp. 1 in Table 4) (ZFMK, DR 100–23). '75 km N Santo Domingo', 17 July 1935 (Hassler), 2♂ and one juvenile (AMNH).

MODISIMUS JIMA HUBER & FISCHER SP. NOV.

(Figs 19, 39, 64, 127, 128, 195)

Type: Male holotype from near Jima (19°01.4'N, 70°28.8'W), Monseñor Nouel Prov., Dominican Republic; degraded forest at brook through plantation, ~700 m a.s.l., near ground, 8 November 2005 (B.A. Huber), in ZFMK (DR 12a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Medium-sized species with pair of small projections, with weakly modified hairs on male chelicerae (Fig. 128; similar to *M. femoratus* and *M. angulatus* sp. nov.), and distinctive epigynum (Fig. 39; similar to *M. femoratus* and *M. angulatus* sp. nov.).

Further distinguished from *M. femoratus* by shorter abdomen (Fig. 19), distinctive ventral notch on procurus (Fig. 127), bulb with more prominent dorsal apophysis (Fig. 127), cheliceral frontal projections more prominent, and different pattern on male genital area (shorter lateral arms); distinguished from *M. angulatus* sp. nov. by pattern on sternum (lateral border not broken), evenly curved abdomen dorsally, and male cheliceral projections slightly closer together.

Male (holotype): Total body length, 2.2; carapace width, 1.1. Leg 1: 20.4 (5.2 + 0.4 + 5.2 + 7.9 + 1.7); tibia 2, 3.4; tibia 3, 2.8; tibia 4, 3.1. Tibia 1 L/d: 44. Habitus as in Figure 19: carapace pale ochre-yellow, ocular area posteriorly brown, clypeus with pair of brown bands, sternum laterally brown, and whitish medially; legs light brown, tips of femora and tibiae light; abdomen bluish grey, with black spots dorsally and laterally, genital area and area in front of spinnerets brown. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 95 µm; PME diameter, 115 µm; PME–ALE, 125 µm; AME–AME, 25 µm; AME diameter, 20 µm. Sternum wider than long (0.65/0.45), unmodified. Chelicerae as in Figure 128, very similar to *M. femoratus*, but frontal apophyses slightly more prominent in lateral view. Palps as in Figure 127, very similar to *M. femoratus*, but procurus with more distinctive notch ventrally, and bulb with more prominent dorsal apophysis. Legs with short spines on femur 1 (two rows, of ~30 and 25 spines each) and femur 2 (two rows, of ~20 each), and many short vertical hairs on all femora; curved hairs on tibiae 1–3; retrolateral trichobothrium on tibia 1 at 9%; prolateral trichobothrium missing on tibia 1, present on other tibiae; tarsus 1 with ~25 pseudosegments.

Variation: Some males with subdistal darker rings on femora (indistinct also on tibiae). Tibia 1 in 13 males: 4.9–6.0 (mean 5.4).

Female: In general similar to male, with rings on legs often distinct; tibia 1 in six females: 3.4–4.0, mean 3.8. Epigynum, similar to *M. femoratus*, but posterior border different (Fig. 39); dorsal view very similar to *M. femoratus* (Fig. 64).

Distribution: Known from several localities in north-central Dominican Republic (Fig. 195).

Material examined: Monseñor Nouel Prov., near Jima, 1♂ holotype above; same data, 2♂, 2♀ and one juvenile (ZFMK, DR 12). Duarte Prov., Reserva Científica Loma Quita Espuela, at ~500 m a.s.l. (19°21.5'N, 70°09'W), 10 November 2005 (B.A.

Huber), 1♀ (ZFMK, DR 26). Espaillat Prov., near Jamao al Norte (19°38.6'N, 70°26.9'W), forest along river, 40 m a.s.l., from low vegetation and near the ground, 13 November 2005 (B.A. Huber), 4♂ and 1♀ (ZFMK, DR 46). Puerto Plata Prov., north of La Cumbre (19°34.3'N, 70°38.0'W), degraded forest near plantations, 600 m a.s.l., 13 November 2005 (B.A. Huber), 2♂ and 2♀ (ZFMK, DR 44). South of Puerto Plata, forest along path towards Isabel Torres National Park (19°46.4'N, 70°42.3'W), 350 m a.s.l., 14 November 2005 (B.A. Huber), 3♂ and 1♀ (ZFMK, DR 49a); La Vega Prov., 10 km north-east of Jarabacoa Hotel Montana, forest [~19°10.9'N, 70°34.8'W], 550 m a.s.l., 18 July–4 August 1995 (S. & J. Peck), 4♂ (AMNH).

MODISIMUS ANGULATUS HUBER & FISCHER
SP. NOV.

(Figs 21, 22, 40, 129, 195)

Type: Male holotype from near La Toma (18°27.5'N, 70°07.2'W), San Cristóbal Prov., Dominican Republic; degraded forest, 70 m a.s.l., near ground, 7 November 2005 (B.A. Huber), in ZFMK (DR 3).

Etymology: The species name refers to the dorsally angular abdomen.

Diagnosis: Medium-sized species with pair of small projections on male chelicerae, provided with weakly modified hairs (Fig. 129; similar to *M. femoratus* and *M. jima* sp. nov.), epigynum very similar to *M. femoratus*. Distinguished from *M. femoratus* and *M. jima* sp. nov. by pattern on sternum (lateral borders of brown marks disrupted; Fig. 22), dorsally angular abdomen (Fig. 21), male cheliceral projections slightly wider apart (Fig. 129), and clypeus pattern in males indistinct or even missing.

Male (holotype): Total length, 2.3; carapace width, 0.9. Leg 1, 20.0 (4.9 + 0.4 + 4.9 + 8.2 + 1.6); tibia 2, 3.0; tibia 3, 2.4; tibia 4, 2.8. Tibia 1 L/d: 55. Habitus as in Figures 21 and 22, carapace pale ochre-yellow, ocular area darker posteriorly, clypeus with very indistinct pair of brown marks, sternum laterally brown, with a distinctively disrupted lateral pattern (Fig. 22), and whitish medially; legs light brown, and femora and tibiae with light tips and dark subdistal rings; abdomen pale greenish grey, with black spots dorsally and laterally, genital area and area in front of spinnerets light brown. Ocular area elevated; thoracic furrow distinct. PME–PME, 70 µm; PME diameter, 90 µm; PME–ALE, 105 µm; AME–AME, 10 µm; AME diameter, 15 µm. Sternum wider than long (0.6/0.4), unmodified. Chelicerae as in Figure 129, very similar

to *M. femoratus* and *M. jima* sp. nov., but frontal apophyses slightly more widely spaced. Palps very similar to *M. femoratus* (cf. Fig. 124). Legs with short spines on femur 1 (two rows, of ~45 and 15 spines each) and femur 2 (two rows, of ~35 spines each), with many short vertical hairs on all femora; curved hairs on tibiae and metatarsi 2 and 3; retrolateral trichobothrium on tibia 1 at 11%; prolateral trichobothrium missing on tibia 1, present on other tibiae; tarsus 1 with ~25 pseudosegments.

Variation: Tibia 1 in three other males: 4.7–4.9.

Female: In general similar to male; tibia 1 in ten females 3.0–3.4, mean 3.2. Epigynum, similar *M. femoratus* (Fig. 40); dorsal view not visibly different from *M. femoratus* (cf. Figs 63, 126).

Distribution and habitat: Known from two localities in the south-central Dominican Republic (Fig. 195). In the Santo Domingo botanical garden, this species was found in low vegetation and under the roof of a shelter.

Material examined: Dominican Republic: San Cristóbal Prov., near La Toma, 1♂, holotype above, together with 1♀ (ZFMK, DR 3). Distrito Nacional, Santo Domingo, Jardín Botánico (18°29.7'N, 69°57.2'W), forest along brook, 50 m a.s.l., low vegetation, near ground, 27 November 2005 (B.A. Huber), 3♂, 7♀ and one juvenile (ZFMK, DR 110); Santo Domingo, Jardín Botánico, under roof of shelter, 18–22 March 1984 (H. & L. Levi), 1♂ and 2♀ (MCZ 26.666). 'Boca Caica' (= Distrito Nacional: Boca Chica?) 5–7 March 1955 (A. M. Nadler), 4♀ (AMNH).

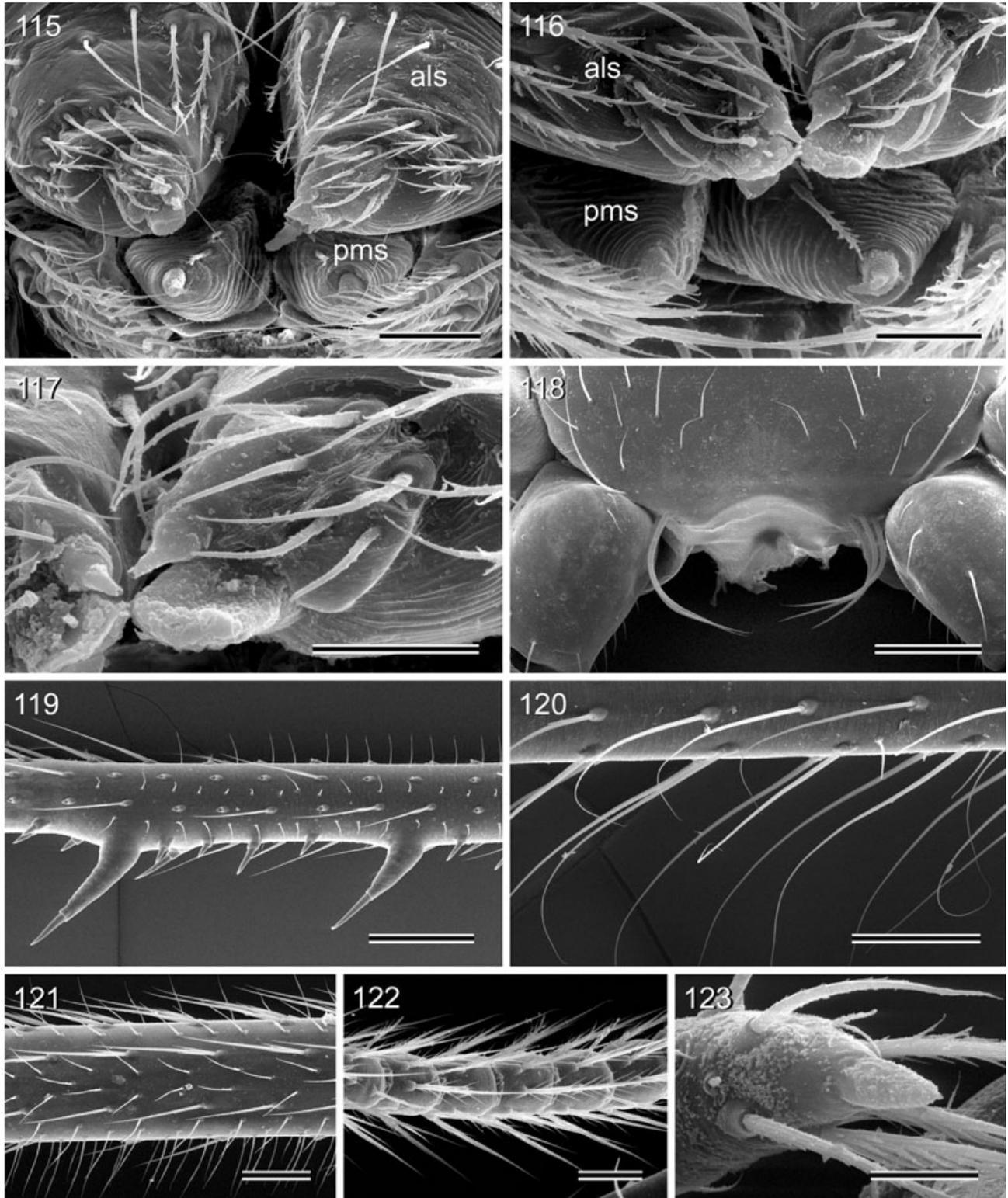
MODISIMUS KISKEYA HUBER & FISCHER SP. NOV.

(Figs 20, 41, 86, 95, 116, 117, 119, 120, 130–132, 196)

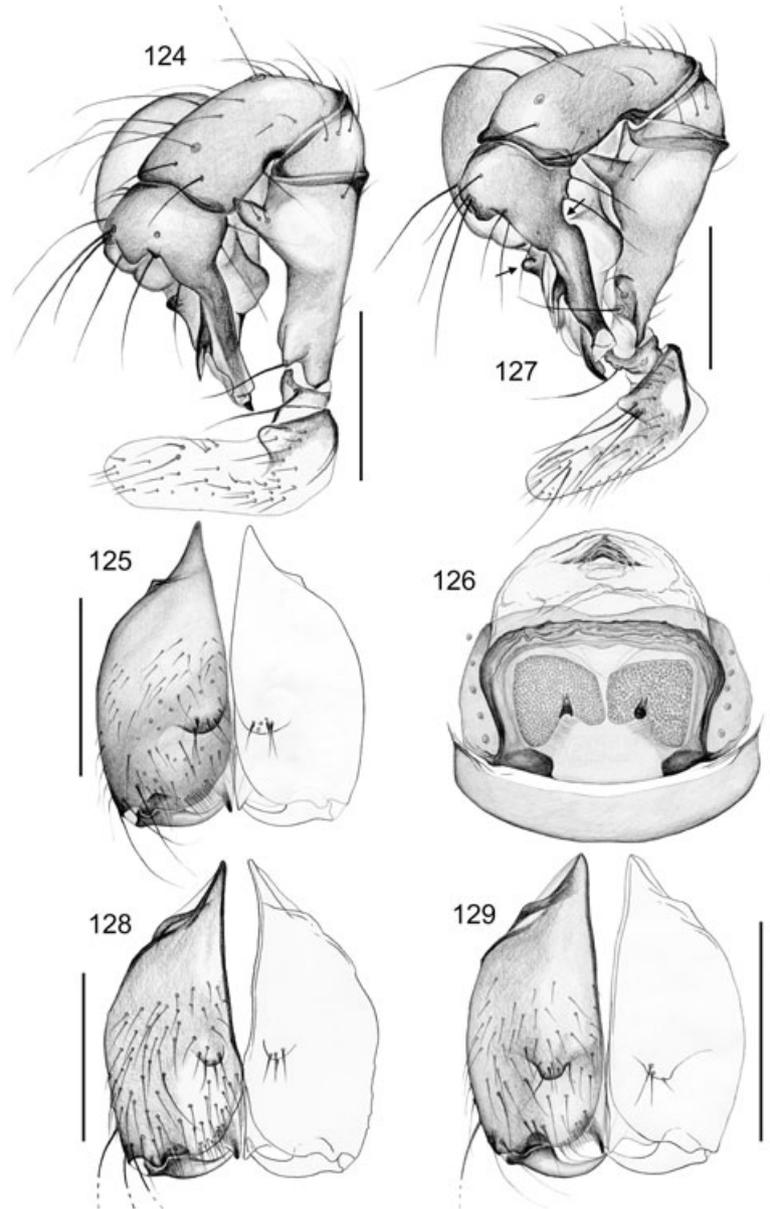
Type: Male holotype from near La Ciénaga (~19°03'N, 70°53'W), La Vega Prov., Dominican Republic; path along river, ~1100 m a.s.l., domed web in vegetation, 9 November 2005 (B.A. Huber), in ZFMK (DR 20a).

Etymology: The species name refers to Kiskeya (Quisqueya), an ancient name for Hispaniola; it is used as a noun in apposition.

Diagnosis: Medium-sized species, easily distinguished from Hispaniolan congeners by long abdomen (Fig. 20), also by pattern of modified hairs on male chelicerae (Fig. 131), and shape of epigynum (Fig. 41).



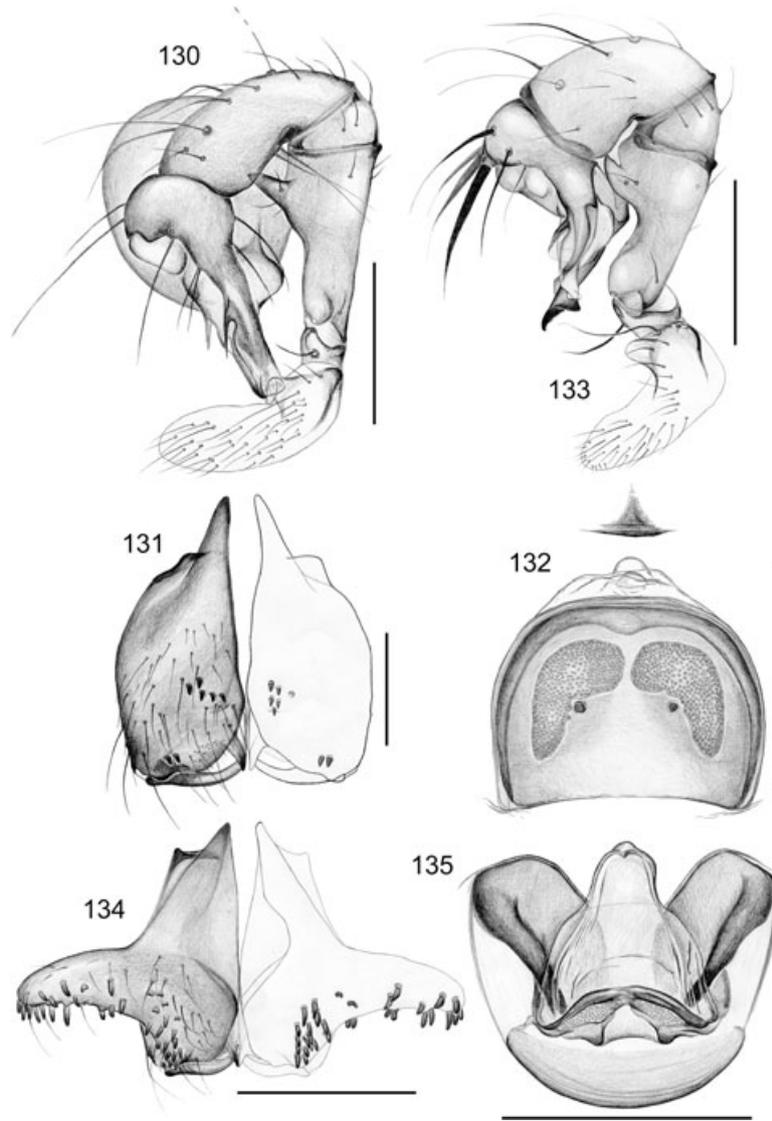
Figures 115–123. SEM images of selected characters. 115–117. Spinnerets of *M. palvet* sp. nov. (115) and *M. kiskeya* sp. nov. (116, 117). 118. Modified hairs on female sternum of *M. toma* sp. nov. 119. Spines on male femur 2 in *M. kiskeya* sp. nov. 120. Curved hairs on male leg of *M. kiskeya* sp. nov. 121. Vertical hairs on male leg femur in *M. palvet* sp. nov. 122. Pseudosegments on tarsus 2 in *M. palvet* sp. nov. 123. Female palp tip of *M. toma* sp. nov. Abbreviations: als, anterior lateral spinneret; pms, posterior median spinneret. Scale bars: 20 μm (116, 117, 123); 30 μm (115, 122); 50 μm (121); 100 μm (118, 120), 200 μm (119).



Figures 124–129. Diagnostic characters. 124–126. *Modisimus femoratus*. 124. Left palp, retrolateral view. 125. Male chelicerae, frontal view. 126. Cleared epigynum, dorsal view. 127, 128. *Modisimus jima* sp. nov. 127. Left palp, retrolateral view (arrows point to ventral notch on procurus and dorsal apophysis on bulb). 128. Male chelicerae, frontal view. 129. *Modisimus angulatus* sp. nov., male chelicerae, frontal view. Scale bars: 0.3 mm.

