Ciboneya antraia Huber & Pérez, 2001

Huber, B. A., Pérez G., A. 2001. A new genus of pholcid spiders (Araneae: Pholcidae) endemic to Western Cuba, with a case of female genitalic dimorphism. Amer. Mus. Novitates 3329: 1-23.

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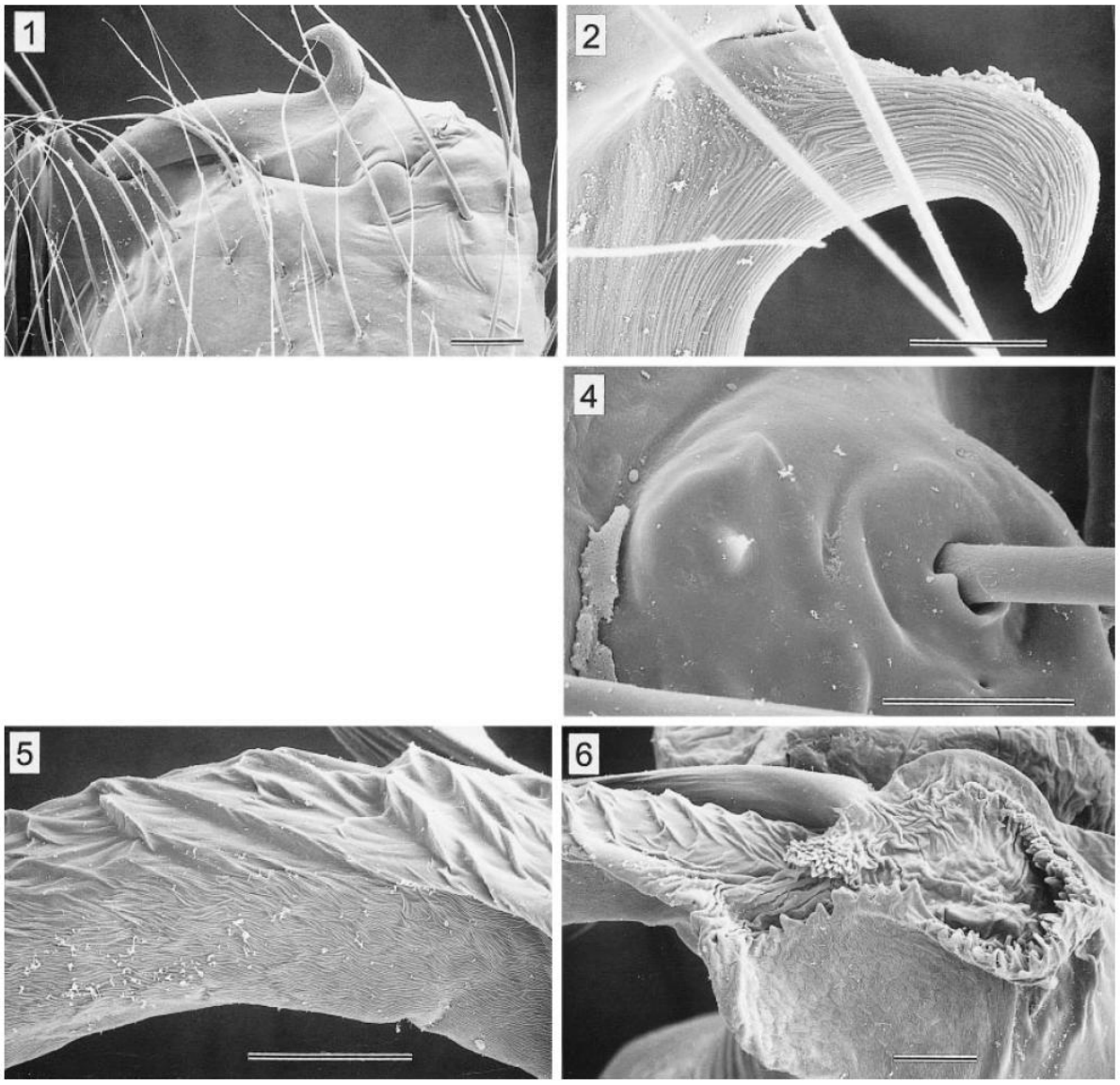

Figs. 1–6. SEM photographs of *C. antraia* (1, 2, 4–6) **1.** Right male chelicera, distal part in frontal view. **2.** Apophysis on male cheliceral fang. **3.** Female palpal tarsal organ. **4.** Male palpal tarsal organ (on left side; hair base on right side). **5.** Detail of the long distal projection of the procursus. **6.** Distal part of procursus at origin of long apophysis. Scale lines: 40 μm (1, 5, 6), 15 μm (2, 4), 5 μm (3).

