

Tertiary harvestmen from Dominican Republic amber (Arachnida: Opiliones: Phalangodidae)

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Summary

Two fossil phalangodid harvestmen (*Philacarus hispaniolensis* n. sp. and *Kimula?* sp.) are described from Dominican Republic amber (Upper Eocene to Upper Oligocene in age). Both are new generic records for Hispaniola. Emended diagnoses of *Kimula* and *Philacarus* are provided. Characters are listed to identify the known fossil harvestmen from the Dominican Republic. A new Recent species of *Kimula* is also reported from St John Island, US Virgin Islands.

Introduction

Harvestmen of the family Phalangodidae are poorly known from Hispaniola. To date only four Recent species (from Haiti) and one fossil species (from Dominican Republic) have been described (Cokendolpher & Camilo-Rivera, 1989). One of the Recent species described from Haiti is also recorded from the Dominican Republic (Cokendolpher, 1987). This apparent scarcity of species may not be a true reflection of the fauna. More likely, the limited number of species is an indication of the few collections studied from that island. A good synoptic collection (possibly impossible to obtain now as many areas have been greatly altered by man) of the Recent arthropods occurring on the island would be invaluable to future researchers trying to study the fossil fauna.

Harvestmen were first reported from Dominican Republic ambers by Schlee & Glöckner (1978). Further details and descriptions of their specimens (collection of Staatlichen Museums für Naturkunde Stuttgart) have not been published. The first and only species of harvestman described from New World amber is *Pellobunus proavus* Cokendolpher (1987). It is the purpose of the present contribution to name the second fossil species of harvestmen as well as to provide details of a specimen of a genus (*Kimula* Goodnight & Goodnight) previously unrecorded from the island. With these additions, the phalangodid fauna of the Dominican Republic consists of *Kimula?* sp., *Pellobunus haitiensis* Šilhavý, *Pellobunus proavus* Cokendolpher, and *Philacarus hispaniolensis* n. sp.

Material and methods

Both fossil specimens here described came from amber mines located in the Cordillera Septentrional between Santiago and Puerto Plata in the northern portion of the Dominican Republic. These mines are in the Altamira facies of the El Mamey Formation (Upper Eocene), which is shale-sandstone interspersed with conglomerate of well-rounded pebbles (Eberle *et al.*, 1980). Differences in the magnitudes of absorption peaks in nuclear magnetic

resonance spectra of the exo-methylene group of amber from different mines in the Dominican Republic were used to calibrate the ages of the various mines using the 25–30 million year age of the Palo Alto mine as a standard (Baroni Urbani & Saunders, 1980). The age of the mines in that region of the country varied from 25–40 million years (Lambert *et al.*, 1985). The amber containing the fossils had all of the visual characteristics of natural Dominican Republic amber and a series of chemical and physical tests performed on the pieces verified that they were authentic (Poinar, 1982).

The amber containing the *Philacarus* was reshaped in order to see diagnostic characters better. To reduce interference by surface imperfections, the amber was observed in mineral oil and olive oil. Although glycerine is highly desirable as a medium (water soluble for quick clean-up), it proved unsatisfactory as its specific gravity is greater than that of the amber. The amber was not reworked for the *Kimula* specimen.

Systematics

Order Opiliones
Suborder Laniatores
Family Phalangodidae
Subfamily Phalangodinae

Identification

Dominican Republic amber harvestmen thus far described can be identified by the characters listed in Table 1.

Genus *Philacarus* Sørensen

Philacarus Sørensen, 1932: 266–267; Roewer, 1949: 50, fig. 98.

Type species

Philacarus samoides Sørensen, by monotypy.

Diagnosis (emended)

Ocularium rounded, unarmed, removed from anterior edge of cephalothorax; anterolateral margin of cephalothorax with 1–2 large spines above each trochanter I; scutum with five areas (except for I, furrows almost obsolete), I–II parallel, not divided by median furrow; free tergites and anal operculum unarmed; stigmata visible; basal third of first cheliceral segment constricted, distal portion noticeably humped dorsally; pedipalp femur with distomesal spine; each (not easily seen on III–IV) leg and

Character	<i>Pellobunus proavus</i>	<i>Philacarus hispaniolensis</i>	<i>Kimula</i> sp.
Palpal femur spines	2 basoventral	1 basoventral	0 basoventral
Palpal tibia spines	2 ventrolateral 0 ventromesal	3 ventrolateral 2 ventromesal	3 ventrolateral 2 ventromesal
Tarsal scopula	present	absent	absent
Widest area of abdomen	posterior end	posterior end	level of coxae IV

Table 1: Characters used to identify harvestmen from Dominican Republic ambers.

pedipalp trochanter with pointed dorsal tubercle; leg lengths III < I < IV < II; trochanter and femur III–IV not enlarged or modified; tarsal segments (4–5):(6–7):(5–6):6, without scopula or pseudonychia; leg tarsal claws simple; distitarsus I with two and distitarsus II with three segments; metatarsus III round (female), compressed and ventrally convex (male).