Male (holotype): Total length, 3.1; carapace width, 1.0. Leg 1, 31.7 (7.7 + 0.4 + 7.6 + 13.5 + 2.5); tibia 2, 4.5; tibia 3, 3.5; tibia 4, 4.0. Tibia 1 L/d: 80. Habitus as in Figure 20, carapace pale ochre-yellow to whitish, with dark median line and wider dark band, visible through cuticle; ocular area posteriorly laterally brown, clypeus mostly without pattern, only distally light brown; sternum medially pale ochre-yellow, laterally wide brown bands (Fig. 20); legs light brown, tips of femora and tibiae lighter, very indistinct

darker rings subdistally on femora and tibiae; abdomen bluish grey with black spots dorsally, arranged in two bands, widening posteriorly, pale bluish spots dorsomedially and laterally, and genital area with pair of long brown bands laterally (Fig. 20). Ocular area strongly elevated; thoracic furrow distinct (Fig. 86). PME–PME, 95 µm; PME diameter, 95 µm; PME–ALE, 105 µm; AME–AME, 10 µm; AME diameter, 20 µm. Sternum wider than long (0.7/0.5), unmodified. Chelicerae with about five modified hairs



Figures 130–135. Diagnostic characters. 130–132. *Modisimusiskeya* sp. nov. 130. Left palp, retrolateral view. 131. Male chelicerae, frontal view. 132. Cleared epigynum, dorsal view. 133–135. *Modisimustoma* sp. nov. 133. Left palp, retrolateral view. 134. Male chelicerae, frontal view. 135. Cleared epigynum, dorsal view. Scale bars: 0.3 mm.

proximally, and two modified hairs near fang joint (Fig. 131). Palps as in Figure 130, coxa with retrolateral apophysis, femur with proximal flap retrolaterally and distal apophysis ventrally; procurus with dorsal spine-like process (Fig. 95) and distal membranous structures, bulb with long apophysis. Legs with only about four weak spines ventrally on femur 1, but strong spines in two ventral rows on femur 2, with ~20 in the prolateral row, ten in the retrolateral row, and a few distal spines on very high bases (Fig. 119); many short vertical hairs on all femora; curved hairs on all tibiae and metatarsi, especially dorsally; retrolateral trichobothrium on tibia 1 at 6%; prolateral trichobothrium missing on tibia 1, present on other tibiae; tarsus 1 with ~40 pseudosegments.

Variation: Smaller males with weaker and fewer spines on femur 2; a small male from 10 km north-east of Jarabacoa lacks the characteristic spines on femur 2, but its chelicerae and palps appear to be identical; some males also with a few weak spines on femur 3; modified hairs on chelicerae vary slightly in number and size. Tibia 1 in 39 other males: 6.5–8.0 (mean 7.3).

Female: In general similar to male, abdomen shorter, dark rings on legs more distinct, clypeus with small brown mark distally; tibia 1 in 40 females: 3.9–5.3 (mean 4.6). Epigynum, simple externally (Fig. 41), with a pair of small dark sclerites visible through cuticle; dorsal view as in Figure 132, with large pore plates.

Distribution and habitat: Widely distributed in the central Dominican Republic (Fig. 196). In contrast to most Hispaniolan congeners, this species is typically found higher in the vegetation, up to about 2 m above ground. Only the leaf-dwelling species and *M. vittatus* occur at similar levels.

Material examined: Dominican Republic: La Vega Prov., 1♂, holotype above; same data, 8♂ and 9♀ (ZFMK, DR 20); same data, 1♂ and 3♀, in pure ethanol (ZFMK, DR 100-14); near La Ciénaga, path to Los Tablonés (19°03.5'N, 70°53.0'W), ~1200 m a.s.l., 8 November 2005 (B.A. Huber), 4♂ and 2♀ (ZFMK, DR 15); 10 km north-east Jarabacoa Hotel Montana [19°10.9'N, 70°34.8'W], forest, 550 m a.s.l., 18 July–4 August 1995 (S. & J. Peck), 1♂ (AMNH). San Cristóbal Prov., degraded forest near La Toma (18°27.5'N, 70°07.2'W), 70 m a.s.l., domed webs in vegetation, 7 November 2005 (B.A. Huber), 4♂, 7♀ and one juvenile (ZFMK, DR 2); same data, 2♀, in pure ethanol (ZFMK, DR 100-4); Borbon, Cuevas Pomier, Cueva La Ligua, 13 July 1995 (S. & J. Peck), 1♂ #95-25 (part), (AMNH). Monseñor Nouel Prov., degraded forest at brook through plantation near Jima (19°01.4'N, 70°28.8'W), ~700 m a.s.l., domed webs in vegetation, 8 November 2005 (B.A. Huber), 3♂ and 2♀ (ZFMK, DR 10); same data, 1♀, in pure ethanol (ZFMK, DR 100-9). Monte Plata Prov., near Yamasá (18°45.9'N, 70°01.2'W), degraded forest along river, 70 m a.s.l., domed webs in vegetation, 20 November 2005 (B.A. Huber), 15♂ and 11♀ (ZFMK, DR 82/83); same data, 2♂, in pure ethanol (ZFMK, DR 100-17); near Monte Plata (18°48.7'N, 69°47.1'W), degraded forest along river, 60 m a.s.l., in vegetation, 21 November 2005 (B.A. Huber), 2♂ and 1♀ (ZFMK, DR 90). Hato Mayor Prov., north of Manchado (18°50.2'N, 69°18.5'W), degraded forest near river, 150 m a.s.l., vegetation, 21 November 2005 (B.A. Huber), 3♂, 7♀ and one juvenile (ZFMK, DR 93). Distrito Nacional: Santo Domingo, Jardín Botánico (18°29.7'N, 69°57.2'W), forest along brook, 50 m a.s.l., domed webs in vegetation, 27 November 2005 (B.A. Huber), 8♂, 13♀ and one juvenile (ZFMK, DR 109); Jardín Botánico, 18–22 March 1984 (H. & L. Levi), 1♀ (MCZ).

MODISIMUS TOMA HUBER & FISCHER SP. NOV.

(Figs 42, 65, 84, 90, 91, 96, 97, 108–110, 118, 123, 133–135, 196)

Type: Male holotype from near La Toma (18°27.5'N, 70°07.2'W; ~70 m a.s.l.), San Cristóbal Prov., Dominican Republic; degraded forest, under dead leaves on ground, 7 November 2005 (B.A. Huber), in ZFMK (DR 4a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Medium-sized species, easily distinguished from known congeners by large male cheliceral apophyses (Figs 91, 134), strong spines on male cymbium (Figs 96, 133), and frontally diverging epigynal sclerites (Fig. 42).

Male (holotype): Total length, 2.1; carapace width, 1.0. Leg 1: 16.6 (4.1 + 0.3 + 4.2 + 6.6 + 1.4); tibia 2, 2.7; tibia 3, 2.1; tibia 4, 2.6. Tibia 1 L/d: 47. Habitus similar to *M. jima* sp. nov. (cf. Fig. 19), carapace pale ochre-yellow, ocular area basally brown posteriorly, clypeus light brown with lighter median band, and sternum light brown, lighter medially; legs pale ochre-yellow; abdomen bluish grey, with black spots dorsally and laterally, genital area light brown. Ocular area strongly elevated (Fig. 84); thoracic furrow distinct. PME–PME, 70 µm; PME diameter, 90 µm; PME–ALE, 95 µm; AME–AME, 10 µm; AME diameter, 15 µm. Sternum wider than long (0.6/0.4), unmodified. Chelicerae with distinctive pair of lateral apophyses, carrying many modified club-shaped hairs (Figs 90, 91, 134). Palps as in Figure 133, coxa with retrolateral apophysis, femur with proximal flap retrolaterally, and distal apophysis ventrally; cymbium with strong spines; procurus with dorsal spine-like process and distal membranous structures (Fig. 97), bulb with long apophysis (Figs 97, 133). Legs without spines, many short vertical hairs dorsally on all femora; curved hairs dorsally on tibiae 1 and 2; retrolateral trichobothrium on tibia 1 at 14%; prolateral trichobothrium missing on tibia 1, present on other tibiae; tarsus 1 with ~25 pseudosegments.

Variation: Some males with fairly distinct darker rings on legs: distally on femora (preceded by whitish ring), and proximally and distally on tibiae (also bordered by whitish rings); some males with rather greenish abdomen. Tibia 1 in 13 other males: 4.0–5.2 (mean 4.4).

Female: In general similar to male, rings on legs more distinct; sternum with a bundle of between two and four strong, long hairs on each side posteriorly (Fig. 118). Tibia 1 in 12 females: 2.4–3.0 (mean 2.8). Epigynum, with distinctive pair of brown plates converging posteriorly (Figs 42, 108); dorsal view as in Figures 65, 135, with large membranous median structure.

Distribution and habitat: Known from three localities in the southern and central Dominican Republic (Fig. 196; Cuevas Pomier and La Toma are repre-

sented by a single mark in Fig. 196). Near La Toma, this species was found under dead curved leaves on the ground.

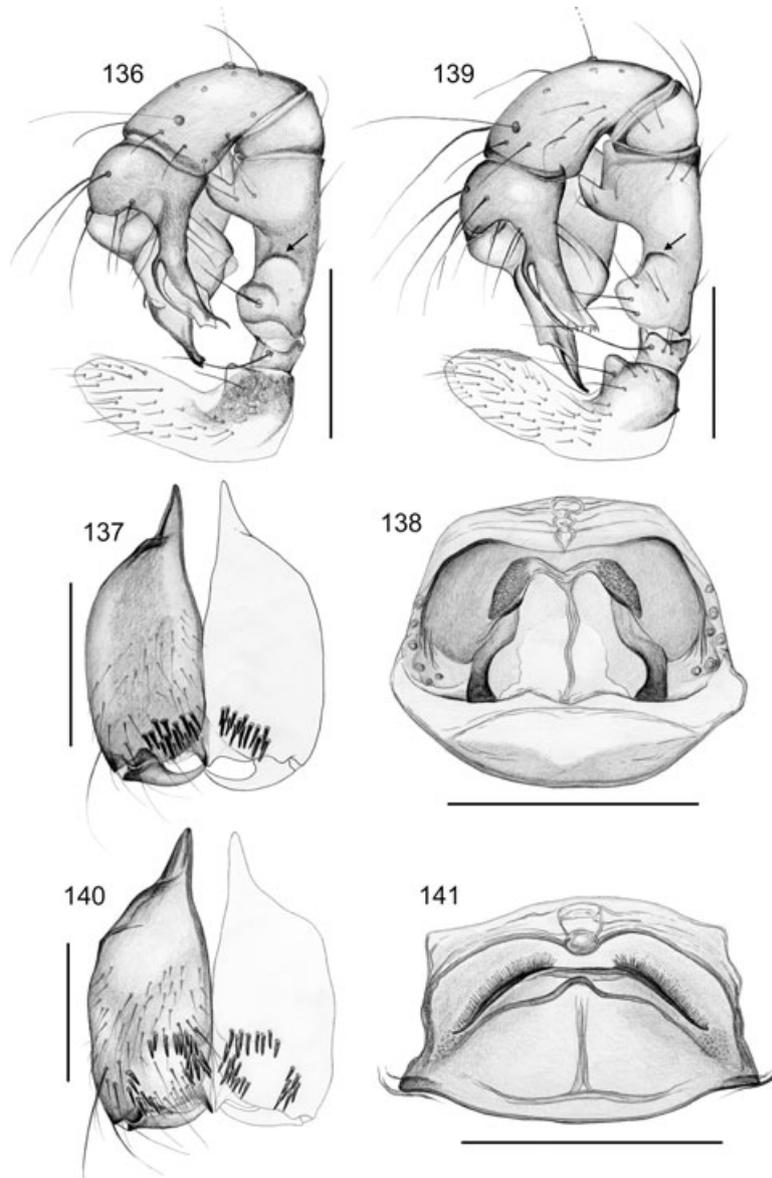
Material examined: Dominican Republic: San Cristóbal Prov., near La Toma, 1♂, holotype above; same data, 6♂ and 12♀ (ZFMK, DR 4); same data, 2♂ and 2♀, in pure ethanol (ZFMK, DR 100-1). Borbon, Cuevas Pomier [$\sim 18^{\circ}28'N$, $70^{\circ}08'W$], tropical deciduous forest, 200 m a.s.l., 13–28 July 1995 (S. & J. Peck), 10♂ (AMNH, #95-23); same data, but 28

July–5 August 1995, 4♂ and 1♀ (AMNH, #95-47). La Vega Prov., 10 km north-east of Jarabacoa Hotel Montana [$19^{\circ}10.9'N$, $70^{\circ}34.8'W$], forest, 550 m a.s.l., 18 July–4 August 1995 (S. & J. Peck), 1♂ (AMNH, #95-30).

MODISIMUS VITTATUS BRYANT, 1948

(Figs 5, 13, 30–34, 43, 66, 136–138, 197)

Modisimus vittatus Bryant, 1948: 370–371, figures 40, 43, 44.



Figures 136–141. Diagnostic characters. 136–138. *Modisimus vittatus*. 136. Left palp, retrolateral view (arrow points to 'step' on femur). 137. Male chelicerae, frontal view. 138. Cleared epigynum, dorsal view. 139–141. *Modisimus makandal* sp. nov. 139. Left palp, retrolateral view (arrow points to 'step' on femur). 140. Male chelicerae, frontal view. 141. Cleared epigynum, dorsal view. Scale bars: 0.3 mm.

Types: Male holotype (together with one juvenile) from Port-au-Prince, Dept Ouest, Haiti; with labels 'Haiti; Port-au-Prince, 5 Sept. 1934 Darlington' and '*Modisimus vittatus* Bryant, ♂ holotype B.0021', in MCZ, examined. Female 'allotype', with labels 'Haiti; hills near Port-au-Prince – 2000 ft., 2 Oct. 1934, P. J. Darlington' and '*Modisimus vittatus* Bryant, ♀ allotype. B.0021', in MCZ, examined.

Diagnosis: Medium-sized species with very high eye turret (Figs 30, 32, 33), male chelicerae with compact patches of modified hairs distally (Fig. 137), epigynum distinctive, with pair of small posterior sclerites (Fig. 43), and male clypeus with only one median dark line (Fig. 32); otherwise, similar to *M. makandal* sp. nov. Also very similar to *M. elevatus* from Cuba (same cheliceral armature), which differs mainly by shape of epigynum and short, paired marks on male clypeus.

Male (Port-au-Prince, Oloffson): Total length, 2.5; carapace width, 1.3. Leg 1: 28.4 (7.5 + 0.5 + 7.2 + 11.7 + 1.5); tibia 2, 4.7; tibia 3, 3.7; tibia 4, 4.2. Tibia 1 L/d: 54. Habitus as in Figures 30–32, carapace pale ochre-white, ocular area posteriorly blackish, clypeus with median brown stripe (Fig. 32); sternum with two wide brown longitudinal bands, and whitish medially; legs light brown, tips of femora and tibiae whitish, darker rings on femora and tibiae subdistally, with patellae also darker; abdomen bluish grey, dorsally, laterally, and especially posteriorly, densely covered with black spots grouped by distinctive lines made of white spots (Fig. 34); with dark bluish mark ventrally, between genital area and spinnerets. Ocular area strongly elevated, with several stronger hairs on top; thoracic furrow distinct. PME–PME, 80 µm; PME diameter, 90 µm; PME–ALE, 115 µm; AME very tiny, lenses not clearly visible in dissecting microscope, without pigment. Sternum wider than long (0.7/0.4), unmodified. Chelicerae with ~15 strong modified hairs in a pair of distal patches (Fig. 137). Palps as in Figure 136, coxa with light retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses, with distinctive retrolateral 'step'; procurus with dark dorsal spine-like process and membranous structures distally, bulb with large, weakly curved apophysis, and small black curved spine, proximally on apophysis. Legs with spines in two ventral rows on femora 1 and 2 (~15 and 35 spines on femur 1; 10 and 20 spines on femur 2), most spines on slightly elevated bases, with retrolateral trichobothrium on tibia 1 at 8%; all of the femora with higher than usual density of short vertical hairs, especially distally; curved hairs dorsally on tibiae and metatarsi 1–3; prolateral trichobothrium missing on

tibia 1, present on all other tibiae. Tarsus 1 with ~25 pseudosegments.

Variation: Tibia 1 in 42 other males: 5.4–8.5 (mean 7.3). Median stripe on clypeus sometimes less distinct, and restricted to distal half, or even missing (near Fondo Negro); small males with fewer spines, sometimes only one row on femur 1; some large males even with a few spines on femur 3; some males with AME pigment. The type is in poor condition, with the left palp missing, legs detached and fragmented, abdomen detached, and coloration largely lost.

Female: In general similar to male, but clypeus with U-shaped mark (Fig. 33) or pair of marks. Tibia 1 in 35 females: 3.9–6.1 (mean 5.2). Epigynum, relatively small, simple trapezoidal plate (Fig. 43), barely elevated, with three or four strong hairs laterally, directed inwards; dorsal view as in Figures 66, 138.

Distribution and habitat: This species is widely distributed in south-eastern Haiti and the south-western Dominican Republic (Fig. 197). It was found in otherwise rather inhospitable habitats, among cacti and agaves near Fondo Negro, among vegetation in a relatively dry forest at Los Patos, among vegetation in the garden of the Hotel Oloffson in Port-au-Prince, and in cavities of exposed road embankments near Paraíso. It seems to be the only *Modisimus* species in the dry Plaine du Cul de Sac–Valle de Neiba fault, where mean annual precipitation may be as low as 700 mm, or less (Diaz, 1983).

Material examined: Haiti: Dept Ouest, Port-au-Prince, 1♂, holotype with one juvenile, above; Port-au-Prince, garden of Hotel Oloffson (18°31.8'N, 72°20.4'W), 90 m a.s.l., among plants, 12 December 2007 (B.A. Huber), 4♂ and 4♀ (ZFMK, Haiti 72); same data, 4♂ and 5♀, in pure ethanol (ZFMK, Haiti 73); Port-au-Prince, 18–21 July 1955 (A. F. Archer), 1♂ and 1♀ (AMNH); hills near Port-au-Prince, 1♀, 'allotype' above. Petionville, 29 July 1958 (S. Lazell), 1♀ (AMNH). Carrefour, 23 July 1955 (A. F. Archer), 1♀ (AMNH). Dept Centre, near Pedro Santana (19°06.8'N, 71°39.7'W), degraded forest along brook, 340 m a.s.l., near ground and in low vegetation, 16 November 2005 (B.A. Huber), 4♀ and two juveniles (ZFMK, DR 58). Dominican Republic: Barahona Prov., between Cabral and Barahona (18°13.9'N, 71°09.0'W), degraded forest, 10 m a.s.l., 17 November 2005 (B.A. Huber), 4♂, 3♀ and one juvenile (ZFMK, DR 65); near Cabral (18°14.6'N, 71°11.8'W), degraded forest, 40 m a.s.l., near ground, mostly under dead leaves, 17 November 2005 (B.A. Huber), 12♂, 17♀ and three juveniles (ZFMK, DR 66/67); same data, 4♀ in pure ethanol (ZFMK, DR 100-41); near Fondo

Negro (18°25.2'N, 71°06.5'W), degraded bush, 190 m a.s.l., domed webs between agave leaves and cacti, 19 November 2005 (B.A. Huber), 5♂, 1♀ and one juvenile (ZFMK, DR 77); forest at Los Patos, 17°57.6'N, 71°11.0'W, 10–50 m a.s.l., domed webs among vegetation, 8 December 2007 (B.A. Huber), 18♂ and 11♀ (ZFMK, Haiti 56/57); same data, 2♀ and three juveniles, in pure ethanol (ZFMK, Haiti 94); near Paraíso at ~18°00'N, 71°10'W, ~100 m a.s.l., road escarpment, 7 December 2007 (B.A. Huber), 1♀ (ZFMK, Haiti 61). Pedernales Prov., 4 km north of Oviedo [~17°50.2'N, 71°24.1'W], 10 m a.s.l., arid thorn forest, 28 November–4 December 1991 (Masner & Peck), 1♂ (AMNH). 'Sierra Martín García, Trujillo Valdez', 8 August 1958 (A. F. Archer), 1♂ and 1♀, in poor condition (AMNH).