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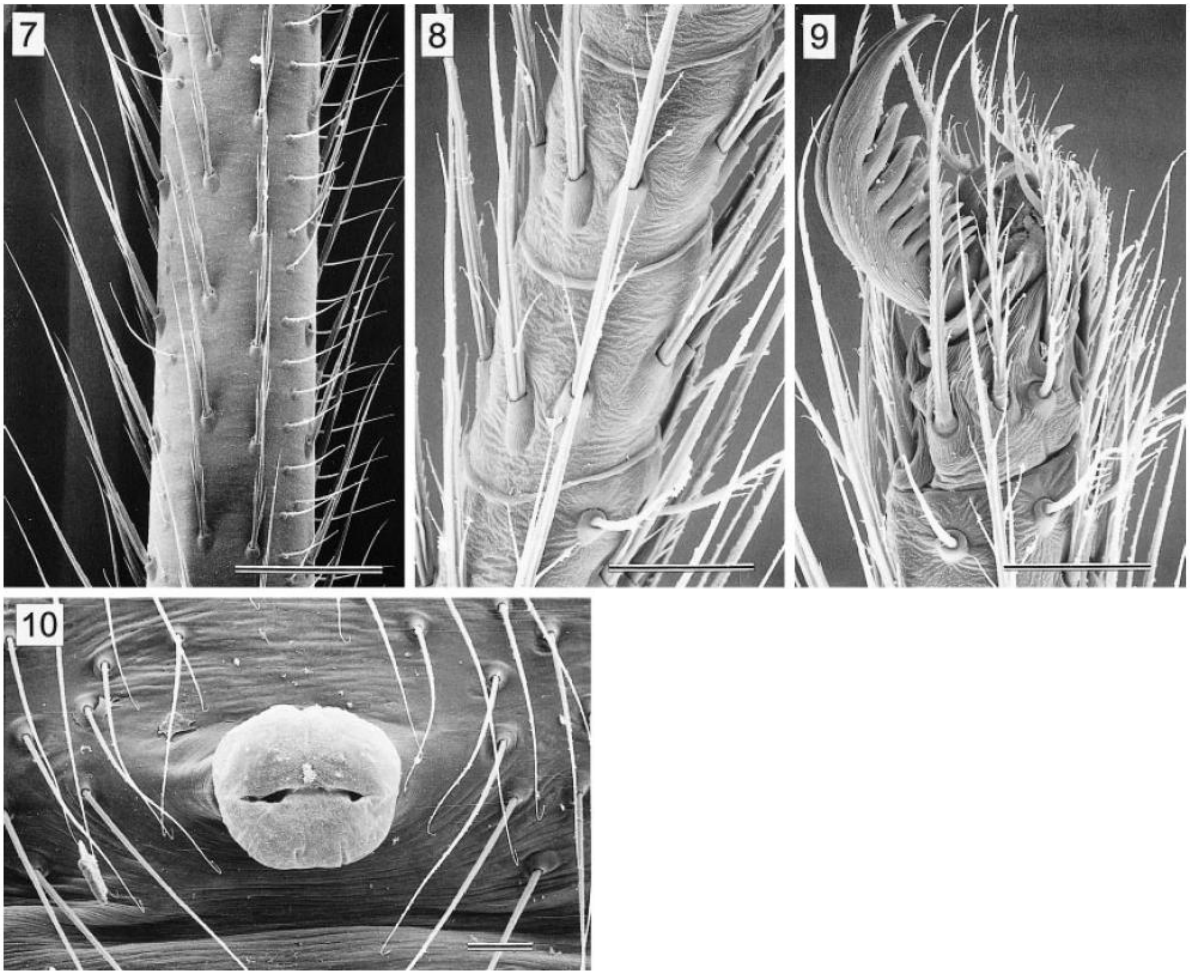

Figs. 7–11. SEM photographs of *C. antraia* (7–10) **7.** Male tibia 1, showing vertical hairs (most on right side). **8.** Male tarsus 1, showing distinct pseudosegmentation. **9.** Male tarsal claws, leg 1. **10, 11.** Male gonopores. Scale lines: 150 μm (7), 30 μm (8–11).