Included species

With the description of *Philacarus hispaniolensis*, the genus now contains two species.

Distribution

Philacarus samoides is known only from the original material reported to have been collected in “Columbia, America meridionali” (Sørensen, 1932). Roewer (1949) listed the locality data as “Columbien: Neu-Granada”. New Granada was (1819–1930) the name of Colombia and Panama when they were a part of Great Colombia. Sørensen’s reference to South America suggests the specimens were from what is now Colombia and not Panama. *Philacarus hispaniolensis* is known only from Dominican Republic amber. We are unable to provide any habitat data on the only Recent species of *Philacarus* because of the imprecision of the recorded collection site.

Philacarus hispaniolensis n. sp. (Figs. 1–4)

Type data

The female holotype (no. A-10-18) is deposited in the Poinar collection of Dominican Republic amber maintained at the University of California, Berkeley. The amber originated from a mine in the northern portion of the Dominican Republic. These deposits are estimated to range from Upper Eocene to Upper Oligocene in age (25–40 million years) and represent the oldest fossil terrestrial invertebrates from the West Indies.

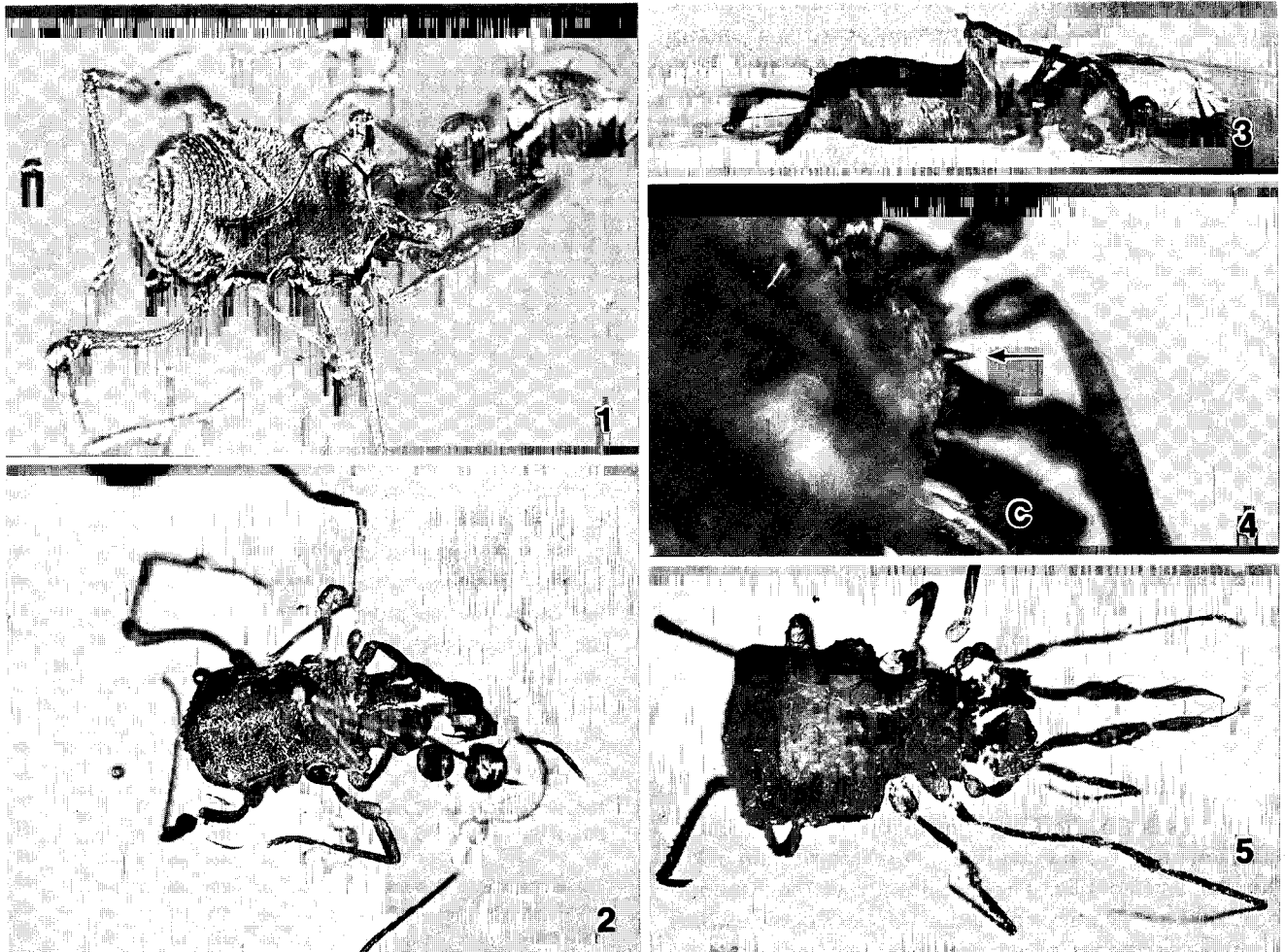
Etymology

The specific epithet refers to the island on which it was recovered.