MODISIMUS MAKANDAL HUBER & FISCHER SP. NOV.

(Figs 11, 12, 44, 67, 139–141, 197)

Type: Male holotype from near Cana (19°29.8'N, 71°16.9'W), Santiago Rodríguez Prov., Dominican Republic; overhangs along river, 150 m a.s.l., 15 November 2005 (B.A. Huber), in ZFMK (DR 53a).

Etymology: The species name refers to Makandal, a famous Maroon, or runaway slave, who tried to organize a mass slave uprising, but was betrayed and burned at the stake in 1758; it is used as a noun in apposition.

Diagnosis: Medium-sized species, with distinctive pattern of modified hairs on male chelicerae (Fig. 140), and distinctive epigynum shape (Fig. 44); otherwise similar to *M. vittatus*.

Male (holotype): Total length, 2.7; carapace width, 1.4. Leg 1: 31.5 (8.1 + 0.5 + 7.9 + 13.0 + 2.0); tibia 2, 5.1; tibia 3, 4.1; tibia 4, 4.6. Tibia 1 L/d: 55. Habitus, in general, similar to *M. vittatus* (cf. Figs 30–34), carapace pale ochre-white, ocular area darker brown, clypeus with pair of brown stripes; sternum with two wide brown longitudinal bands, medially whitish; legs light brown, tips of femora and tibiae whitish, indistinct darker rings on femora and tibiae subdistally; abdomen bluish grey, dorsally, laterally, and especially posteriorly, densely covered with black spots grouped by distinctive lines made of bluish-white spots (cf. *M. vittatus*); ventrally with dark bluish mark between genital area and spinnerets. Ocular area strongly elevated, with several stronger hairs on top; thoracic furrow distinct. PME–PME, 105 µm; PME diameter, 115 µm; PME–ALE, 135 µm; AME–AME, 20 µm; AME diameter, 20 µm. Sternum wider than long (0.75/0.55), unmodified. Each chelicera with

~20 strong modified hairs, forming an arc, and with roughly seven hairs of similar size in laterodistal patch (Fig. 140). Palps as in Figure 139, coxa with retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses, with distinctive retrolateral 'step'; procurus with dark dorsal spine-like process, and membranous structures distally, bulb with large, weakly curved apophysis, with small black rounded branch subdistally. Legs with spines in ventral rows on femora 1 and 2 (~35 spines on femur 1 and 20 spines on femur 2; with a few spines in second row distally on femur 2); retrolateral trichobothrium on tibia 1 at 8%; all femora with higher than usual density of short vertical hairs; curved hairs on tibiae 1–3 and all metatarsi; prolateral trichobothrium missing on tibia 1, present on all other tibiae. Tarsus 1 with ~25 pseudosegments.

Variation: Tibia 1 in 25 other males: 6.2–9.2 (mean 7.7); the males from Labadie are larger than those from other localities (ranges 8.1–9.2 vs. 6.2–8.1). Small males without spines on femora 1 and 2.

Female: In general similar to male; rings on legs tend to be more distinct; at least some females with a few weak spines distally on femur 1. Tibia 1 in 18 females: 4.7–7.0 (mean 5.7); the females from Labadie are larger than those from other localities (ranges 6.1–7.0 vs. 4.7–6.5). Epigynum, relatively small and simple externally, barely elevated, with a few stronger hairs laterally directed inwards (Fig. 44); dorsal view as in Figures 67 and 141.

Distribution and habitat: Known from several localities in the north-western Dominican Republic and northern Haiti (Fig. 197). This species typically occurs close to the ground, among and under rocks, and in cavities of embankments.

Material examined: Dominican Republic: Santiago Rodríguez Prov., near Cana, 1♂, holotype above; same data, 3♂, 4♀ and one juvenile (ZFMK, DR 53); same data, 2♀, in pure ethanol (ZFMK, DR 100-37). Haiti: Dept Nord, forest near Labadie at 19°47.1'N, 72°14.5'W, 10–30 m a.s.l., domed sheets among rocks, 4 December 2007 (B.A. Huber), 8♂, 7♀ and some juveniles (ZFMK, Haiti 28/29); same data, 3♂, 2♀ and two juveniles, in pure ethanol (ZFMK, Haiti 90); near Plaisance at 19°36.3'N, 72°27.4'W, 490 m a.s.l., forest along brook, 5 December 2007 (B.A. Huber), 10♂, 5♀ and one juvenile (ZFMK, Haiti 34/35); same data, 1♂ and 2♀, in pure ethanol (ZFMK, Haiti 105). Dept Artibonite, north-east of Gonaïves at 19°29.5'N, 72°29.5'W, 300 m a.s.l., small forest patch near river, near ground among plants and rocks, 4 December 2007 (B.A. Huber), 5♂, 6♀ and some juveniles

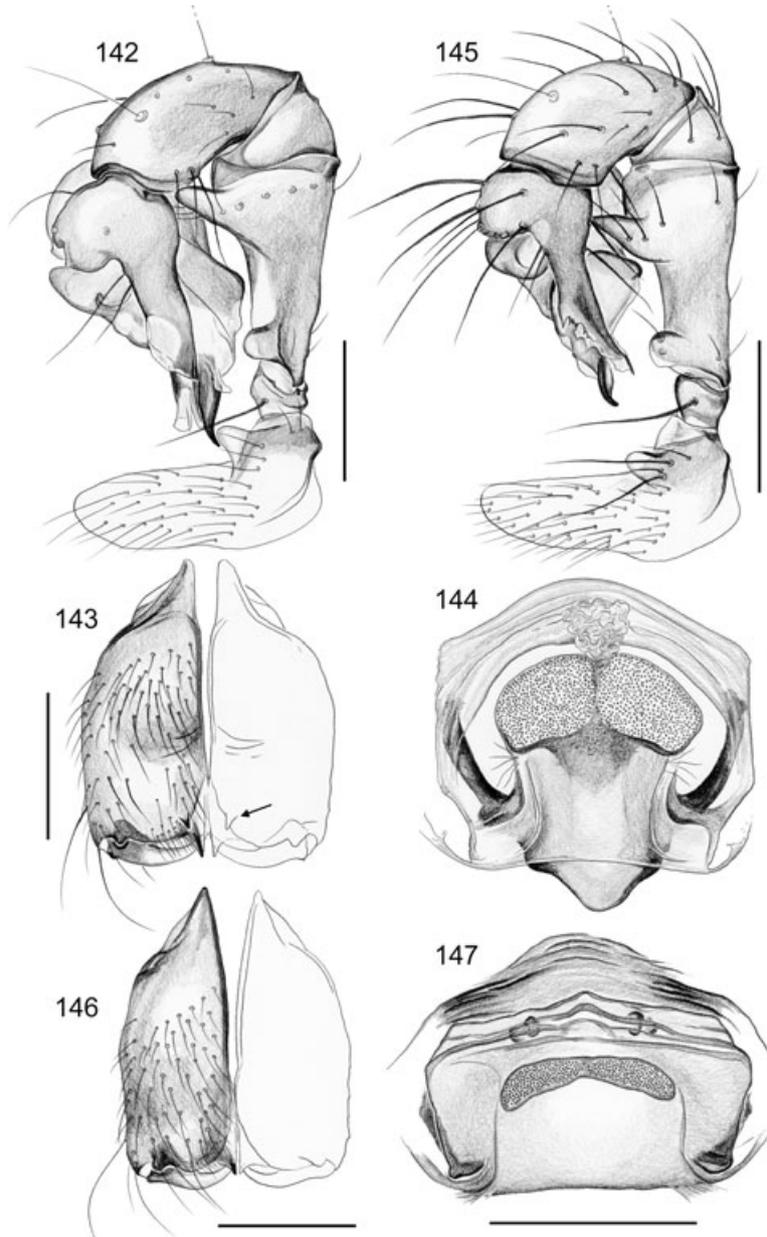
(ZFMK, Haiti 38); same data, 2♂, 4♀ and one juvenile, in pure ethanol (ZFMK, Haiti 92).

Assigned tentatively: Haiti: Dept Nord, Cap-Haïtien, lower altitude, part of city, 27–30 March 1969 (L. Reynolds), 1♀ (AMNH).

***MODISIMUS FUSCUS* BRYANT, 1948**
(Figs 45, 68, 142–144, 198)

Modisimus fuscus Bryant, 1948: 368–369, figures 34, 36, 37, 45.

Types: Male holotype from Kenscoff [~18°27'N, 72°17'W; ~1500 m a.s.l.], Dept Ouest, Haiti; with labels 'Haiti; Kenscoff – 4500 ft., 12 Nov. 1934 – P.J. Darlington' and '*Modisimus fuscus* Bryant, ♂ – holotype B.0022', in MCZ, examined. Female 'allotype' and male paratype from La Visite [~18°20'N,



Figures 142–147. Diagnostic characters. 142–144. *Modisimus fuscus*. 142. Left palp, retrolateral view. 143. Male chelicerae, frontal view (arrow points to distinctive apophysis). 144. Cleared epigynum, dorsal view. 145–147. *Modisimus epepye* sp. nov. 145. Left palp, retrolateral view. 146. Male chelicerae, frontal view. 147. Cleared epigynum, dorsal view. Scale bars: 0.3 mm.

72°16'W], Dept Sud-Est, Haiti; with labels 'Haiti; La Visite, 6-7000', 16–23 Sept. 1934 – Darlington' and '*Modisimus fuscus* Bryant, ♀ allotype – ♂ paratype', in MCZ, examined.

Diagnosis: Medium-sized species with low ocular area (similar to *M. epepye* sp. nov.), enlarged femora (similar to *M. epepye* sp. nov.), contiguous pore plates (Fig. 144; similar to *M. epepye* sp. nov.); distinguished from *M. epepye* sp. nov. by rings on legs, shape of epigynum (scape, Fig. 45), and pair of small apophyses on chelicerae (Fig. 143).

Male (Case Dent): Total length, 2.6; carapace width, 1.27. Leg 1: 3.7 + 0.5 + 3.6 + 4.5, tarsus missing; tibia 2, 2.4; tibia 3, 2.0; tibia 4, 2.4. Tibia 1 L/d: 23. Habitus in general similar to *M. epepye* sp. nov. (cf. Figs 23, 24), carapace ochre-yellow, with dark structure visible through cuticle posteriorly, ocular area and clypeus dark ochre; sternum ochre-yellow, darker behind labium frontally, and posteriorly; leg femora with three dark ochre and three light, wide rings, tibiae with dark rings proximally and subdistally; abdomen bluish grey, densely covered with dark spots dorsally and laterally, with a few white spots; dark-ochre transverse mark in genital area ventrally, dark plate in front of spinnerets. Ocular area only slightly elevated; thoracic furrow distinct and deep. PME–PME, 125 µm; PME diameter, 95 µm; PME–ALE, 105 µm; AME–AME, 10 µm; AME diameter, 20 µm. Sternum wider than long (0.8/0.6), unmodified. Chelicerae with proximal round humps frontally, and a pair of small pointed apophyses, close to lamellae, distally (Fig. 143). Palps as in Figure 142, coxa with light retrolateral apophysis, femur with rounded proximal and long distal ventral apophyses, procurus simple, with membranous structures distally, but without dorsal spine-like process, bulb with large, weakly curved apophysis. Legs with relatively thick femora, no spines; retrolateral trichobothrium on tibia 1 at 23%; all femora with many short vertical hairs; curved hairs, especially on tibiae, but with fewer on femora and metatarsi; prolateral trichobothrium missing on tibia 1, present on all other tibiae.

Variation: Tibia 1 in other males: holotype, 3.5; paratype, 3.7. The types are in fair condition, but are more or less uniformly brown. In the holotype, the distal margin of the proximal male cheliceral hump is slightly more abrupt and distinct.

Female: In general similar to male, but with very long hairs posteriorly on sternum. Tibia 1 in all three females: 3.2. Epigynum, roughly triangular plate converging posteriorly (Fig. 45), with long hairs frontally

that appear functionally related to the long sternum hairs; dorsal view as in Figures 68 and 144.

Distribution and habitat: Known from two localities in the Massive de la Selle, Haiti (Fig. 198). Near La Visite, this species was found in a thick layer of pine leaves overhanging the embankment of a ravine in the pine forest.

Material examined: Haiti: Dept Ouest, Kenscoff, 1♂, holotype above. Dept Sud-Est, La Visite, 1♂ and 1♀, paratypes above. 'Case Dent' (18°20.2'N, 72°16.4'W) near La Visite, ravine in pine forest, 1880 m a.s.l., in small webs near the ground, 27 November 2007 (B.A. Huber), 1♂ and 2♀ (ZFMK, Haiti 3); same data, 2♀ and one juvenile, in pure ethanol (ZFMK, Haiti 66).

MODISIMUS EPEPYE HUBER SP. NOV.

(Figs 23, 24, 46, 69, 145–147, 198)

Type: Male holotype from near Seguin (18°18.2'N, 72°17.5'W, ~990 m a.s.l.), Dept Sud-Est, Haiti; degraded forest with plantations; in the deeper, wet areas of piles of banana sheaths on the ground, 28 November 2007 (B.A. Huber), in ZFMK (Haiti 6a).

Etymology: The species name is derived from the Creole words epè (thick) and pye (leg), and refers to the thick femora of this species; it is used as a noun in apposition.

Diagnosis: Medium-sized species with low ocular area (Fig. 24; similar to *M. fuscus*), enlarged femora (similar to *M. fuscus*), contiguous pore plates (Fig. 147; similar to *M. fuscus*); distinguished from *M. fuscus* by monochromous legs, shape of epigynum (Fig. 46; no scape), and unmodified male chelicerae (Fig. 146).

Male (holotype): Total length, 2.8; carapace width, 1.27; Leg 1: 12.3 (3.4 + 0.5 + 3.5 + 3.8 + 1.1); tibia 2, 2.4; tibia 3, 1.9; tibia 4, 2.9. Tibia 1 L/d: 22. Habitus as in Figures 23 and 24; carapace, ocular area, and clypeus mostly brown, only lateral side of ocular area light ochre, sternum monochromous brown; legs monochromous, same colour as carapace, slightly lighter distally; abdomen bluish grey with many black spots, except heart area and ventrally; genital area and plate in front of spinnerets brown. Ocular area only slightly elevated; thoracic furrow distinct. PME–PME, 115 µm; PME diameter, 95 µm; PME–ALE, 60 µm; AME–AME, 20 µm; AME diameter, 25 µm. Sternum wider than long (0.85/0.55), unmodified. Chelicerae unmodified (Fig. 146). Palps as in Figure 145, coxa with light retrolateral apophysis, femur

with basal and distal ventral apophyses, procurus rather simple, with membranous structures dorsodistally, bulb with flattened distal apophysis, with small subdistal hump on prolateral side. Legs without spines; retrolateral trichobothrium on tibia 1 at 25%; all femora with many short vertical hairs; curved hairs on all tibiae and metatarsi; prolateral trichobothrium missing on tibia 1, present on all other tibiae; tarsus 1 with ~15 pseudosegments, fairly distinct, except proximally.

Variation: The second male is generally lighter, and the light marks lateral to the ocular area extend further back; tibia 1, 3.4.

Female: In general, similar to male, with curved hairs also on femora, and light areas on carapace, as in lighter male. Tibia 1: 3.2. Epigynum, simple flat plate (Fig. 46); dorsal view as in Figures 69 and 147.

Distribution: Known from type locality only (Fig. 198).

Material examined: Haiti: Dept Sud-Est, near Seguin, 1♂, holotype above; same data, 1♂ and 1♀ (ZFMK, Haiti 6); same data, 2♂, in pure ethanol (ZFMK, Haiti 80).

***MODISIMUS SEGUIN* HUBER & FISCHER SP. NOV.**

(Figs 27–29, 47, 70, 88, 98, 148–151, 199)

Type: Male holotype from near Seguin, at 18°18.2'N, 72°17.5'W, Dept Sud-Est, Haiti; 990 m a.s.l., leaf litter in forest over coffee and banana plantations, 28 November 2007 (B.A. Huber), in ZFMK (Haiti 4a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Medium-sized species with pale callus-like area posteriorly on male abdomen (Figs 27, 28; similar to *M. roumaini* sp. nov.), modified hairs of various lengths on male chelicerae (Figs 88, 149; similar to *M. roumaini* sp. nov.); distinguished from *M. roumaini* sp. nov. by shape of epigynum (Figs 47, 150; wider scape), internal sclerites in female genitalia (Figs 70, 151), and numerous spines on male femora.

Male (holotype): Total length, 3.1; carapace width, 1.35. Leg 1: 33.2 (8.3 + 0.6 + 8.3 + 13.6 + 2.4); tibia 2, 5.5; tibia 3, 4.4; tibia 4, 5.9. Tibia 1 L/d: 67. Habitus as in Figures 27–29, carapace pale ochre-white, with wide brown lateral margins posteriorly, thoracic furrow also dark brown; ocular area light brown,

clypeus with pair of lateral brown bands; sternum medially brown with light spot behind labium, and pale ochre-yellow to whitish laterally; legs light brown, tips of femora and tibiae whitish, darker rings subdistally on femora (indistinct on tibiae); abdomen bluish grey, dorsally (except heart area) and laterally densely covered with black spots, with some small light-bluish spots forming disrupted lines, with distinctive pale area posteriorly; genital area and area in front of spinnerets light brown, bluish spot in-between. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 150 µm; PME diameter, 135 µm; PME–ALE, 175 µm; AME–AME, 20 µm; AME diameter, 25 µm. Sternum wider than long (0.9/0.7), unmodified. Chelicerae with ~30 modified hairs on each side, mediobasal hairs clearly longer than the others (Figs 88, 149). Palps as in Figure 148, coxa with retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses; procurus without dorsal spine-like process (Fig. 98), curved towards femur distally, bulb with large, curved apophysis, and complex membranous subdistal projections. Legs with spines on femora 1 and 2; femur 1 with prolateral row (~30 spines not reaching tip) and retrolateral row (~20 very weak spines not reaching tip); femur 2 with four rows, prolateral (~25 spines, not reaching tip), prolateroventral (18 spines), retro-lateroventral (20 spines), and retrolateral (~20 spines, almost until tip); all femora with many short vertical hairs; curved hairs on tibiae 1–3 and metatarsi 2–4; retrolateral trichobothrium of tibia 1 at 11%; prolateral trichobothrium missing on tibia 1, present on all other tibiae. Tarsus 1 with ~30 pseudosegments.

Variation: Tibia 1 in four other males: 7.6, 7.9, 8.2, 8.5.