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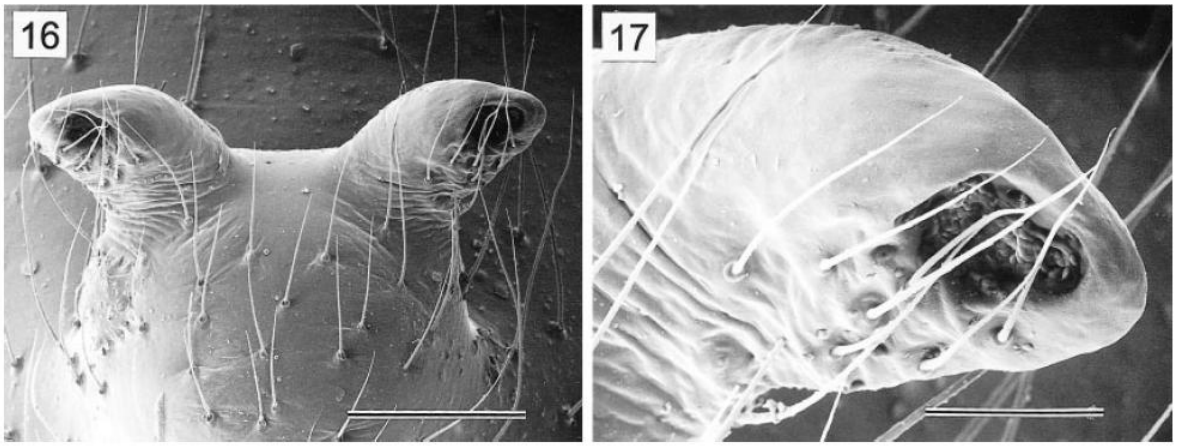

Figs. 12–17. SEM photographs of *C. parva* (12), *C. nuriae* (13, 15), *C. odilere* (14), and *C. antraia* (16, 17). **12.** Female anterior lateral spinnerets. **13.** Male left anterior lateral and posterior median (upper right corner) spinnerets. **14, 15.** Pockets on epigynum. **16.** Anterior apophyses on the epigynum of a microgyne. **17.** Detail of figure 16, showing pocket at tip of apophysis. Scale lines: 150 μm (16), 50 μm (17), 20 μm (12–15).

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***Ciboneya antraia*, new species**
Figures 1, 2, 4–10, 16, 17, 58–76

TYPES: Male holotype, 10 male and 23 female paratypes from Cueva de la Lechuza, Ceja de Francisco, Prov. Pinar del Rio, Cuba; Oct. 28, 1999 (A. Pérez González and B. A. Huber), in ISB; 2♂ 2♀ paratypes, same collection data, in AMNH; 2♂ 2♀ paratypes, same collection data, in collection BAH.

ETYMOLOGY: The species name is from the Greek *antraios* (''cave dwelling''), and refers to the fact that this species has been found only in caves.

DIAGNOSIS: Easily distinguished from known congeners by the long projection distally on the procursus (figs. 62–64), the ventral apophysis proximally on the male palpal femur (figs. 62, 63), and the absence of projections distally on the bulb (fig. 65).

MALE (holotype): Total length 3.5, carapace width 1.71. Leg 1: 32.1 (8.1 + 0.7 + 8.7 + 12.1 + 2.5), tibia 2: 5.6, tibia 3: 2.9, tibia 4: 7.1; tibia 1 l/d: 57. Habitus and prosoma shape as in figs. 58–60. Carapace