Diagnosis and comparisons

With single large spine on cephalothorax above each trochanter I; ocularium taller than wide; tarsal segments 4:6:6:6.

Philacarus samoides is easily distinguished from *P. hispaniolensis*. The former species has two spines above each trochanter I; ocularium approximately as high or less than wide; tarsal segments (4–5):7:5:(5–6).



Figs. 1–5: 1–4 *Philacarus hispaniolensis* n. sp., female. 1 Ventral aspect; 2 Dorsal aspect; 3 Lateral aspect; 4 Dorsal aspect of spine (arrow) on left anterolateral margin of cephalothorax (c = basal segment of left chelicera). 5 *Kimula?* sp., female, ventral aspect.

Description

Body total length 1.18 mm, greatest width (posterior end of abdomen) 0.78 mm; cephalothorax length 0.53 mm; ocularium rounded, unarmed, 0.25 mm tall, 0.20 mm wide at base, 0.10 mm wide at summit; eyes on ocularium at base; distance from anterior edge of cephalothorax to ocularium 0.06 mm; cheliceral segment lengths 0.33 mm (basal piece), 0.48 mm (distal piece); other appendage lengths as in Table 2. Dorsum of body and coxae covered with relatively large rounded tubercles, slightly larger pair of rounded tubercles centrally on each dorsal abdominal area; unarmed. Anterior margin of cephalothorax armed with large spine above base of each leg I (Fig. 4). Openings to ozopores and spiracles undetected, obscured by amber. Mouthparts, sternum, and genital operculum also obscured by air bubbles and fracture in amber. Cheliceral distal segment not noticeably enlarged; basal segment with hump distodorsally, unarmed. Pedipalps with long spines: one on basomesal and one on distomesal areas of femur; tibia ventrally with three lateral and two mesal; tarsus with two pairs on each side ventrally; femur laterally compressed and slightly expanded basoventrally; tibia convex above, flat to concave ventrally; tarsus slightly concave ventrally; tarsal claw long, smooth. Legs short; coxae with short pointed tubercles dorsally, IV covered with numerous small pointed tubercles. Femora III and IV strongly curved to follow curvature of abdomen. Tarsal segments 4:6:6:6; without scopula; distitarsus I with two segments; distitarsus II with two segments.

Comments

Distitarsi I and II of *P. hispaniolensis* appear to consist of two segments each, I possibly with three segments. This arrangement is unlike that of the Recent congeneric species which has two segments in distitarsus I and three segments in distitarsus II. Because of the uncertainty of the counts of the fossil, we list the counts obtained from Recent material in the generic diagnosis.

Genus *Kimula* Goodnight & Goodnight

Kimula Goodnight & Goodnight, 1942: 3; Šilhavý, 1969: 399–400; Avram, 1973: 253.

Type species

Kimula elongata Goodnight & Goodnight, by monotypy.

	Lengths				
	Leg I	Leg II	Leg III	Leg IV	Palpus
Trochanter	0.18	0.18	0.13	0.18	0.13
Femur	0.58	0.78	0.43	0.63	0.38
Patella	0.35	0.34	0.15	0.26	0.30
Tibia	0.43	0.68	0.38	0.35	0.35
Metatarsus	0.63	0.60	0.43	0.59	
Tarsus/claw	0.34	0.69	0.43	0.43	0.23/0.20
Totals	2.51	3.27	1.95	2.44	1.59

Table 2: Measurements of female holotype of *Philacarus hispaniolensis* n. sp., in mm.

Diagnosis (emended)

Ocularium near anterior margin of cephalothorax, armed with central spine; scutum with four or five areas, area boundaries parallel; coxae IV widened laterally; third area of scutum wider than cephalothorax; third free tergite with a median spine; abdominal spiracles visible; fourth legs enlarged, especially in males; leg tarsi III and IV without scopula or pseudonychia, leg tarsal claws simple; tarsal segments 4: more than 6:5:5–6; distitarsus I–II with two segments.