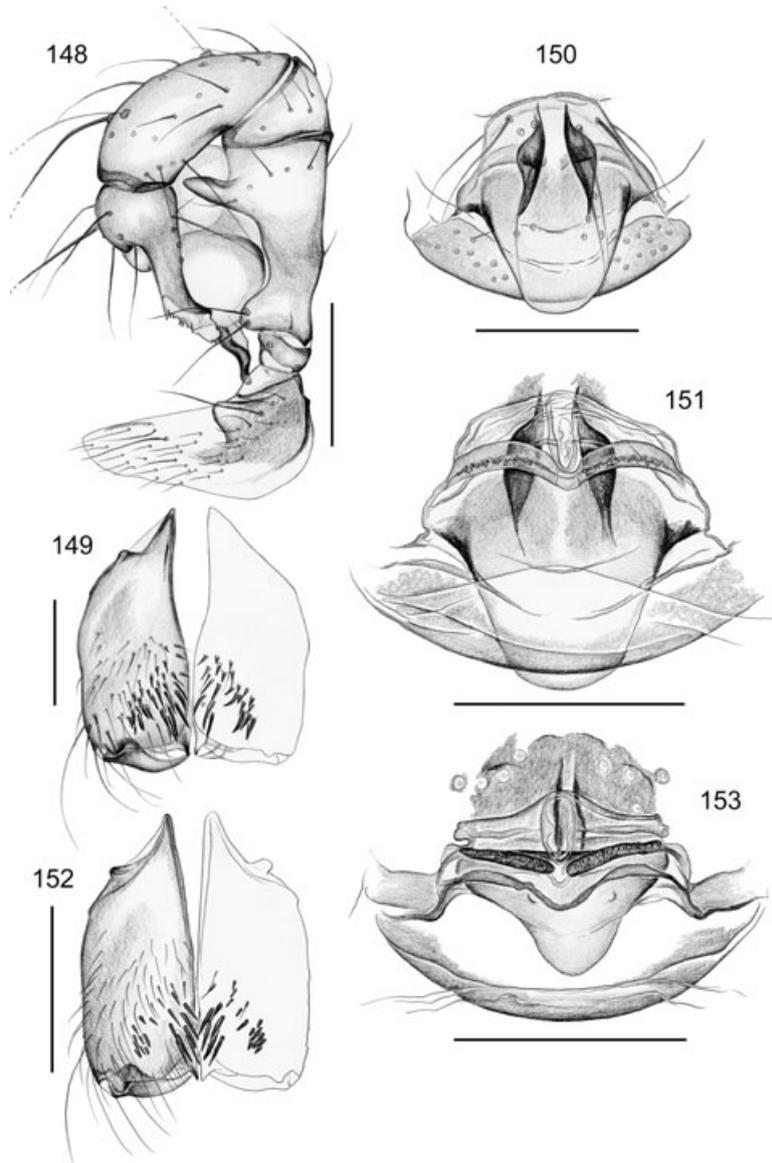
Female: In general similar to male, but without callus-like area posteriorly on abdomen. Tibia 1 in six females: 5.9–6.6 (mean 6.2). Epigynum, with tongue-shaped scape, and distinctive dark sclerites (Figs 47, 150); dorsal view as in Figures 70 and 151.

Distribution and habitat: Known from type locality only (Fig. 199). This species was found in the same piles of dead banana leaf bases on the ground as *M. epepe* sp. nov., but in the dryer upper parts.

Material examined: Haiti: Dept Sud-Est, near Seguin, 1♂, holotype above; same data, 5♂, 7♀ and four juveniles (ZFMK, Haiti 4/5); same data, 3♀ and two juveniles, in pure ethanol (ZFMK, Haiti 81).

***MODISIMUS ROUMAINI* HUBER SP. NOV.**

(Figs 48, 71, 152, 153, 199)



Figures 148–153. Diagnostic characters. 148–151. *Modisimus seguin* sp. nov. 148. Left palp, retrolateral view. 149. Male chelicerae, frontal view. 150, 151. Cleared epigynum, ventral (150) and dorsal (151) views. 152, 153. *Modisimus roumaini* sp. nov. 152. Male chelicerae, frontal view. 153. Cleared epigynum, dorsal view. Scale bars: 0.3 mm.

Type: Male holotype from between Léogâne and Jacmel, at 18°21.4'N, 72°35.0'W, Dept Sud-Est, Haiti; secondary forest over plantations, near ground, under leaves, 730 m a.s.l., 26 November 2007 (B.A. Huber), in ZFMK (Haiti 70).

Etymology: The species name honours Jacques Roumain (1907–1944), author of *Masters of the Dew*, about a young Haitian man's effort to save a once-thriving community from drought and family feuds.

Diagnosis: Medium-sized species with pale callus-like area posteriorly on male abdomen (similar to *M. seguin* sp. nov.), modified hairs of various lengths on

male chelicerae (Fig. 152; similar to *M. seguin* sp. nov.); distinguished from *M. seguin* sp. nov. by shape of epigynum (Fig. 48; smaller and narrower scape), internal sclerites in female genitalia (Figs 71, 153), and absence of spines on male femora.

Male (holotype): Total length, 2.1; carapace width, 1.1. Leg 1: 30.4 (7.6 + 0.5 + 7.7 + 12.3 + 2.3); tibia 2, 5.2; tibia 3, 4.1; tibia 4, 5.3. Tibia 1 L/d: 79. Habitus similar to *M. seguin* sp. nov. (cf. Figs 27–29), carapace pale ochre-white with brown lateral marks posteriorly, thoracic furrow also dark brown, indistinct brown spot posteriorly; ocular area brown posteriorly,

clypeus with pair of lateral brown bands; sternum medially brown, with small light spot behind labium, pale ochre-yellow to whitish laterally; legs ochre-yellow, tips of femora and tibiae whitish, indistinct darker rings subdistally on femora and tibiae; abdomen bluish grey, dorsally (except heart area) and laterally densely covered with black spots, with some small whitish spots forming disrupted lines, with distinctive pale area posteriorly; genital area and area in front of spinnerets light brown, bluish spot in between. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 135 µm; PME diameter, 90 µm; PME–ALE, 175 µm; AME–AME, 20 µm; AME diameter, 20 µm. Sternum wider than long (0.7/0.55), unmodified. Chelicerae with ~25 modified hairs on each side, mediolateral hairs clearly longer than the others (Fig. 152). Palps extremely similar to those of *M. seguin* sp. nov. (cf. Fig. 148), but smaller, and bulbal apophysis slightly more curved, with dorsal bulbal sclerite of a minimally different shape. Legs without spines; all femora with many short vertical hairs; curved hairs on all tibiae and on metatarsi 2–4; retrolateral trichobothrium of tibia 1 at 12%; prolateral trichobothrium missing on tibia 1, present on all other tibiae. Tarsus 1 with ~25 pseudosegments.

Female: In general similar to male, but without callus-like area posteriorly on abdomen, dark rings on legs more distinct; tibia 1, 5.8. Epigynum, with tongue-shaped scape, and distinctive dark sclerites (Fig. 48); dorsal view as in Figures 71 and 153.

Distribution: Known from type locality only (Fig. 199).

Material examined: Haiti: Dept Sud-Est: between Léogâne and Jacmel: 1♂, holotype above; same data, 1♀ (ZFMK, Haiti 70); same data, two juveniles, in pure ethanol (ZFMK, Haiti 71).

**MODISIMUS ENRIQUILLO HUBER & FISCHER
SP. NOV.**

(Figs 49, 50, 72, 154–156, 199)

Type: Male holotype from north-west of Paraiso, at ~18°02.4'N, 71°11.6'W, Barahona Prov., Dominican Republic; secondary forest at 180 m a.s.l., dome-shaped webs under dead palm fronds on ground, 7 December 2007 (B.A. Huber), in ZFMK (Haiti 58b).

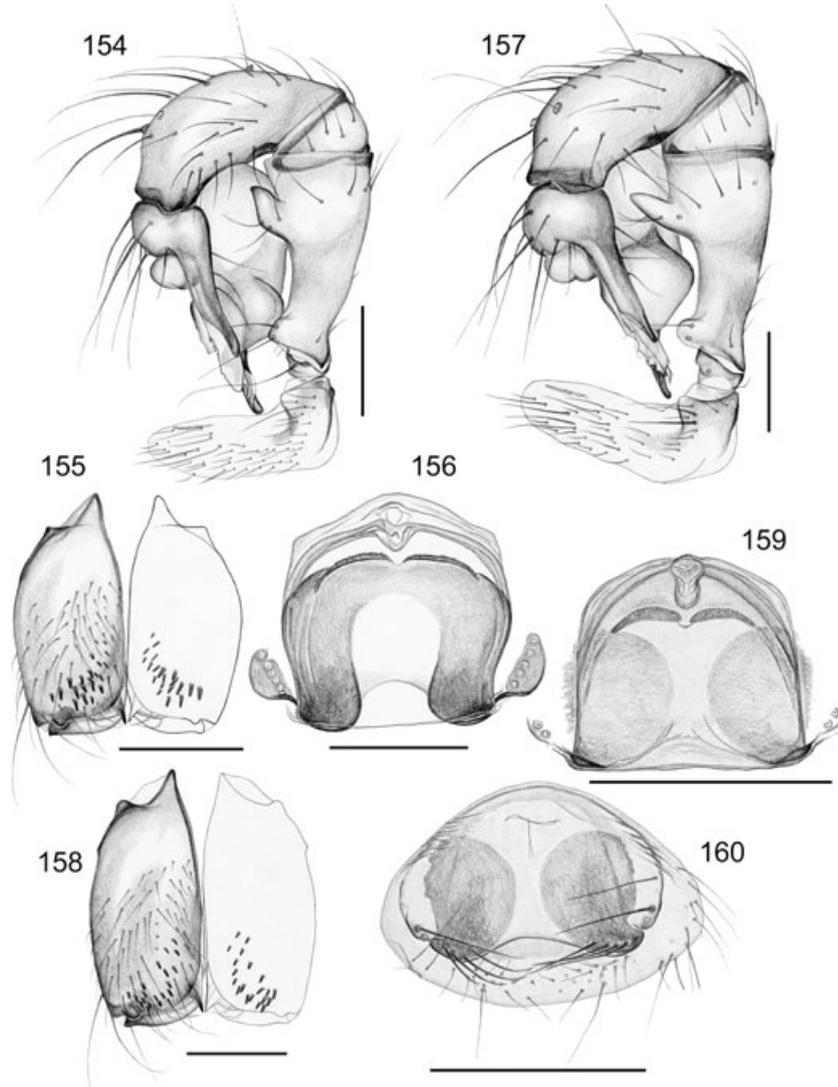
Etymology: The species name refers to Enriquillo, the Taino chief of the 1519 rebellion against Spanish subjugation; it is used as a noun in apposition.

Diagnosis: Medium-sized species with pair of small apophyses posteriorly on female sternum (Figs 49, 50), distinctive epigynum shape (Figs 49, 50), otherwise very similar to *M. tiburon* sp. nov. (palps, male chelicerae).

Male (holotype): Total length, 2.9; carapace width, 1.3. Leg 1: 28.6 (7.6 + 0.5 + 7.4 + 10.9 + 2.2); tibia 2, 4.9; tibia 3, 3.9; tibia 4, 5.2. Tibia 1 L/d: 58. Habitus similar to *M. seguin* sp. nov. (cf. Figs 27–29), carapace pale ochre-white, with wide brown lateral margins above legs 2–4, thoracic furrow also dark brown, ocular area and clypeus brown, clypeus with pair of lateral dark-brown bands; sternum medially brown with some light spots, laterally whitish; legs light ochre-brown, tips of femora and tibiae whitish, distinct darker rings subdistally on femora and tibiae; abdomen bluish grey, densely covered with black spots dorsally (except heart area) and laterally, with distinct white lines made of small spots; genital area and area in front of spinnerets light brown, bluish spot in between. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 115 µm; PME diameter, 125 µm; PME–ALE, 150 µm; AME–AME, 20 µm; AME diameter, 20 µm. Sternum wider than long (0.80/0.65), unmodified. Chelicerae with patch of ~15 short modified hairs on each side (Fig. 155 shows a male from near Polo, with slightly more and larger modified hairs). Palps as in Figure 154, coxa with retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses; procurus without dorsal spine-like process, bulb with large, weakly curved apophysis and complex membranous and sclerotized subdistal projections. Femur 1 with prolateral row of ~30 short spines, not reaching tip; femur 2 with three rows of spines (~25 in prolateral row, ~10 in prolateroventral row, ~20 in retrolateroventral row; the latter two reaching tip); all femora with many short vertical hairs; curved hairs on tibiae and metatarsi 1–3 (most on legs 2); retrolateral trichobothrium of tibia 1 at 12%; prolateral trichobothrium missing on tibia 1, present on all other tibiae. Tarsus 1 with more than 20 pseudosegments, indistinct.

Variation: Number of spines on femora 1 and 2 varies considerably; prolateral rows may be missing entirely; white lines on abdomen variably distinct, often rather light bluish; the male from near Polo has slightly larger and more modified hairs on the chelicerae than the type. Tibia 1 in 12 other males: 5.5–8.4 (mean 7.3).

Female: In general, similar to male, but sternum with pair of distinct projections on posterior margin (Figs 49, 50). Tibia 1 in 25 females: 4.9–6.4 (mean



Figures 154–160. Diagnostic characters. 154–156. *Modisimus enriquillo* sp. nov. 154. Left palp, retrolateral view. 155. Male chelicerae, frontal view. 156. Cleared epigynum, dorsal view. 157–160. *Modisimus tiburon* sp. nov. 157. Left palp, retrolateral view. 158. Male chelicerae, frontal view. 159, 160. Cleared epigynum, dorsal (159) and ventral (160) views. Scale bars: 0.3 mm.

5.7). Epigynum, distinctively shaped sclerotized plate, five brushes/combs of stronger hairs (one median frontally and two lateral pairs); dorsal view as in Figures 72 and 156. Females from near Polo differ slightly in the shape of the epigynum (Fig. 49), but have indistinguishable internal genitalia.

Distribution. Known only from Barahona Province, Dominican Republic (Fig. 199).

Material examined: Dominican Republic: Barahona Prov., north-west Paraíso, 1♂, holotype above; same data: 9♂, 12♀ and three juveniles (ZFMK, Haiti 58, 58a); forest north-west of Paraíso, about 500 m from

type locality, 180 m a.s.l., near ground, 7 December 2007 (B.A. Huber), 3♂, 8♀ and seven juveniles (ZFMK, Haiti 52); same data, 1♀ and three juveniles, in pure ethanol (ZFMK, Haiti 101); south of Barahona (18°01.9'N, 71°08.4'W), forest along brook, 60–150 m a.s.l., 18 November 2005 (B.A. Huber), 1♂ and 7♀ (ZFMK, DR 70); near Polo (18°06.8'N, 71°16.2'W), forest with plantations, 850 m a.s.l., 17 November 2005 (B.A. Huber), 1♂, 2♀ and two juveniles (ZFMK, DR 64).

***MODISIMUS TIBURON* HUBER & FISCHER SP. NOV.**

(Figs 51, 52, 73, 157–160, 199)

Type: Male holotype from 'Case Dent' (18°20.2'N, 72°16.4'W), La Visite N. P., Dept Sud-Est, Haiti; 1880 m a.s.l., ravine in pine forest, 27 November 2007 (B.A. Huber), in ZFMK (Haiti 2a).

Etymology: The species name refers to the Tiburon Peninsula that encompasses Haiti's southern coast; it is used as a noun in apposition.

Diagnosis: Medium-sized species with distinctive epigynum shape (Figs 51, 52, 160). Similar to *M. leprete* sp. nov., but distinguished by pattern of modified hairs on male chelicerae (Fig. 158), larger epigynum, and relatively smaller and narrower pore plates (Fig. 159). Also similar to *M. enriquillo* sp. nov. (palps and male chelicerae), but without apophyses on female sternum, and with different epigynum shape.

Male (holotype): Total length, 3.1; carapace width, 1.5. Leg 1: 31.6 (8.3 + 0.6 + 8.3 + 11.2 + 3.2); tibia 2, 5.8; tibia 3, 4.8; tibia 4, 6.1. Tibia 1 L/d: 55. Habitus similar to *M. seguin* sp. nov. (cf. Figs 27–29), carapace pale ochre-white, with wide brown lateral margins posteriorly, thoracic furrow also dark brown, dark median spot posteriorly; ocular area and clypeus brown, clypeus with pair of lateral dark-brown bands; sternum medially brown with some light spots, laterally whitish; legs ochre to greenish brown, tips of femora and tibiae whitish, darker rings subdistally on femora and tibiae; abdomen bluish-grey, densely covered with black spots dorsally (except heart area) and laterally, with some small white spots forming disrupted lines; genital area and area in front of spinnerets light brown, bluish spot in between. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 175 µm; PME diameter, 135 µm; PME–ALE, 175 µm; AME–AME, 20 µm; AME diameter, 35 µm. Sternum wider than long (1.1/0.9), unmodified. Chelicerae with patch of ~20 short modified hairs on each side (Fig. 158). Palps as in Figure 157, coxa with retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses; procurus without dorsal spine-like process, bulb with large, weakly curved apophysis, and complex membranous and sclerotized subdistal projections. Legs without spines; all femora with many short vertical hairs; curved hairs on all tibiae and metatarsi; retrolateral trichobothrium of tibia 1 at 12%; prolateral trichobothrium missing on tibia 1, present on all other tibiae. Tarsus 1 with ~30 pseudosegments.

Variation: Second male from type locality with a few weak spines distally on femur 2. Tibia 1 in two other males: 7.9 and 8.4.

Female: In general similar to male, sternum with pair of low and indistinct elevations on posterior margin. Tibia 1 in eight females: 6.1–7.0 (mean 6.4). Epigynum, composed of two oval plates, with two pairs of brushes/combs of stronger hairs (Figs 51, 52, 160); dorsal view as in Figures 73 and 159.

Distribution: Known from two localities in Massif de la Selle, south-east Haiti (Fig. 199). Near La Visite, this species was found in the thick layer of pine leaves overhanging an embankment (together with *M. fuscus*); near Kenscoff, it was found in little cavities of rocks and soil in a ravine.

Material examined: Haiti: Dept Sud-Est, La Visite N. P., 'Case Dent': 1♂, holotype above; same data, 1♂, 7♀ and one juvenile (ZFMK, Haiti 2); same data, 3♂, 3♀ and three juveniles, in pure ethanol (ZFMK, Haiti 67); La Visite N. P., broadleaf forest patch ('Berac', 18°19.7'N, 72°17.7'W), 1580 m a.s.l., 27 November 2007 (B.A. Huber), 1♀, in pure ethanol (ZFMK, Haiti 68). Dept Ouest, near Kenscoff, at 18°27.5'N, 72°17.4'W, 1220 m a.s.l., in escarpment of ravine, 10 December 2007 (B.A. Huber), 1♂ and 4♀ (ZFMK, Haiti 25); same data, 2♂, 1♀ and four juveniles, in pure ethanol (ZFMK, Haiti 74).

MODISIMUS LEPRETE HUBER SP. NOV.

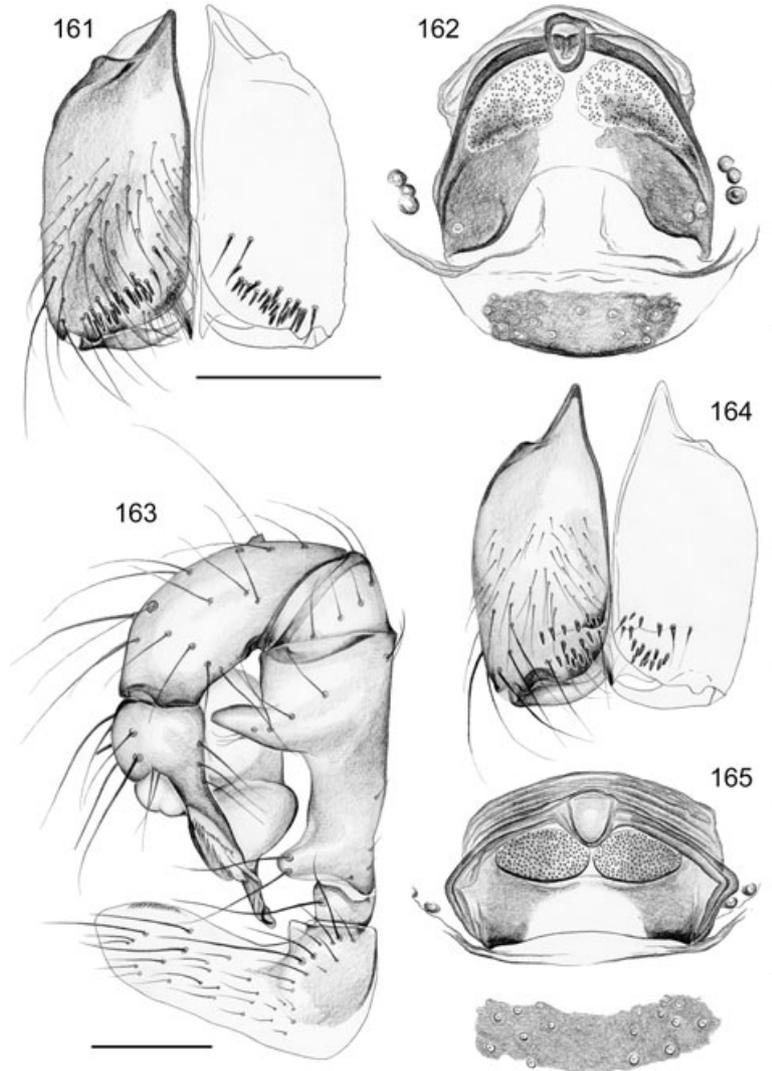
(Figs 53, 74, 161, 162, 199)

Type: Male holotype from near Le Prete (18°15.9'N, 73°56.7'W), Dept Sud, Haiti; 170 m a.s.l., forest over coffee and banana plantations, from sheltered places near the ground, 2 December 2007 (B.A. Huber), in ZFMK (Haiti 15a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Medium-sized species that is very similar to *M. tiburon* sp. nov., but differs in the pattern of modified hairs on male chelicerae (Fig. 161), epigynum much smaller, pore plates relatively larger and rounder (Fig. 162), and prolateral trichobothrium present on tibia 1.