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whitish ochre with darker median line in thoracic groove and larger V-mark behind ocular area. Ocular area light brown; distance PME-PME 0.215; diameter PME 0.080; distance PME-ALE 0.040; diameter AME 0.035. Sternum shape as in *C. nuriae* (cf. fig. 21), monochromous light brown. Chelicerae light brown; apophyses on fangs pointing downwards (figs. 58, 61). Distance between tips of fang apophyses 0.37. Palps as in figs. 62 and 63, mostly ochre to light brown; procursus with brown and black structures. Procursus without hook-shaped apophysis proximally, with black spine and distinctive long projection distally (fig. 64). Bulb without any distinct projections (fig. 65). Palpal femur length (fig. 63) 1.37; procursus length (fig. 64) 0.93. Legs ochre to light brown, without rings; without spines, with curved hairs on metatarsi 1 and 2, with many vertical hairs on tibiae and metatarsi (especially on legs 1 and 2, much less on others); retrolateral trichobothrium of tibia 1 at 24%; tarsus 1 with about 30 distinct pseudosegments. Opisthosoma as in fig. 58, monochromous ochre-gray with some white

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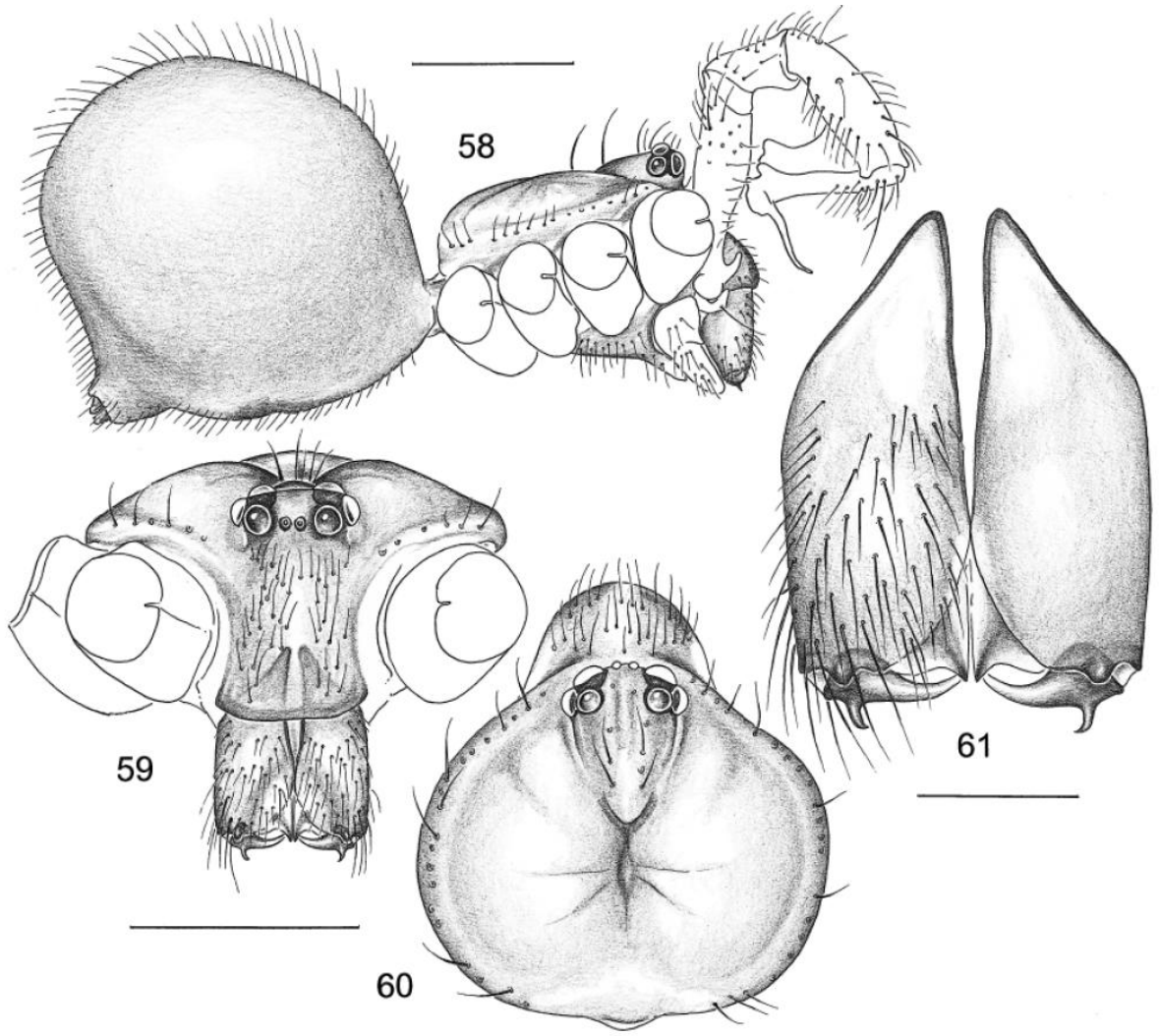
spots; genital plate and plate in front of spinnerets slightly darker.