Comments

Six Recent species of *Kimula* are described from Cuba and a single species is described from Puerto Rico (Cokendolpher & Camilo-Rivera, 1989). A Recent species (apparently undescribed) occurs on St John Island, US Virgin Islands.

The *Kimula* n. sp. from St John will key to *K. goodnightorum* Šilhavý in Šilhavý's (1969) key to the species of *Kimula*. Like *K. goodnightorum* the dorsal scutum on the third area is not modified, but the St John species is much smaller (2.6–3.5 mm total length) than the Cuban species. It is also easily separated from *K. goodnightorum* by differences in the ventral armature of the abdomen. *Kimula goodnightorum* has a large median tubercle on each free sternite, whereas the species from St John has a median pair of small tubercles on free sternite V. Numerous collections of the *Kimula* n. sp. were made by W. B. Muchmore between 26 Feb. and 18 May 1984 on St John, US Virgin Islands: Bordeaux Mt., Brown Bay, Catherineberg, Cinnamon-Centerline Trail, Coral Bay, Emmaus, Europa Bay, Francis Bay, Johnny Horn Trail, King Hill, Lameshur Bay-VIERS, Little Lameshur Bay.

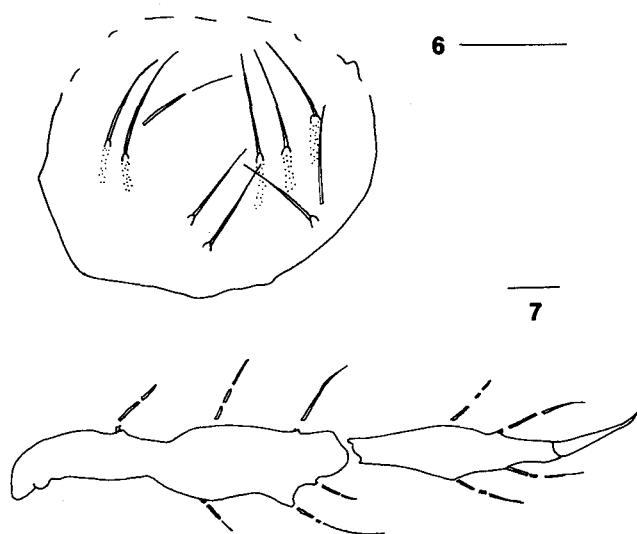
A specimen in amber, herein reported from the Dominican Republic, is tentatively identified as a member of this genus. It differs from typical *Kimula* in several respects and may represent another genus. The amber specimen is about half the size of the smallest known Recent *Kimula* spp. (*K. banksi* Šilhavý from Cuba and *K. n. sp.* from St John Island). It also differs by not having the fourth femora and tibiae enlarged and by lacking bifurcations at distal ends of setae on the ovipositor. The pedipalpal spination is also reduced compared with other *Kimula* spp. Because of the questionable generic assignment and poor preservation of the amber specimen we do not feel it prudent to name the species.

Kimula?* sp. (Figs. 5–7)Material studied*

Female in amber collected in Dominican Republic, Hispaniola. Specimen currently in private collection of J. Manuel Perez (93 Hamilton Road, Capitol Hill, North Carolina 27514).

Description

Body length 1.6 mm, cephalothorax length 0.6 mm. Dorsum unarmed; with some small rounded tubercles,



Figs. 6-7: *Kimula?* sp., female. 6 Anteroventral aspect of ovipositor with two pairs of ventral setae and three pairs of dorsal setae; 7 Ventral aspect of left pedipalp. Scale lines = 0.1 mm.

especially on posterior edge of abdomen. Details of ocularium uncertain; appears to be rounded cone without (?) distal spine, eyes on sides of cone; scutum with four distinct areas, possibly fifth area present on posterior edge, first without medial line or pair of large tubercles. Pedipalps collapsed and distorted, unarmed dorsally; spination as in Fig. 7. Legs collapsed and distorted; femora and tibiae III and IV and possibly I covered with rounded tubercles; femora IV not noticeably larger than other femora; femur II length 1.2 mm; tibiae II length 0.6 mm; tibia I length 0.48 mm. Tarsal formula unknown. Ovipositor (Fig. 6) with two pairs of ventral setae, three pairs of dorsal setae; setae simple, pointed (at 150X). No other significant details available.

Comments

The abdomen was crushed ventrally before entombment in amber. This has resulted in the exposure of the ovipositor setae which are better preserved than any other structure on the animal. The seminal receptacles were apparently not preserved. It is unusual for the exoskeleton of the appendages to be collapsed and somewhat shrivelled. Because Recent harvestmen do not undergo these changes following death, we assume the shrinkage was

caused by the drying of the resins during formation of the amber. The fact that the body cavity was broken and embedded with resins may have increased the distortions.

Acknowledgements

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