Male (holotype): Total length, 2.7; carapace width, 1.2. Leg 1: 31.1 (7.8 + 0.5 + 7.8 + 12.5 + 2.5); tibia 2, 5.2; tibia 3, 4.3; tibia 4, 5.6. Tibia 1 L/d: 73. Habitus similar to *M. seguin* sp. nov. (cf. Figs 27–29), carapace pale ochre-white, with wide brown lateral margins posteriorly, thoracic furrow also dark brown, indistinct spot posteriorly medially; ocular area and clypeus light brown, clypeus with pair of lateral dark-brown bands; sternum medially brown with some



Figures 161–165. Diagnostic characters. 161, 162. *Modisimus leprete* sp. nov. 161. Male chelicerae, frontal view. 162. Cleared epigynum, dorsal view. 163–165. *Modisimus macaya* sp. nov. 163. Left palp, retrolateral view. 164. Male chelicerae, frontal view. 165. Cleared epigynum, dorsal view. Scale bars: 0.3 mm.

light spots, whitish laterally; legs ochre to light brown, tips of femora and tibiae whitish, darker rings subdistally on femora and tibiae; abdomen bluish grey, with many black spots dorsally (except heart area) and laterally, with some small white spots forming disrupted lines; genital area and area in front of spinnerets light brown, with a bluish spot in between. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 105 μ m; PME diameter, 135 μ m; PME–ALE, 135 μ m; AME–AME, 25 μ m; AME diameter, 25 μ m. Sternum wider than long (0.85/0.60), unmodified. Chelicerae with patch of ~20 short modified hairs distally on each side (Fig. 161). Palps very similar to *M. tiburon* sp. nov. (cf. Fig. 157), but much smaller, and bulbal apophysis more curved and more pointed in dorsal view. Legs with spines on

femur 1 (one prolateral row, ~25 short spines not reaching tip of femur) and femur 2 (three rows: prolateral row with ~20 spines, not reaching tip; prolatroventral row with five spines reaching tip; retrolateroventral row with eight spines, reaching tip); all femora with many short vertical hairs; curved hairs on all tibiae and metatarsi; retrolateral trichobothrium of tibia 1 at 11%; prolateral trichobothrium present on all tibiae. Tarsus 1 with ~30 pseudosegments.

Variation: Second male without spines on femora. Tibia 1: 7.2.

Female: In general similar to male. Tibia 1 in three females: 5.5, 5.9, and 6.1. Epigynum, composed of two lateral plates, smaller and more sculptured than in

M. tiburon sp. nov., and with a more distinct posterior sclerite (Fig. 53); dorsal view as in Figures 74 and 162, with oval pore plates.

Distribution: Known from type locality only (Fig. 199).

Material examined: Haiti: Dept Sud, near Le Prete, 1♂, holotype above; same data, 1♂, 3♀ and six juveniles (ZFMK, Haiti 15); same data, 2♂, 1♀ and one juvenile, in pure ethanol (ZFMK, Haiti 87).

MODISIMUS MACAYA HUBER & FISCHER SP. NOV.

(Figs 6, 14, 54, 75, 163–165, 199)

Type: Male holotype from Macaya B.R., at 18°20.4'N, 74°00.9'W, Dept Sud, Haiti; broadleaf forest patch in ravine, 1290 m a.s.l., domed webs in escarpment of ravine, 29 November 2007 (B.A. Huber), in ZFMK (Haiti 42a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Large species with distinctive epigynum shape (Fig. 54), few or no spines on male femora.

Male (holotype): Total length, 4.3; carapace width, 1.7. Leg 1: 42.4 (10.4 + 0.8 + 10.5 + 16.5 + 4.2); tibia 2, 7.3; tibia 3, 5.9; tibia 4, 7.4. Tibia 1 L/d: 54. Habitus as in Figure 6, carapace pale ochre with brown lateral marks posteriorly, thoracic furrow also dark brown, posteriorly indistinct brown spot; ocular area and clypeus brown; sternum medially brown with small light spots, pale ochre-yellow laterally; legs light brown, darker rings subdistally on femora and tibiae, and in patella area; abdomen bluish grey, densely covered with black spots dorsally (except heart area) and laterally, with a few small bluish white spots; genital area with narrow transverse brown plate, area in front of spinnerets light brown. Ocular area strongly elevated; thoracic furrow distinct. PME–PME, 175 µm; PME diameter, 170 µm; PME–ALE, 210 µm; AME–AME, 25 µm; AME diameter, 25 µm. Sternum wider than long (1.1/0.8), unmodified. Chelicerae with ~20 modified hairs on each side, some of them on small elevation (Fig. 164). Palps as in Figure 163, coxa with retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses, procurus without dorsal spine-like process. Legs without spines; all femora with many short vertical hairs; curved hairs on all tibiae and metatarsi; retrolateral trichobothrium of tibia 1 at 10%; prolateral trichobothrium missing on tibia 1, present on all other tibiae. Tarsus 1 with ~35 pseudosegments.

Variation: Other male from type locality with two small spines distally on femur 2. Tibia 1 in two other males: 10.4 and 10.6. A further male from near the type locality has the cheliceral elevation much more proximally; it is assigned tentatively (both tibiae 1 missing in this specimen, tibia 2: 6.7).

Female: In general, similar to male, dark rings on femora preceded by additional light rings, with light margins on sternum missing in some females. Tibia 1 in five females: 6.7–8.1 (mean 7.4). Epigynum, simple transversal sclerite, whitish posteriorly and medially (Fig. 54); dorsal view as in Figures 75 and 165.

Distribution and habitat: Known from Macaya Biosphere Reserve only (Fig. 199). This species was found in sheltered places close to the ground, also at rocks and soil in the embankment of a ravine (Fig. 14).

Material examined: Haiti: Dept Sud, Macaya B.R.: 1♂, holotype above; same data, 1♂ and 4♀ (ZFMK, Haiti 42/43); same data, 6♀, in pure ethanol (ZFMK, Haiti 77); same data, one juvenile, in pure ethanol (ZFMK, Haiti 84); ravine with some broadleaf trees in pine forest (18°20.5'N, 74°01.0'W), 1350 m a.s.l., 30 November 2007 (B.A. Huber), 3♀ and two juveniles in pure ethanol (ZFMK, Haiti 62); broadleaf forest patch, at 18°20.6'N, 74°01.0'W, 1400 m a.s.l., near ground, 30 November 2007 (B.A. Huber), 1♂ and one juvenile (ZFMK, Haiti 21); broadleaf forest at river, at 18°21.2'N, 74°02.3'W, 1220 m a.s.l., near ground, 1 December 2007 (B.A. Huber), 1♀ and two juveniles (ZFMK, Haiti 44).

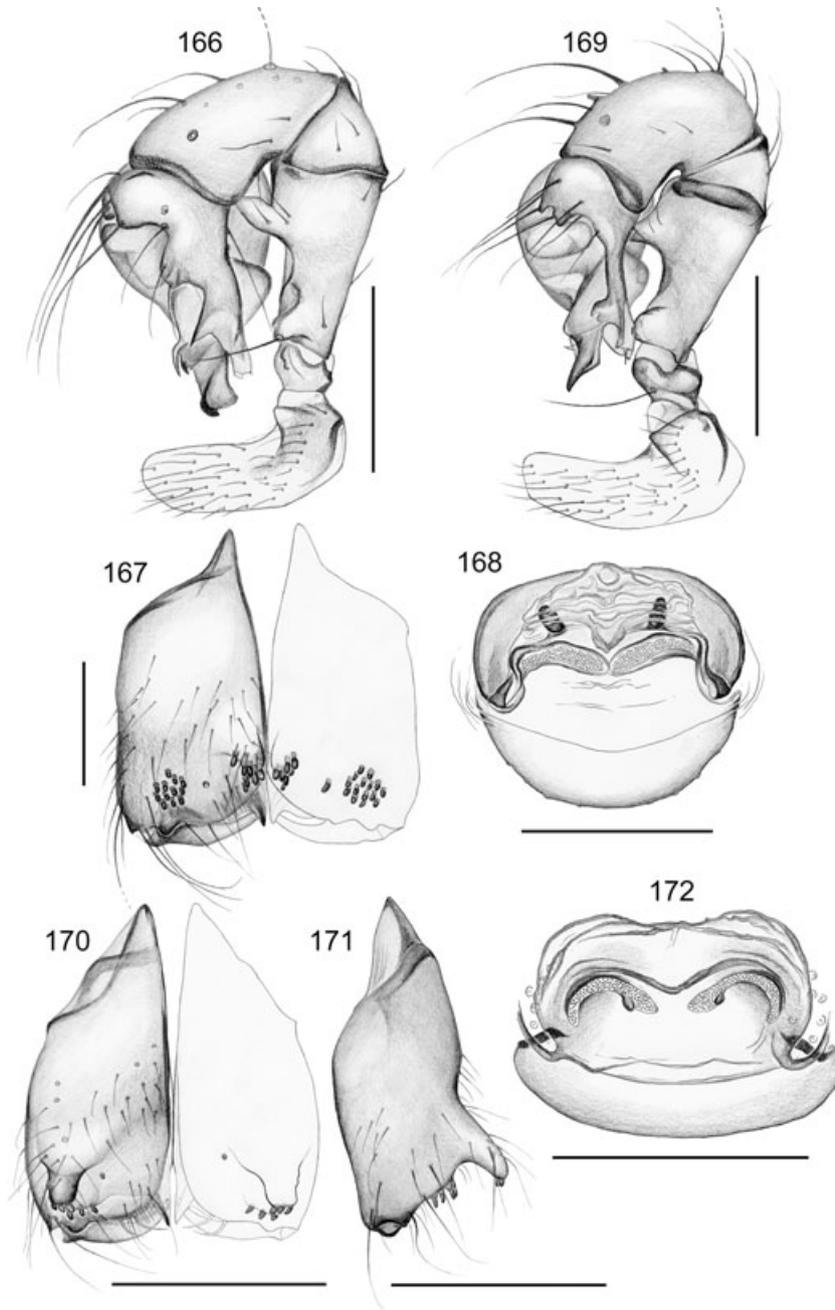
Assigned tentatively: Macaya B.R., ravine at 18°20.2'N, 74°01.3'W, 1220 m a.s.l., 1 December 2007 (B.A. Huber), 1♂ (ZFMK, Haiti 39).

MODISIMUS MARIPOSAS HUBER & FISCHER SP. NOV.

(Figs 76, 166–168, 200)

Type: Male holotype from near Jima (19°01.4'N, 70°28.8'W), Monseñor Nouel Prov., Dominican Republic; degraded forest at brook through plantation, ~700 m a.s.l., near ground, 8 November 2005 (B.A. Huber), in ZFMK (DR 11).

Etymology: The species name honours the Mirabal sisters, who fervently opposed the dictatorship of Trujillo, and formed a group of opponents known as Las Mariposas (The Butterflies). Three of them were assassinated in 1960; the name is used as a noun in apposition.



Figures 166–172. Diagnostic characters. 166–168. *Modisimus mariposas* sp. nov. 166. Left palp, retrolateral view. 167. Male chelicerae, frontal view. 168. Cleared epigynum, dorsal view. 169–172. *Modisimus bachata* sp. nov. 169. Left palp, retrolateral view. 170, 171. Male chelicerae, frontal (170) and lateral (171) views. 172. Cleared epigynum, dorsal view. Scale bars: 0.3 mm.

Diagnosis: Medium-sized species, easily distinguished from congeners by procurus shape (Fig. 166; dorsal projection), club-shaped hairs on male chelicerae (Fig. 176; median hairs on apophyses), and epigynum shape (Fig. 168).

Male (holotype): Total length, 1.9; carapace width, 0.8. Leg 1: 21.5 (5.2 + 0.3 + 5.3 + 8.7 + 2.0); tibia 2, 3.5;

tibia 3, 2.6; tibia 4, 3.4. Tibia 1 L/d: 70. Habitus similar to *M. jima* sp. nov. (cf. Fig. 19), carapace pale ochre-yellow, with light-brown lateral bands, dark median line and wider dark median band visible through cuticle; ocular area also darker, clypeus with pair of brown stripes; sternum mostly light brown, medially whitish; legs ochre to light brown, tips of femora and tibiae lighter, very indistinct darker rings

subdistally on femora and tibiae; abdomen bluish grey, densely covered with small black spots dorsally and laterally, with indistinct whitish lines. Ocular area elevated; thoracic furrow distinct. PME–PME, 70 µm; PME diameter, 105 µm; PME–ALE, 105 µm; AME tiny, but apparently with lenses. Sternum wider than long (0.6/0.4), unmodified. Chelicerae with short modified hairs in distinctive pattern, median group on apophysis, lateral group not elevated (Fig. 167). Palps as in Figure 166, coxa with retrolateral apophysis, femur with proximal flap retrolaterally and distal apophysis ventrally; procurus with rounded dorsal projection and widened distally (mostly membranous structures); bulbal apophysis very wide in dorsal view. Legs with many short vertical hairs on all femora; no curved hairs and no spines; retrolateral trichobothrium on tibia 1 at 12%; prolateral trichobothrium missing on tibia 1, but present on other tibiae; tarsus 1 with ~30 pseudosegments.

Female: In general similar to male; tibia 1 missing in female from near Jima; epigynum in female from near Jima apparently artificially spread, with a pair of dark structures visible through the frontal plate; dorsal view as in Figure 76. The female from Loma Quita Espuela has a very similar, but slightly smaller, epigynum, and is therefore assigned tentatively; tibia 1: 4.0.

Distribution: Known from two localities (one tentative) in the central Dominican Republic (Fig. 200).

Material examined: Dominican Republic: Monseñor Nouel Prov., near Jima: 1♂, holotype above; same data, 1♀ and one juvenile (ZFMK, DR 11).

Assigned tentatively: Dominican Republic: Duarte Prov., Reserva Científica Loma Quita Espuela, at ~500 m a.s.l. (19°21.5'N, 70°09'W), 10 November 2005 (B.A. Huber), 1♀ (ZFMK, DR 27).

***MODISIMUS BACHATA* HUBER & FISCHER SP. NOV.**

(Figs 55, 77, 169–172, 200)

Type: Male holotype from near La Ciénaga, (~19°03'N, 70°53'W), La Vega Prov., Dominican Republic; ~1100 m a.s.l., path along river, under dry rolled-up leaves on ground, 9 November 2005 (B.A. Huber), in ZFMK (DR 19a).

Etymology: The species name refers to bachata, a form of music and dance that originated in the Dominican Republic and in which tales of heartbreak and sadness are prevalent. The name is used as a noun in apposition.

Diagnosis: Medium-sized species, easily distinguished from congeners by procurus shape (Fig. 169; narrow with dorsodistal projection), and club-shaped hairs on male chelicerae (Figs 170, 171; some hairs on distinct lateral apophyses).

Male (holotype): Total length, 1.9; carapace width, 0.8. Leg 1: 13.9 (3.3 + 0.3 + 3.5 + 5.3 + 1.5); tibia 2, 2.0; tibia 3, 1.6; tibia 4, 2.1. Tibia 1 L/d: 47. Habitus similar to *M. jima* sp. nov. (cf. Fig. 19), carapace pale ochre-yellow, with dark median line and wider dark median band visible through cuticle; ocular area also darker, clypeus with pair of brown stripes; sternum mostly light brown, lighter medially; legs ochre to light brown, tips of femora and tibiae lighter, very indistinct darker rings subdistally on femora and tibiae; abdomen bluish grey, black spots dorsally and laterally; light brown genital area and plate in front of spinnerets. Ocular area elevated; thoracic furrow distinct. PME–PME, 70 µm; PME diameter, 105 µm; PME–ALE, 115 µm; AME tiny, but with lenses. Sternum wider than long (0.6/0.5), unmodified. Chelicerae with short modified hairs in distinctive pattern, each proximal group on prominent apophysis, distal group barely elevated (Figs 170, 171). Palps as in Figure 169, coxa with indistinct retrolateral apophysis, femur with proximal flap retrolaterally, and distal apophysis ventrally; procurus very slender, with distinctive distal structures (mostly membranous). Legs with many short vertical hairs on all femora; few spines distally on femur 1, about ten spines in two rows distally on each femur 2; no curved hairs; retrolateral trichobothrium on tibia 1 at 13%; prolateral trichobothrium missing on tibia 1, but present on other tibiae; tarsus 1 with ~25 pseudosegments.

Variation: Some males with longer rows of about ten spines each on femur 2, other males without any spines. Tibia 1 in seven other males: 3.2–3.5 (mean 3.4). All males in AMNH appear artificially darkened.

Female: In general, similar to male. Tibia 1 in three females: 2.2, 2.2, and 2.3. Epigynum, a very simple plate (Fig. 55); dorsal view as in Figures 77 and 172.

Distribution: Known only from the Ciénaga area, in the central Dominican Republic (Fig. 200).

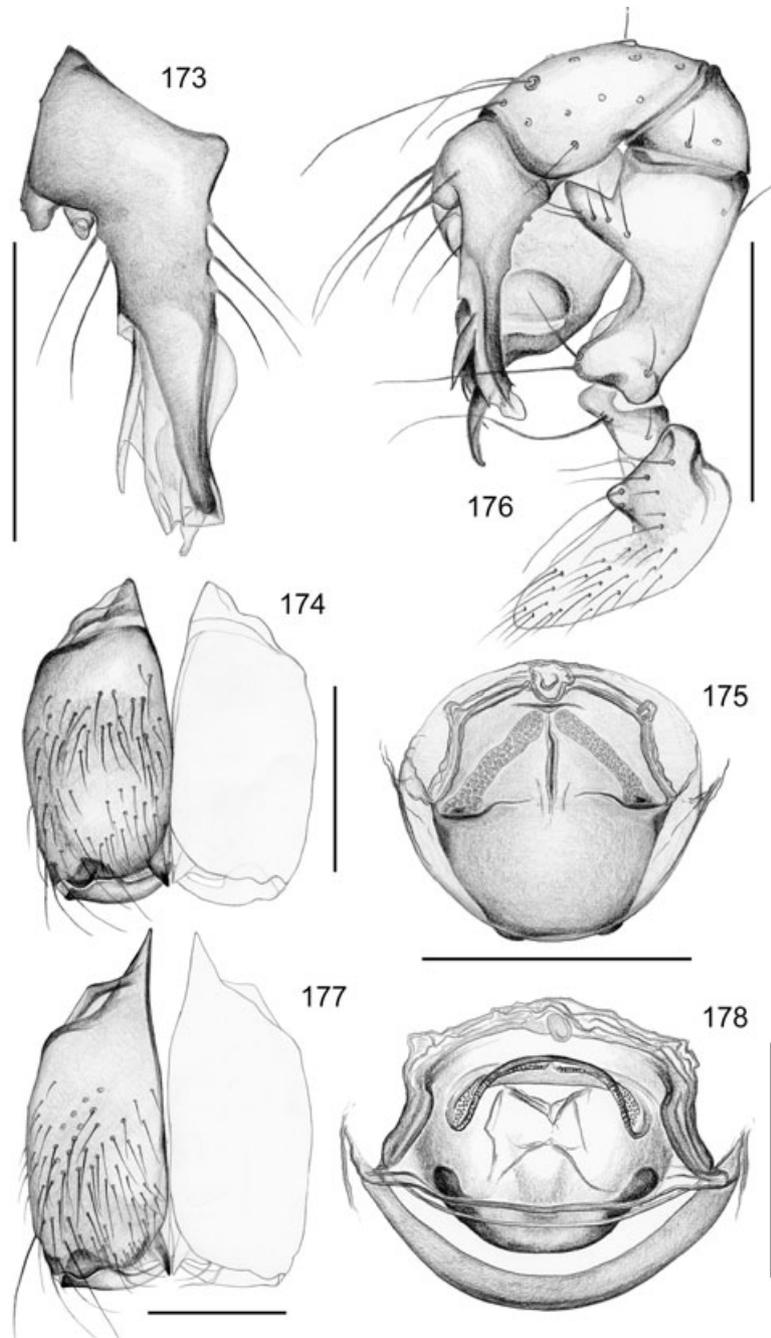
Material examined: Dominican Republic: La Vega Prov., near La Ciénaga, 1♂, holotype above; same

data, 1♂, 3♀ and one juvenile (ZFMK, DR 19); Parque Nacional A. Bermudez, Ciénaga, 1010 m a.s.l., tropical evergreen forest, 19 July–2 August 1995 (S. & J. Peck), 4♂ and two juveniles #95-33 (AMNH); same data but 1100 m a.s.l., 1♂ #95-36 (AMNH); same data but 1020 m a.s.l., 1♂ #95-34 (AMNH).