VARIATION: Males (N = 19), in contrast to females, show only the usual continuous variation in size and no significant variation in shape: carapace width 1.45–1.81 ($\bar{x}$ = 1.63); tibia 1: 7.9–10.3 ($\bar{x}$ = 8.6); procursus length 0.87–1.00 ($\bar{x}$ = 0.94); palpal femur length 1.29–1.51 ($\bar{x}$ = 1.40); distance between tips of fang apophyses 0.33–0.39 ($\bar{x}$ = 0.36). Some males with darker (light brown) frontal femora; some males with many ochre spots on opisthosoma, except ventrally.

FEMALE: In general similar to male, but with few vertical hairs on legs. Most characters show continuous range of size variation. Carapace width (N = 35) 1.13–1.74 ($\bar{x}$ = 1.43); tibia 1 (N = 32) 5.2–10.4 ($\bar{x}$ = 6.9). Epigynum, however, dimorphic, with ''long-type'' (figs. 66, 68) and ''short-type'' (figs. 67, 69). Entire epigynum sclerotized (i.e., the two types are definite end-products and cannot be converted into each other in mature females by bending the frontal part back or forth). Females with long-type epigynum will hereafter be called ''macrogynes'', fe-

males with short-type epigynum "microgynes" (terms borrowed from entomologists). Epigynum length (fig. 68) in macrogynes (N = 16) 1.51–2.12 ($\bar{x}$ = 1.77); in microgynes (N = 17) 0.33–0.80 ($\bar{x}$ = 0.61). Distance between pockets (fig. 66) not as clearly dimorphic: macrogynes: 0.24–0.40 ($\bar{x}$ = 0.33) (inner margins), 0.32–0.48 ($\bar{x}$ = 0.43) (outer margins); microgynes: 0.21–0.35 ($\bar{x}$ = 0.27) (inner margins), 0.32–0.44 ($\bar{x}$ = 0.37) (outer margins). One female of intermediate type (fig. 70): carapace width 1.39; tibia 1: 6.8; epigynum length 1.08, distance between pockets: 0.37 (inner margins), 0.45 (outer margins). Female internal genitalia similar in macro- and microgynes (figs. 71, 72).

QUANTITATIVE ANALYSIS: To exclude possibly confusing interpopulation variation, the following quantitative analysis is restricted to the 15 males and 27 females collected on a single day in a single cave (the type material). Table 1 gives the basic statistics. Note the much higher coefficient of variation in female than in male characters and the extreme value in epigynum length. As figure 73 shows, all measured male characters vary fairly continuously and fall reasonably well into a normal distribution (a better fit is not expected with such a small sample size). Female characters tend to show a bimodal distribution (fig. 74). This bimodality is extreme in epigynum length, where the distribution is significantly different from normal (Kolmogorov-Smirnov, P = 0.05). Regressions of most characters on carapace width (all $\log_{10}$ transformed) are linear, with the exception of