MODISIMUS CUADRO HUBER & FISCHER **SP. NOV.**

(Figs 56, 78, 99, 111, 112, 173–175, 200)

Type: Male holotype from near La Toma (18°27.5'N, 70°07.2'W), San Cristóbal Prov., Dominican Republic;



Figures 173–178. Diagnostic characters. 173–175. *Modisimus cuadro* sp. nov. 173. Left procursus, retrolateral view. 174. Male chelicerae, frontal view. 175. Cleared epigynum, dorsal view. 176–178. *Modisimus pelejil* sp. nov. 176. Left palp, retrolateral view. 177. Male chelicerae, frontal view. 178. Cleared epigynum, dorsal view. Scale bars: 0.2 mm (175, 178), 0.3 mm (173, 174, 176, 177).

degraded forest at 70 m a.s.l., near ground, 7 November 2005 (B.A. Huber), in ZFMK (DR 5a).

Etymology: The name is derived from the Spanish cuadro (square), and refers to the square-shaped epigynum; it is used as a noun in apposition.

Diagnosis: Medium-sized species, distinguished from congeners by barely modified male chelicerae (Fig. 174; similar to *M. pelejil* sp. nov.), simple square-shaped epigynum (Fig. 56), and procurus shape (Figs 99, 173).

Male (holotype): Total length, 2.7; carapace width, 1.4. Leg 1: 22.8 (5.9 + 0.4 + 6.1 + 8.8 + 1.6); tibia 2, 4.1; tibia 3, 3.1; tibia 4, 3.8. Tibia 1 L/d: 57. Habitus similar to *M. jima* sp. nov. (cf. Fig. 19), carapace pale ochre-yellow, with pair of light-brown marks on posterior half, and smaller indistinct pair in front of them; dark median line and wider dark median band visible through cuticle; ocular area laterally brown, clypeus with pair of brown stripes; sternum mostly light brown, whitish medially; legs light brown, tips of femora and tibiae lighter, very indistinct darker rings subdistally on femora and tibiae; abdomen bluish grey, densely covered with small black spots dorsally and laterally, with pale-bluish lines dorsally (medially) and laterally (two pairs). Ocular area elevated; thoracic furrow distinct. PME–PME, 135 µm; PME diameter, 115 µm; PME–ALE, 150 µm; AME–AME, 20 µm; AME diameter, 20 µm. Sternum wider than long (0.8/0.6), unmodified. Chelicerae barely modified, with slightly stronger hairs proximally, and paler area with few hairs (Fig. 174). In general, palps very similar to *M. kiskeya* sp. nov. and *M. femoratus* (cf. Figs 124, 130), but procurus with distinctive mostly membranous projections distally (Figs 99, 173). Legs with short spines in single rows on femur 1 (~30 spines) and femur 2 (~20); many short vertical hairs on all femora; no curved hairs; retrolateral trichobothrium on tibia 1 at 11%; prolateral trichobothrium missing on tibia 1, present on other tibiae; tarsus 1 with ~25 pseudosegments.

Variation: Tibia 1 in nine other males: 5.2–7.0 (mean 6.1). In some males, the brown marks on the carapace and/or the white-bluish lines on the abdomen are very indistinct; the male from near La Mula and two of the four males from Cuevas Pomier lack spines on femora 1 and 2, but have identical palps and chelicerae.

Female: In general, similar to male; colour variation as in males. Tibia 1 in 12 females: 4.0–4.5 (mean 4.3). Epigynum, a simple brown plate (Fig. 56); dorsal view as in Figures 78 and 175, with anteriorly converging pore plates.

Distribution and habitat: Known from several localities in the Dominican Republic (Fig. 200). This species typically occurs close to the ground, under logs and dead leaves, and in low vegetation.

Material examined: Dominican Republic: San Cristóbal Prov., near Toma, 1♂, holotype above; same data, 4♂, 4♀ and four juveniles (ZFMK, DR 5); same data, 1♀, in pure ethanol (ZFMK, DR 100-3); Borbon, Cuevas Pomier, tropical deciduous forest, 200 m a.s.l., 13–28 July 1995 (S. & J. Peck), 1♂, #95-23 (AMNH); same data but 28 July–5 August 1995, #95-47, 3♂ (AMNH). Borbon, Cuevas Pomier, Cueva Puente, twilight zone, 13 July 1995 (S. & J. Peck), 1♀, #95-24 (AMNH); Borbon, Cuevas Pomier, C. Funeraria, 250 m a.s.l., 14 July 1995 (S. & J. Peck), 6♂, 2♀ and three juveniles, #95-28 (AMNH); Borbon, Cuevas Pomier, Cueva La Ligua, 13 July 1995 (S. & J. Peck), 1♂, #95-25 (part) (AMNH). Distrito Nacional, Santo Domingo, Jardín Botánico (18°29.7'N, 69°57.2'W), forest along brook, 50 m a.s.l., low vegetation, near ground, 27 November 2005 (B.A. Huber), 3♀ (ZFMK, DR 108); Jardín Botánico, under roof of shelter, 18–22 March 1984 (H. & L. Levi), 1♂ and 2♀ (MCZ). Peravia Prov., near Nizao (18°36.0'N, 70°29.2'W), degraded forest along river, 670 m a.s.l., 19 November 2005 (B.A. Huber), 1♂ (ZFMK, DR 78). Monte Plata Prov., near Monte Plata (18°48.7'N, 69°47.1'W), degraded forest along river, 60 m a.s.l., near ground, 21 November 2005 (B.A. Huber), 1♂, 2♀ (ZFMK, DR 92). San Pedro de Macorís Prov., near La Mula (18°30.2'N, 69°36.7'W), degraded forest at entrance to cave, 30 m a.s.l., 26 November 2005 (B.A. Huber), 1♂ and 2♀ (ZFMK, DR 107). La Romana Prov., forest at Rio Chavón (18°26.5'N, 68°53.3'W), 20 m a.s.l., 23 November 2005 (B.A. Huber), 2♀ and one juvenile (ZFMK, DR 101). La Vega Prov., 10 km north-east of Jarabacoa Raquet Club, 550 m a.s.l., mixed forest, 20 July–4 August 1995 (S. & J. Peck), 3♂ and one juvenile #95-37 (AMNH). María Trinidad Sánchez Prov., near La Entrada, forest above rocks at Santuario de La Virgen (19°34.9'N, 69°54.0'W), 15 m a.s.l., 12 November 2005 (B.A. Huber), 1♀ (ZFMK, DR 42).

***MODISIMUS PELEJIL* HUBER & FISCHER SP. NOV.**

(Figs 57, 79, 176–178, 200)

Type: Male holotype from east of San Juan de la Maguana (18°47.6'N, 71°12.2'W), San Juan Prov., Dominican Republic; degraded forest along river, 410 m a.s.l., 16 November 2005 (B.A. Huber), in ZFMK (DR 59a).

Etymology: The name honours the victims of the massacre of 1937, when Trujillo had 25 000 Haitians murdered within 36 hours. The Spanish word *perejil*

was used to identify Haitians, who tend to pronounce it like 'pelejil'. The name is used as a noun in apposition.

Diagnosis: Medium-sized species, distinguished from congeners by barely modified male chelicerae (Fig. 177; similar to *M. cuadro* sp. nov.), shapes of epigynum (Fig. 57) and procurus (Fig. 176).

Male (holotype): Total length, 2.1; carapace width, 0.95. Leg 1: 16.4 (4.2 + 0.3 + 4.3 + 6.2 + 1.4); tibia 2, 2.8; tibia 3, 2.3; tibia 4, 2.8. Tibia 1 L/d: 55. Habitus similar to *M. jima* sp. nov. (cf. Fig. 19), carapace pale ochre-white, with dark median band of internal structure visible through cuticle, ocular area and clypeus darker brown; sternum with two wide brown longitudinal bands, whitish medially; legs light ochre-brown, tips of femora and tibiae whitish; abdomen bluish grey, densely covered with black spots dorsally and laterally, with some bluish-white spots along median line and in dorsal transversal line. Ocular area strongly elevated, with several stronger hairs on top; thoracic furrow distinct. PME–PME, 80 µm; PME diameter, 95 µm; PME–ALE, 105 µm; black spot in AME area, but apparently no lenses. Sternum wider than long (0.6/0.4), unmodified. Chelicerae barely modified, with a pair of slightly elevated light areas near median line, and slightly stronger hairs more laterally (Fig. 177). Palps as in Figure 176, coxa with retrolateral apophysis, femur with rounded proximal and pointed distal ventral apophyses; procurus with dorsal spine-like process and membranous distal structures, bulb with large, weakly curved apophysis and complex membranous subdistal projections. Legs with small spines in ventral rows on femora 1 and 2 (~25 spines on femur 1; 20 on femur 2); retrolateral trichobothrium on tibia 1 at 15%; all femora with more than the usual number of short vertical hairs; no curved hairs; prolateral trichobothrium missing on tibia 1, but present on all other tibiae. Tarsus 1 with ~20 pseudosegments.

Variation: The other male lacks spines on femora 1 and 2; tibia 1: 3.9.

Female: In general similar to male. Tibia 1 in two females: 3.0 and 3.5. Epigynum, simple roundish plate, barely elevated (Fig. 57); dorsal view as in Figures 79 and 178.

Distribution: Known from type locality only (Fig. 200).

Material examined: Dominican Republic: San Juan Prov., east of San Juan de la Maguana, 1♂, holotype; same data, 1♂, 3♀ and two juveniles (ZFMK, DR 59).

MODISIMUS MANGO HUBER SP. NOV.

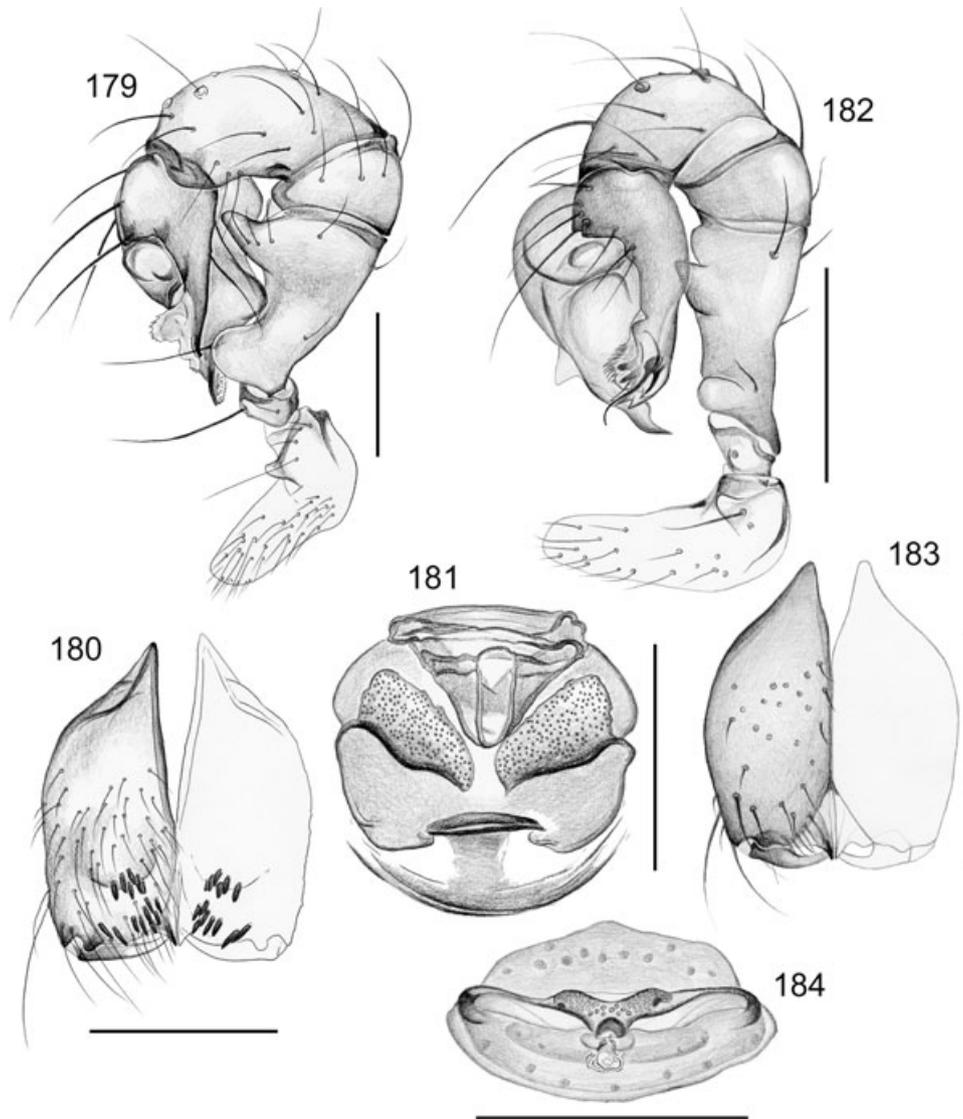
(Figs 7, 8, 25, 58, 80, 179–181, 200)

Type: Male holotype from Le Prete (18°15.9'N, 73°56.7'W; ~170 m a.s.l.), Dept Sud, Haiti, in small web under dead mango leaves on the ground, near river, 2 December 2007 (B.A. Huber), in ZFMK (Haiti 16a).

Etymology: The name refers to the fact that all specimens were collected under dry mango leaves on the ground; it is used as a noun in apposition.

Diagnosis: Small, long-legged species, with pair of small marks on carapace (Fig. 25), distinctive pattern of modified hairs on chelicerae (Fig. 180), and distinctive shapes of epigynum (Fig. 58) and procurus (Fig. 179).

Male (holotype): Total length, 1.1; carapace width, 0.63. Leg 1: 15.5 (3.9 + 0.3 + 4.0 + 6.0 + 1.3); tibia 2, 2.2; tibia 3, 1.5; tibia 4, 1.9. Tibia 1 L/d: 55. Habitus as in Figures 7, 8, 25, carapace pale ochre-yellow, with dark mark medially, and a pair of small marks laterally between legs 2 and 3, clypeus also darkened, sternum whitish with pair of darker lateral areas frontally; legs ochre-yellow, with indistinct darker rings on femora and tibiae subdistally, patellae also slightly darker; abdomen bluish grey, with large black and small white spots dorsally and laterally; genital area and plate in front of spinnerets also slightly darker. Ocular area elevated; thoracic furrow distinct. PME–PME, 60 µm; PME diameter, 70 µm; PME–ALE, 70 µm; small median pigment spot in place of AME, no lenses. Sternum wider than long (0.45/0.35), unmodified. Chelicerae with ~15 modified hairs on each side, six of them on low elevation (Fig. 180). Palps as in Figure 179, coxa with light retrolateral apophysis, femur with large proximal flap and long distal ventral apophysis, procurus simple, tapering distally, with membranous structures distally, barely visible in dissecting microscope, and bulbal apophysis with transparent lateral flap. Legs without spines; retrolateral trichobothrium on tibia 1 at 16%; all femora with many short vertical hairs; curved hairs on tibiae and metatarsi 1 and 2; prolateral trichobothrium missing on tibia 1, present on all other tibiae; tarsus 1 with more than 15 pseudosegments, distally fairly distinct.



Figures 179–184. Diagnostic characters. 179–181. *Modisimus mango* sp. nov. 179. Left palp, retrolateral view. 180. Male chelicerae, frontal view. 181. Cleared epigynum, dorsal view. 182–184. *Modisimus cienaga* sp. nov. 182. Left palp, retrolateral view. 183. Male chelicerae, frontal view. 184. Cleared epigynum, dorsal view. Scale bars: 0.2 mm.

Variation: The second male has a lighter abdomen and fewer white spots. Tibia 1: 4.1.

Female: In general, similar to male, but dark rings on legs clearly more distinct. Tibia 1: 2.2 and 2.3. Epigynum, simple plate, with lateral sclerites converging posteriorly, and median transverse sclerite (Fig. 58); dorsal view as in Figures 80, 181.

Distribution: Known from type locality only (Fig. 200).

Material examined: Haiti: Dept Sud, Le Prete, 1♂, holotype above; same data, 1♂ and 2♀ (ZFMK, Haiti

16); same data, 1♂ and 2♀, in pure ethanol (ZFMK, Haiti 89).

***MODISIMUS CIENAGA* HUBER & FISCHER SP. NOV.**

(Figs 26, 85, 87, 92, 100–103, 113, 182–184, 200)

Type: Male holotype from near La Ciénaga (19°03'N, 70°53'W; ~1000 m a.s.l.), La Vega Province, Dominican Republic; forest along river, among the dry leaves of a dead epiphyte on the ground, 9 November 2005 (B.A. Huber), in ZFMK (DR 17a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Small, short-legged species, similar to *M. culicinus* (carapace pattern, Fig. 26; palpal femur, Fig. 182), but male chelicerae (Fig. 183) and male clypeus unmodified, distinctive procurus tip (Figs 100, 103).

Male (holotype): Total length, 1.2; carapace width, 0.55. Leg 1: 5.2 (1.4 + 0.2 + 1.4 + 1.6 + 0.5); tibia 2, 1.4; tibia 3, 0.7; tibia 4, 1.0. Tibia 1 L/d: 23. Habitus as in Figure 26, carapace light ochre-yellow, with three pairs of distinct dark spots and dark median Y-shaped mark, clypeus with a pair of brown stripes, narrowing towards chelicerae, sternum whitish; legs light ochre-yellow, very indistinct darker rings subdistally on tibiae and femora, tips of femora and tibiae whitish; abdomen bluish grey with large black spots in a row on each side of heart and laterally; genital area light brown. Ocular area moderately elevated (Fig. 85); thoracic furrow distinct (Fig. 87). PME–PME, 45 µm; PME diameter, 55 µm; PME–ALE, 45 µm; no AME. Sternum wider than long (0.4/0.3), unmodified. Chelicerae unmodified (Fig. 183). Palps as in Figure 182, coxa with light retrolateral apophysis, femur with rounded basal and more pointed distal ventral apophyses, procurus complex distally, with membranous and sclerotized structures (Figs 100, 103), bulb with simple distal apophysis and membranous dorsal structure (Fig. 102). Legs without spines and curved hairs; no short vertical hairs on femora; retrolateral trichobothrium on tibia 1 at 31%; prolateral trichobothrium apparently absent on tibia 1, but present on other tibiae; tarsus 1 with ~15 pseudosegments.

Variation: Tibia 1 in two other males: 1.3 and 1.4.

Female: In general similar to male, but dark rings on legs more distinct, and with additional rings on femora (proximally and medially) and tibiae (proximally). Tibia 1 in seven females: 0.96–1.10 (mean 1.03). Epigynum, very simple externally; dorsal view as in Figure 184, with contiguous pore plates.

Distribution: Known from type locality only (Fig. 200).

Material examined: Dominican Republic: La Vega Province, near La Ciénaga, 1♂, holotype above; same data, 2♂ and 7♀ (ZFMK; 1♂ used for SEM; chelicerae of other male lost; DR 17); same data, 3♀ and one juvenile, in pure ethanol (ZFMK, DR 100-13).

MODISIMUS CULICINUS (SIMON, 1893)

New records: Dominican Republic: San Pedro de Macorís Prov., Juan Dolio (18°25.5'N, 69°25.6'W), in hotel room, 10 m a.s.l., 23 November 2005 (B.A.

Huber), 1♂, 3♀ and two juveniles (ZFMK, DR 104); same data, 1♂ and 11♀, in pure ethanol (ZFMK, DR 100-43).

Assigned tentatively: Dominican Republic: Barahona Prov., near Fondo Negro (18°25.2'N, 71°06.5'W), degraded bush, 190 m a.s.l., 19 November 2005 (B.A. Huber), 1♀ (ZFMK, DR 75).

MODISIMUS PALVET HUBER & FISCHER SP. NOV.

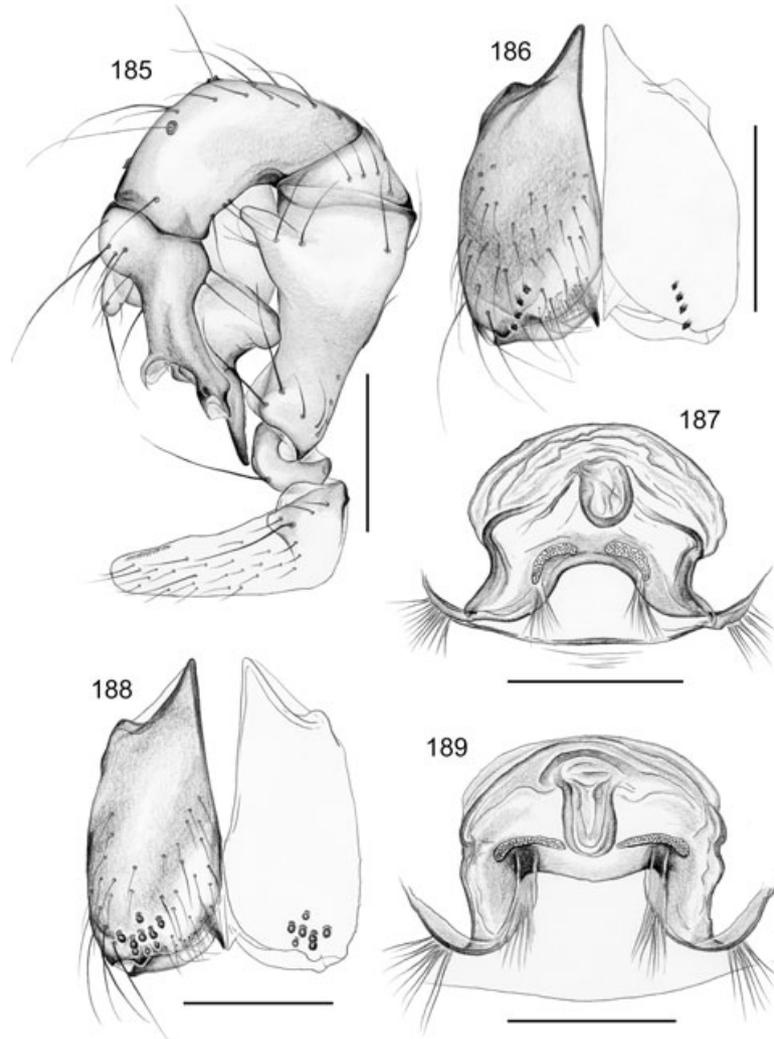
(Figs 9, 16, 35, 60, 89, 93, 114, 115, 121, 122, 185–187, 201)

Type: Male holotype from Macaya B.R., at 18°20.5'N, 74°01.0'W, Dept Sud, Haiti; ravine, with some broad-leaf trees in pine forest, 1350 m a.s.l., domed sheets connected to undersides of green leaves, 30 November 2007 (B.A. Huber), in ZFMK (Haiti 19a).

Etymology: The species name is derived from the Creole words *pal* (pale) and *vèt* (green), and refers to the colour of this species; it is used as a noun in apposition.

Diagnosis: Medium-sized, pale-greenish, long-legged species, with six eyes, distinguished from close relatives (*M. miri* sp. nov. and *M. berac* sp. nov.) by pattern and conical shape of modified hairs on male chelicerae (Figs 89, 186), and by epigynum shape (Figs 60, 114); further distinguished from *M. miri* sp. nov. by slightly more slender procurus, and absence of apophyses above fang joints; distinguished from *M. berac* sp. nov. by slightly more slender bulbal apophysis, and slightly longer dorsal cymbium projection.

Male (holotype): Total length, 1.9; carapace width, 0.73. Leg 1: 23.6 (5.7 + 0.3 + 5.7 + 9.8 + 2.1); tibia 2, 3.7; tibia 3, 2.4; tibia 4, 2.8. Tibia 1 L/d: 76. Habitus as in Figures 9, 35, carapace pale ochre-yellow, clypeus with wide brown distal margin, sternum whitish; legs pale ochre-yellow with darker patella area and tibia–metatarsus joints; abdomen pale greenish grey, with some purple spots close together dorsally, ventrally monochromous. Ocular area elevated; thoracic furrow distinct, but shallow. PME–PME, 95 µm; PME diameter, 55 µm; PME–ALE, 95 µm; no AME. Sternum as wide as long (0.45), unmodified. Chelicerae with four cone-shaped modified hairs on each side (Figs 89, 186). Palps as in Figure 185, coxa with retrolateral apophysis, femur with low proximal projection, and distal apophysis ventrally; procurus rather short and wide, with several membranous structures, including distinctive dorsal projection, bulb with prominent apophysis, and membranous and sclerotized subdistal elements. Legs



Figures 185–189. Diagnostic characters. 185–187. *Modisimus palvet* sp. nov. 185. Left palp, retrolateral view. 186. Male chelicerae, frontal view. 187. Cleared epigynum, dorsal view. 188, 189. *Modisimus berac* sp. nov. 188. Male chelicerae, frontal view. 189. Cleared epigynum, dorsal view. Scale bars: 0.2 mm.

without spines, many short vertical hairs on all femora; without curved hairs; retrolateral trichobothrium on tibia 1 at 7%; prolateral trichobothrium missing on tibia 1, present on all other tibiae; tarsus 1 with ~35 pseudosegments.

Variation: Tibia 1 in four other males: 5.3, 5.3, 5.7, and 5.8.

Female: In general, similar to male, but paler, without purple spots on abdomen; some females with white spots dispersed over dorsal side of abdomen, and indistinct darker rings subdistally on femora. Tibia 1 in six females: 3.8–4.5 (mean 4.1). Epigynum, simple externally (Figs 60, 114); dorsal view as in Figure 187.

Distribution: Known from type locality only (Fig. 201).

Material examined: Haiti: Dept Sud, Macaya B.R.: 1♂, holotype above; same data, 4♂ and 6♀ (ZFMK, Haiti 19); same data, 4♀, in pure ethanol (ZFMK, Haiti 64).

***MODISIMUS BERAC* HUBER SP. NOV.**

(Figs 15, 36, 59, 81, 188, 189, 201)

Type: Male holotype from broadleaf forest patch ('Berac', 18°19.7'N, 72°17.7'W), La Visite N. P., Dept Sud-Est, Haiti, 1580 m a.s.l., domed sheet connected to underside of green fern leaves, 27 November 2007 (B.A. Huber), in ZFMK (Haiti 23a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Medium-sized, pale-greenish, long-legged species, with six eyes, distinguished from close relatives (*M. palvet* sp. nov. and *M. miri* sp. nov.) by pair of distinct dark epigynal sclerites (Fig. 59); further distinguished from *M. palvet* sp. nov. by the pattern of club-shaped modified hairs on male chelicerae (Fig. 188), slightly stronger bulbal apophysis, distally curved towards prolateral, and slightly shorter dorsal cymbium projection; distinguished from *M. miri* sp. nov. by absence of apophyses above fang joints.

Male (holotype): Total length, 2.0; carapace width, 0.8. Leg 1: 20.3, (4.8 + 0.3 + 4.9 + 7.9 + 2.4); tibia 2, 3.2; tibia 3, 2.2; tibia 4, 2.5. Tibia 1 L/d: 65. Habitus as in Figure 36, carapace pale ochre-yellow to whitish, clypeus with wide brown distal margin, sternum whitish; legs pale ochre-yellow, with darker patella area and tibia–metatarsus joints; abdomen pale greenish grey with black spot dorsally (smaller and more posterior than in Fig. 36), ventrally monochromous. Ocular area slightly elevated; thoracic furrow distinct but shallow. PME–PME, 125 µm; PME diameter, 70 µm; PME–ALE, 70 µm; no AME. Sternum slightly wider than long (0.6/0.55), unmodified. Chelicerae with around eight cone-shaped modified hairs on each side (Fig. 188). Palps very similar to *M. palvet* sp. nov. (cf. Fig. 185), but slightly larger, with slightly shorter dorsal projection on cymbium, and bulbal apophysis stronger and strongly bent towards prolateral distally. Two long spines on each femur 1, many short vertical hairs on all femora; curved hairs on tibiae and metatarsi 1–3; retrolateral trichobothrium on tibia 1 at 7%; prolateral trichobothrium missing on tibia 1, present on all other tibiae; tarsus 1 with ~30 pseudosegments.

Variation: One male with large anterior black spots dorsally on abdomen (Fig. 36). Tibia 1 in three other males: 5.4, 5.4, and 5.7.

Female: In general similar to male, but paler, without darker clypeus margin, spots on abdomen variable (from monochromous to three large black spots; same in juveniles). Tibia 1 in nine females: 3.8–4.5 (mean 4.1). Epigynum, simple externally, with distinctive pair of black spots (Fig. 59); dorsal view as in Figures 81, 189.

Distribution: Known from type locality only (Fig. 201).

Material examined: Haiti: Dept Sud-Est, La Visite N. P., 1♂, holotype above; same data, 3♂, 9♀ and six juveniles (ZFMK, Haiti 23); same data, 4♂, 1♀ and one juvenile in pure ethanol (ZFMK, Haiti 69).

MODISIMUS MIRI HUBER & FISCHER SP. NOV.

(Figs 61, 82, 190, 191, 201)

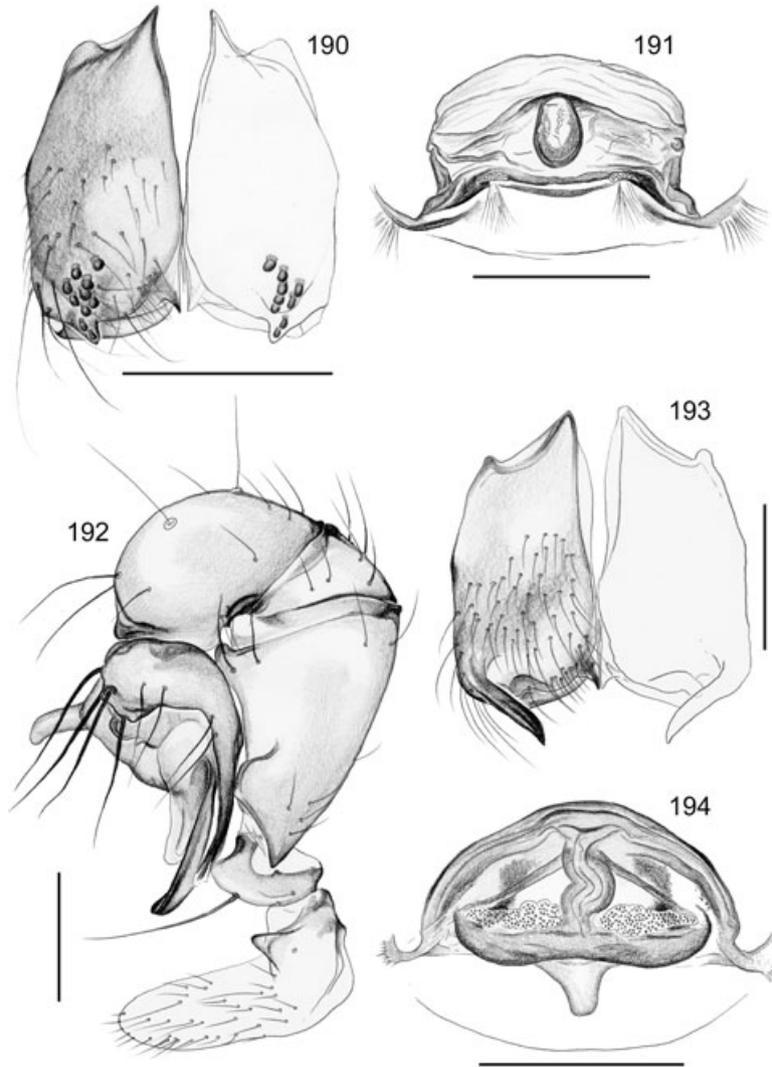
Type: Male holotype from Reserva Científica Loma Quita Espuela, near summit (19°21.5'N, 70°09'W), Duarte Prov., Dominican Republic; 900 m a.s.l., underside of manacra (palm) leaves, 10 November 2005 (B.A. Huber), in ZFMK (DR 23a).

Etymology: The species name honours the Dominican poet and writer Pedro Julio Mir Valentín (1913–2000).

Diagnosis: Medium-sized, pale-greenish, long-legged species, with six eyes, distinguished from close relatives (*M. palvet* sp. nov. and *M. berac* sp. nov.) by epigynum shape (Fig. 61) and pair of apophyses above fang joints (Fig. 190); further distinguished from *M. palvet* sp. nov. by pattern of club-shaped modified hairs on male chelicerae (Fig. 190) and slightly wider procurus.

Male (holotype): Total length, 1.9; carapace width, 0.80. Leg 1: 24.0 (5.8 + 0.3 + 5.8 + 9.8 + 2.3); tibia 2, 4.0; tibia 3, 2.8; tibia 4, 3.1. Tibia 1 L/d: 72. Habitus similar to *M. palvet* sp. nov. (cf. Fig. 35), carapace pale ochre-yellow to whitish, clypeus with wide brown distal margin, sternum whitish; legs pale ochre-yellow, with darker patella area and tibia–metatarsus joints; abdomen pale greenish grey with purplish marks dorsally at heart area, monochromous ventrally. Ocular area slightly elevated; thoracic furrow distinct but shallow. PME–PME, 95 µm; PME diameter, 70 µm; PME–ALE, 80 µm; no AME. Sternum slightly wider than long (0.60/0.55), unmodified. Chelicerae with about ten club-shaped modified hairs on each side, and distinctive apophyses above fang joints (Fig. 190). Palps very similar to *M. palvet* sp. nov. (cf. Fig. 185), procurus slightly wider, and bulbal apophysis slightly wider and shorter. Long spines on femora 1 (three or four) and femora 2 (two), many short vertical hairs on all femora; without curved hairs; retrolateral trichobothrium on tibia 1 at 7%; prolateral trichobothrium missing on tibia 1, present on all other tibiae; tarsus 1 with ~30 pseudosegments.

Variation: Other male with entire clypeus and anterior side of ocular area brown. Tibia 1: 5.4.



Figures 190–194. Diagnostic characters. 190, 191. *Modisimus miri* sp. nov. 190. Male chelicerae, frontal view. 191. Cleared epigynum, dorsal view. 192–194. *Modisimus paraiso* sp. nov. 192. Left palp, retrolateral view. 193. Male chelicerae, frontal view. 194. Cleared epigynum, dorsal view. Scale bars: 0.2 mm.

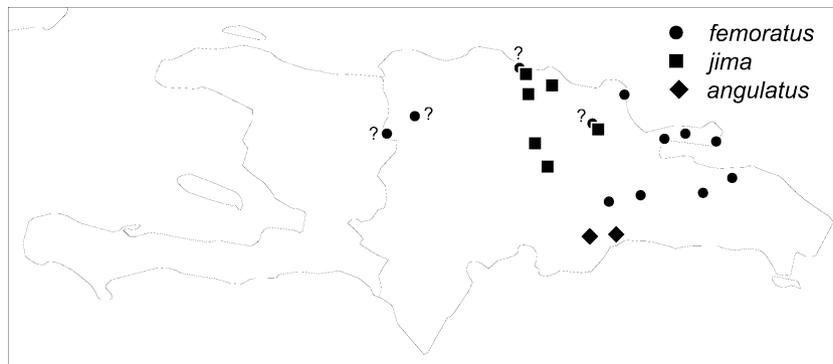


Figure 195. Known distributions of representatives of the *femoratus* group, part 1 (see also Fig. 196). The question marks indicate specimens that are assigned tentatively to *Modisimus femoratus*.



Figure 196. Known distributions of representatives of the *femoratus* group, part 2 (see also Fig. 195).

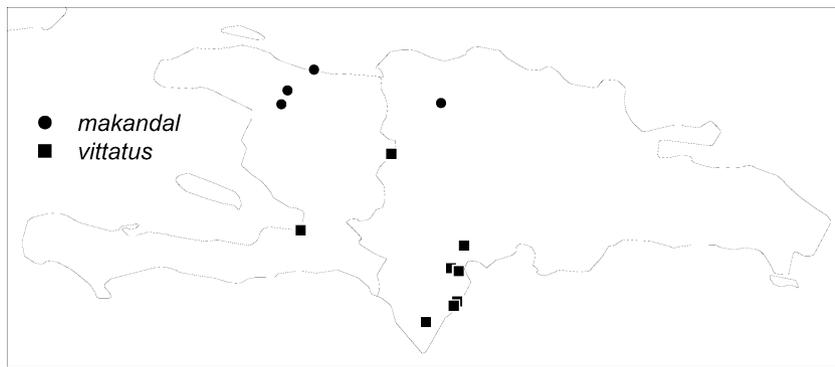


Figure 197. Known distributions of *Modisimus vittatus* and *Modisimus makandal* sp. nov.

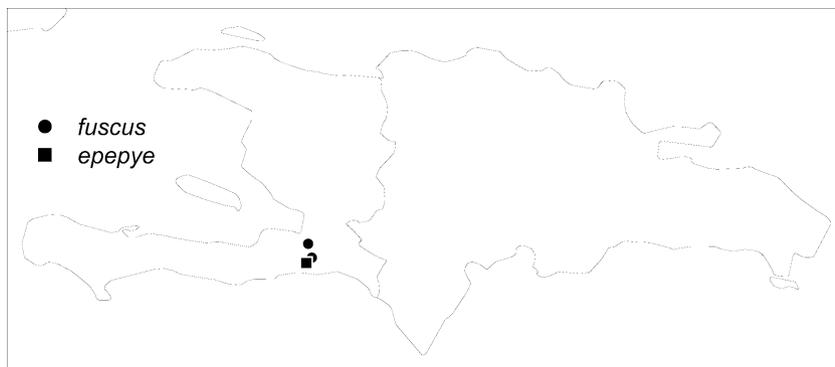


Figure 198. Known distributions of representatives of the *fuscus* group.

Female: In general similar to male, without darkened clypeus. Tibia 1: 4.2. Epigynum, simple externally (Fig. 61); dorsal view as in Figures 82, 191.

Distribution: Known from type locality only (Fig. 201).

Material examined: Dominican Republic: Duarte Prov., Reserva Científica Loma Quita Espuela, 1♂, holotype above; same data, 1♂, 1♀ and one juvenile

(ZFMK, DR 23); same data, one juvenile, in pure ethanol (ZFMK, DR 100-24).

MODISIMUS PARAISO HUBER SP. NOV.

(Figs 10, 37, 62, 192–194, 201)

Type: Male holotype from ~7 km north-west of Paraíso (18°02.4'N, 71°11.6'W; ~180 m a.s.l.), Barahona Prov., Dominican Republic; forest near river, in vegetation

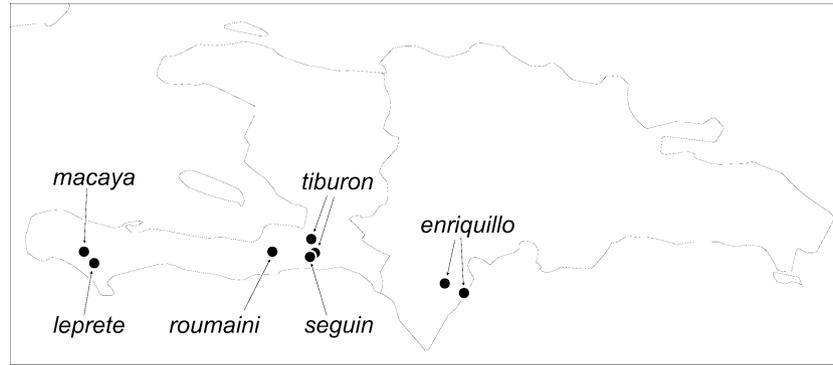


Figure 199. Known distributions of representatives of the southern paleoisland group.

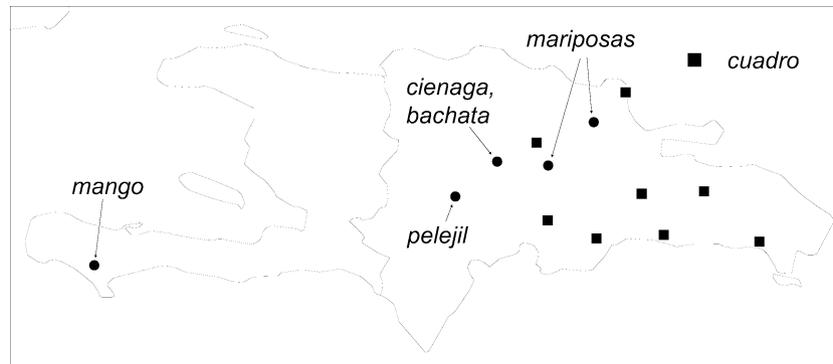


Figure 200. Known distributions of *Modisimus cienaga* sp. nov. and species that are not yet assigned to any species group.

about 0.5–2 m above the ground, from sheet webs connected to undersides of leaves, 7 December 2007 (B.A. Huber), in ZFMK (Haiti 53a).

Etymology: The species name refers to the type locality; it is used as a noun in apposition.

Diagnosis: Medium-sized, pale-greenish, long-legged species, with six eyes, easily distinguished from close relatives (*M. palvet* sp. nov., *M. miri* sp. nov., and *M. berac* sp. nov.) and other congeners by long male cheliceral apophyses (Fig. 193), simple rod-shaped procurus (Fig. 192), and distinctive dorsal projection on bulb (Fig. 192).

Male (holotype): Total length, 2.1; carapace width, 0.80. Leg 1: 24.4 (5.7 + 0.3 + 5.9 + 10.2 + 2.3); tibia 2, 3.8; tibia 3, 2.7; tibia 4, 3.1. Tibia 1 L/d: 74. Habitus as in Figures 10, 37, carapace pale ochre-yellow, clypeus light brown with darker lateral bands, sternum whitish with pair of darker lateral areas frontally; legs pale ochre-yellow with darker patella area and tibia–metatarsus joints; abdomen ochre-grey with several large white spots dorsally. Ocular area elevated; thoracic furrow distinct, but shallow. PME–

PME, 105 µm; PME diameter, 80 µm; PME–ALE, 95 µm; no AME. Sternum wider than long (0.55/0.45), unmodified. Chelicerae with pair of long apophyses (Fig. 193). Palps as in Figure 192, coxa with retrolateral apophysis, trochanter with small ventral projection, femur strongly widened distally, with proximal flap retrolaterally and distal apophysis ventrally; procurus very simple, without dorsal membranous structures, bulb with distinctive dorsal projection, prominent curved apophysis, and membranous embolus area. Legs with three or four long, and more than 30 short, spines on femur 1, many short vertical hairs on all femora; without curved hairs; retrolateral trichobothrium on tibia 1 at 9%; prolateral trichobothrium missing on tibia 1, present on all other tibiae; tarsus 1 with more than 30 pseudosegments, distally fairly distinct.

Variation: Some males with distinct purple mark on abdomen medially; some males without white spots on abdomen. Tibia 1 in five other males: 5.8–6.9 (mean 6.3).

Female: In general similar to male, but paler, and clypeus with dark V-shaped mark. Tibia 1 in eight

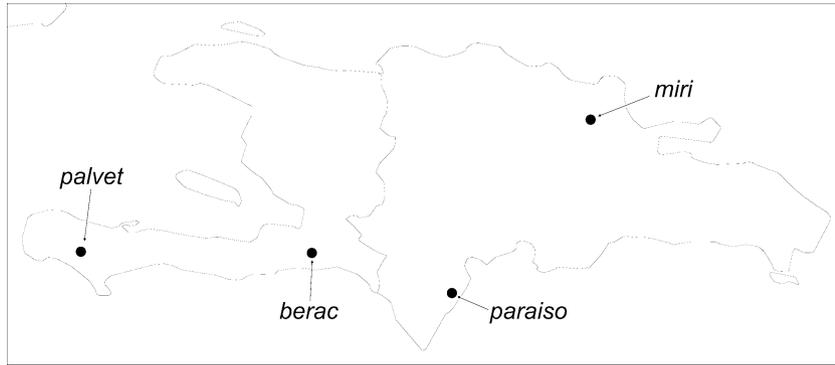


Figure 201. Known distributions of representatives of the leaf-dwelling species group.

females: 3.6–4.8 (mean 4.1). Epigynum, very simple externally (Fig. 62); dorsal view as in Figure 194.

Distribution: Known from type locality only (Fig. 201).

Material examined: Dominican Republic: Barahona Prov., ~7 km north-west of Paraiso, 1♂, holotype above; same data, 8♂ and 11♀ (ZFMK, Haiti 53); same data, 4♂ and 1♀, in pure ethanol (ZFMK, Haiti 98); same locality (7 km north-west of Paraiso), 200 m a.s.l., rainforest remnant, sweeping, 27 November 1991 (Masner & Peck), 1♂ and 2♀ (AMNH).

DISCUSSION

ENDEMICISM AND CONSERVATION STATUS

All of the species described above are exclusively known from Hispaniola. Only *M. glaucus* was originally described from Hispaniola, St. Thomas, and Jamaica (Simon, 1893a, b), but as noted above, the taxonomic identity of this species remains an open question, and the records from St. Thomas and Jamaica must be doubted. High species-level endemism has also been described for other taxa in the West Indies in general, like nonvolant mammals (100%), amphibians (99%), reptiles (96%), and freshwater fishes (96%) (Hedges, 1996, 2001, 2006a), certain insect groups like stick insects and mutillid wasps ($\geq 90\%$) (Genaro & Tejuca, 2001), certain butterfly families like Satyridae (100%) (Miller & Miller, 2001), and palms (90%) (Roncal *et al.*, 2008). In the case of *Modisimus*, we must concede that most Greater Antillean species remain undescribed. We made a substantial effort to compare most described and numerous undescribed species from Cuba, Puerto Rico, and the Central American mainland with the Hispaniolan species, but found no species to occur on more than one island (except for the synanthropic and cosmopolitan *M. culicinus*). However, the pholcids of Eastern Cuba

and Puerto Rico, areas that were connected to northern and central Hispaniola, respectively, during the Early Oligocene and late into the Miocene (Iturralde-Vinent & MacPhee, 1999), and that remain geographically fairly close, remain poorly known.

The differences in the regional conservation status between the Dominican Republic and Haiti (Hedges & Woods, 1993; Diamond, 2005) are clearly reflected by our results. In the Dominican Republic, most species were collected at more than one locality: suitable forests (including degraded secondary forests) were encountered frequently, almost all over the country, and most sites visited yielded at least one species of *Modisimus*, with a maximum of four species per locality. In Haiti, by contrast, most species were found only at the respective type localities: it was extremely difficult to find suitable habitats, which explains the lower number of collecting sites visited in the same time period (14 vs. 33); most of the country harbours just two ecologically tolerant and widespread species (*M. vittatus* and *M. makandal* sp. nov.); most other Haitian species described herein are restricted to the two national parks and their surrounding areas, the La Visite National Park and the Macaya Biosphere Reserve. Some of them were collected outside the parks, in degraded forests over plantations (*M. leprete* sp. nov., *M. mango* sp. nov., *M. epepye* sp. nov., and *M. seguin* sp. nov.). These are not considered to be seriously threatened species, because this type of habitat is still fairly widespread, and is not likely to change dramatically within the next few decades. Other species are restricted to small patches of broadleaf forest within the pine-dominated park areas (*M. palvet* sp. nov., *M. berac* sp. nov., *M. macaya* sp. nov., and *M. tiburon* sp. nov.). Even though these patches are known to support high avian and floristic diversity (Woods, Sergile & Ottenwalder, 1992), they are rapidly declining in size and number (Sergile & Woods, 2001; Rimmer *et al.*, 2005a, b). The species restricted to them may face immediate extinction.

SPECIES LIMITS: MORPHOLOGY VERSUS MOLECULES

The main prerequisite for molecular markers to be useful for rapid species delimitation (and identification) is that they be strongly congruent with species boundaries derived from other (usually morphological) data. In an ideal world, not only would there be a distinct gap between inter- and intraspecific distance measures, but this gap would also be constant across taxa. Within Pholcidae, only one previous study has examined the usefulness of molecular markers for species re-identification (Astrin *et al.*, 2006). The gap range for *COI* was similar to that derived from the present study (in that study there was actually a range of overlap between 8.7 and 10.9%). The highest congruence between morphological and molecular species boundaries was for a gap range of 9.7–13.4% for *COI* (compared with 8.5–9.7% in the present study). The situation is different for *16S*: the previous study found a high gap range of 12.3–14.9% (compared with 3.5–5.5% in the present study). Even if one problematic species is excluded from the previous analysis (*Coryssocnemis simla*, with the highest intraspecific *16S* p-distance of 12.2%), the range remains high (7.1–14.9%). Contrary to the previous suggestion that *16S* may be the superior barcoding gene in pholcid spiders, because of the more distinct gap between intra- and interspecific distances (Astrin *et al.*, 2006), the present study suggests that *COI* performs no worse in this regard, but is more constant across taxa (as long as indel areas are considered in *16S* – these were critical factors for establishing the ‘barcoding gap’ described in Astrin *et al.* 2006).

Independent from the group under study, a species identification threshold for *COI* has been suggested that represents ten times the arithmetic mean of intraspecific distances (Hebert *et al.*, 2004b; this value has been questioned in subsequent studies). In the Barcode of Life Data Systems (BOLD), a threshold of 1% sequence divergence is used in ascertaining species identities; otherwise a sequence is assigned to a genus when differing by less than 3% in comparison with a reference sequence (Ratnasingham & Hebert, 2007). For insects, Hebert *et al.* (2003) suggested applying *COI* species thresholds of 3% for K2P distances. In another study on spiders (Barrett & Hebert, 2005), the gap range lay between 3.6–6.5% (which is extremely similar to our results). The observations by Lefébure *et al.* (2006) suggest that in Crustacea, a threshold should be set between 8 and 15%, whereas in palaeartic mussels, this range lies between 2 and 14% (Mikkelsen, Schander & Willassen, 2007). A tentative value of 10% has been named for amphibians (Vences *et al.*, 2005), and a value of 2.7% has been suggested for Nearctic

birds (Hebert *et al.*, 2004b). In some tropical beetles, a threshold of 5% (p-distance) can be applied (Monaghan *et al.*, 2005). Fewer comparable data are available for *16S* thresholds in other taxa, but Vences *et al.* (2005) suggested a value of about 5%, which is congruent with the gap range in the present study (3.5–5.5%).

The higher mean/median interspecific distances reported by Astrin *et al.* (2006) (19.8/19.6% for *COI* vs. 16.4/18.3% in the present study; 23.4/24.0% for *16S* vs. 17.7/16.6% in the present study) probably result from the different rationale, and thus taxon choice, of that previous study. It was designed to test molecular markers in morphologically unambiguous species, whereas the present study includes some closely related species from a much more limited geographic area. The fact that both markers performed well even in this scenario indicates that rapid diversity estimates based on short DNA sequences (or even routine identifications once a comprehensive database of reference sequences exists; cf. Ekrem, Willassen & Stur, 2007), may be highly reliable in this group of spiders. It is noteworthy that our 16.4% mean interspecific distance for *COI* exactly replicates the value found by Barrett & Hebert (2005) for a large sample of non-pholcid spiders and other arachnids.

One particularly exciting aspect of DNA barcoding is that it suggests specific lines for further research. Cryptic species have repeatedly been indicated first by unexpectedly high molecular distances, and may later be confirmed by previously neglected or overlooked morphological, ecological, or behavioural characters (e.g. Hebert *et al.*, 2004a; Hendrixson & Bond, 2005). The present study identifies two cases of molecularly unusually distant populations that warrant further study: the population of *M. makedal* sp. nov. from north-east Gonaïves, and the population of *M. vittatus* from Los Patos.

BIOGEOGRAPHY

The origins of the Caribbean biota seem to be as complex as the geological history of the region. Several hypotheses are currently being debated, including Cenozoic overwater dispersal (Hedges, 1996, 2001, 2006a, b), vicariance resulting from a period of coalescence between the proto-Antilles and Yucatán, in the Early Cenozoic (Rosen, 1975), and dispersal via an Oligocene landspan that connected South America to the islands for some 2–3 million years (Iturralde-Vinent & MacPhee, 1999). The four main lines of evidence listed by Hedges in support of overwater dispersal are: (1) the reduced higher-level taxonomic composition of the fauna (now, and in the past); (2) the presence of unusually large adaptive

radiations; (3) the fact that most non-volant vertebrates have their closest relatives in South America; and (4) the divergence time estimates between island and mainland groups are not clustered around a particular time. Current data do not allow reliable conclusions on the last point, so we will discuss only points 1–3.

The fact that the higher-level taxonomic composition of the West Indian fauna is reduced when compared with that of adjacent mainland areas has been known for a long time (e.g. Wallace, 1881, cited in Hedges, 2006a). Pholcid spiders follow this trend. Compared with Mexico (ten genera of Pholcidae) and Venezuela (17 genera), the largest Caribbean islands have a reduced diversity (Cuba, five genera; Hispaniola, three extant genera, *Modisimus*, *Leptopholcus*, and *Tainonia*, plus three genera in amber only, *Coryssoenemis*, *Pholcophora*, and *Serratochorus*). As such a pattern is characteristic of oceanic islands, rather than of islands previously connected to mainland areas (Paulay, 1994), Hedges (2006a) considers this the strongest support for overwater dispersal. However, another important detail of Caribbean history discussed by Hedges might also account for the reduced higher-level diversity: the Yucatán bolide impact of 65 Mya. This impact is thought to have caused a massive extinction of the proto-Antillean fauna (Maurrasse & Sen, 1991; Hedges, 2001), and may have affected some taxa more than others, leaving just a fraction of the original fauna on the islands that at this time were already separated from the mainland. As noted by Hedges (2006a), no evidence exists in the fossil record supporting this combination of vicariance and extinction.

Unusually large radiations are a further characteristic of oceanic islands that have never been connected to continents. Niches that are left vacant because of the reduced higher-level diversity may be filled by the taxa that happen to be present. The replicated evolution of similar ecomorphs of *Anolis* lizards (Losos *et al.*, 1998; Losos, 2004) exemplifies this model of adaptive radiation. Our data suggest that *Modisimus* on Hispaniola qualifies as an unusual radiation. The only reasonable comparison possible at this time is with Costa Rica. It is of similar size (51 060 km²; Hispaniola, 73 930 km²), climate (similar mean annual precipitation, about 1350–1500 mm), and topographical heterogeneity; it is better preserved (forest cover > 45%; human population about 4 million vs. 18 million on Hispaniola), and more exhaustively collected from, and the diversity of the genus *Modisimus* in Costa Rica has been revised (Huber, 1998). Only nine mainland species are known from Costa Rica, compared with 29 (22 described plus seven undescribed) on Hispaniola. Even Mexico, a country 26 times the size of Hispaniola, and exten-

sively studied by Gertsch (1971, 1973, 1977) and others, has only 16 known species. It remains unknown, however, to which extent the diversity on Hispaniola (and other Caribbean islands) is a result of ecological shifts vs. pure allopatric speciation. A phylogeny based on a much wider sample of species from the entire geographic range of the genus, together with ecological data, will be necessary to answer this question.

In contrast to the two points above, Hedge's third line of evidence does not appear to be supported by the available data on *Modisimus*. Although a large fraction of the nonvolant vertebrate fauna is evidently derived from South American relatives (Hower & Hedges, 2003; Hedges & Heinicke, 2007; Heinicke *et al.*, 2007), the closest relatives of Caribbean *Modisimus* occur in Central America. A congruent pattern of Central American–Greater Antillean relationships has also been documented for a variety of groups (references in Chakrabarty, 2006). *Modisimus* appears to be entirely absent from mainland South America. Apart from the cosmopolitan anthropophilic *M. culicinus*, only two species with dubious type localities have been reported for South America: *Modisimus globosus* Schmidt, 1956, presumed to be Colombian, but collected in Hamburg, Germany, from a container with bananas originating from Colombia; and *Modisimus simoni* Huber, 1996, presumed to be Venezuelan, but described from a specimen accompanying the Venezuelan type of *M. culicinus*. As E. Simon supposedly repeatedly added specimens from different localities into single vials, Venezuela may not be the type locality of *M. simoni*. Other than these three widespread or dubious species, two species have been described from the Galápagos Islands (Gertsch & Peck, 1992); all of the other known mainland species range from the Canal Zone in Panama to the south-eastern USA. In the Caribbean, *Modisimus* is more widely distributed than published records suggest (it also occurs on Jamaica, and on at least some of the Lesser Antilles; Sewlal & Starr, 2008; B.A. Huber, unpublished data), but there is no evidence that *Modisimus* has ever occurred in South America.

Thus, the phylogenetic data, although preliminary, seem to support neither the landspan model of Iturralde-Vinent & MacPhee (1999) nor the overwater dispersal model of transport on floating vegetation (flotsam), as favoured by Hedges (2006a) for nonvolant vertebrates. The present-day surface water current is predominantly from the south-east to the north-west, and it is believed to have been similar in the past, even prior to the emergence of the Isthmus of Panama (Hedges, 2001, 2006a). An alternative for passive overwater dispersal in spiders is ballooning. Spiders are known to travel wide distances by

emitting silk lines that are caught by the air currents (Foelix, 1996; Bonte *et al.*, 2003). Air currents reaching the West Indies are mostly from the north-east (Hedges, 1996; Sergile & Woods, 2001), and hurricanes usually reach the islands from the south-east. However, occasional hurricanes are known to travel in the opposite direction (Hedges, 2006a), and the prevailing winds from October to November are from the north-west (Sergile & Woods, 2001): so, passive dispersal by air cannot be excluded. The fact that three species groups are restricted to one of the two Hispaniolan paleoislands (*fuscus*, southern paleoisland, and *femoratus* groups) makes *Modisimus* spiders appear to be rather poor dispersers. This is in agreement with the idea that there should be strong selection against passive dispersal in isolated populations and fragmented landscapes (Cody & Overton, 1996; Bonte *et al.*, 2003).

In summary, current evidence does not support a South American origin of Caribbean *Modisimus* spiders. There is some evidence in favour of dispersal as opposed to vicariance, but in the absence of a robust phylogeny of the entire genus, and of time estimates for the separation of mainland and insular taxa, both the vicariance and the dispersal models remain viable alternatives.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Concatenated mitochondrial partitions in combination with the morphological data.

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