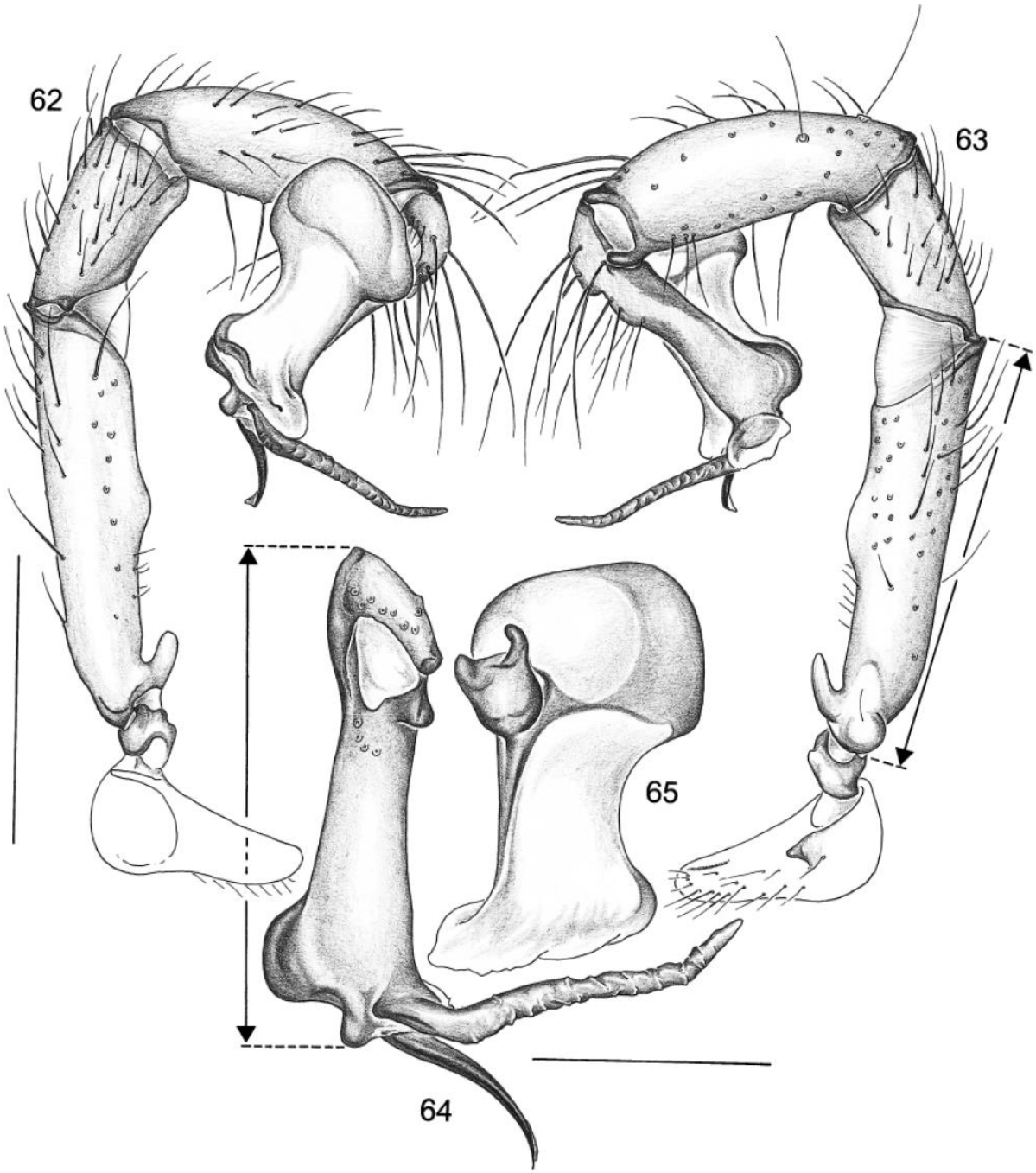
Figs. 58–61. *C. antraia,* male. **58.** Habitus. **59, 60.** Prosoma, frontal and dorsal views. **61.** Chelicerae, frontal view. Scale lines: 1 mm (58–60), 0.3 mm (61).

epigynum length on carapace width, with the latter being decidedly sigmoidal (fig. 75).

DISTRIBUTION: Known from several caves in Pinar del Rio Province (map 1).

NATURAL HISTORY: This species has been found only in caves, where the spiders build their webs either close to the ground or in crevices of lower sections of walls. When disturbed they do not vibrate their body, but dash off into some hole in the rock or over the cave floor (which makes them quite hard to catch, especially males). In captivity (15 males, 11 females, in containers of 6–8 cm diameter filled at the bottom with gypsum), the spiders built flimsy webs of no distinct shape. *Drosophila* flies hardly got entangled in the nonsticky silk of these webs, but the spiders were able to locate the flies immediately and loosely wrapped them before the victims could walk away on the web. While numerous attacks of this kind by females were observed, only once did a male attack while being observed. Females repeatedly produced egg-sacs in captivity (N = 14); six females produced two successive egg-sacs each. The numbers of spiderlings emerging from egg-sacs of macrogynes were 24 and 29, of microgynes (N = 6) only 7–13.

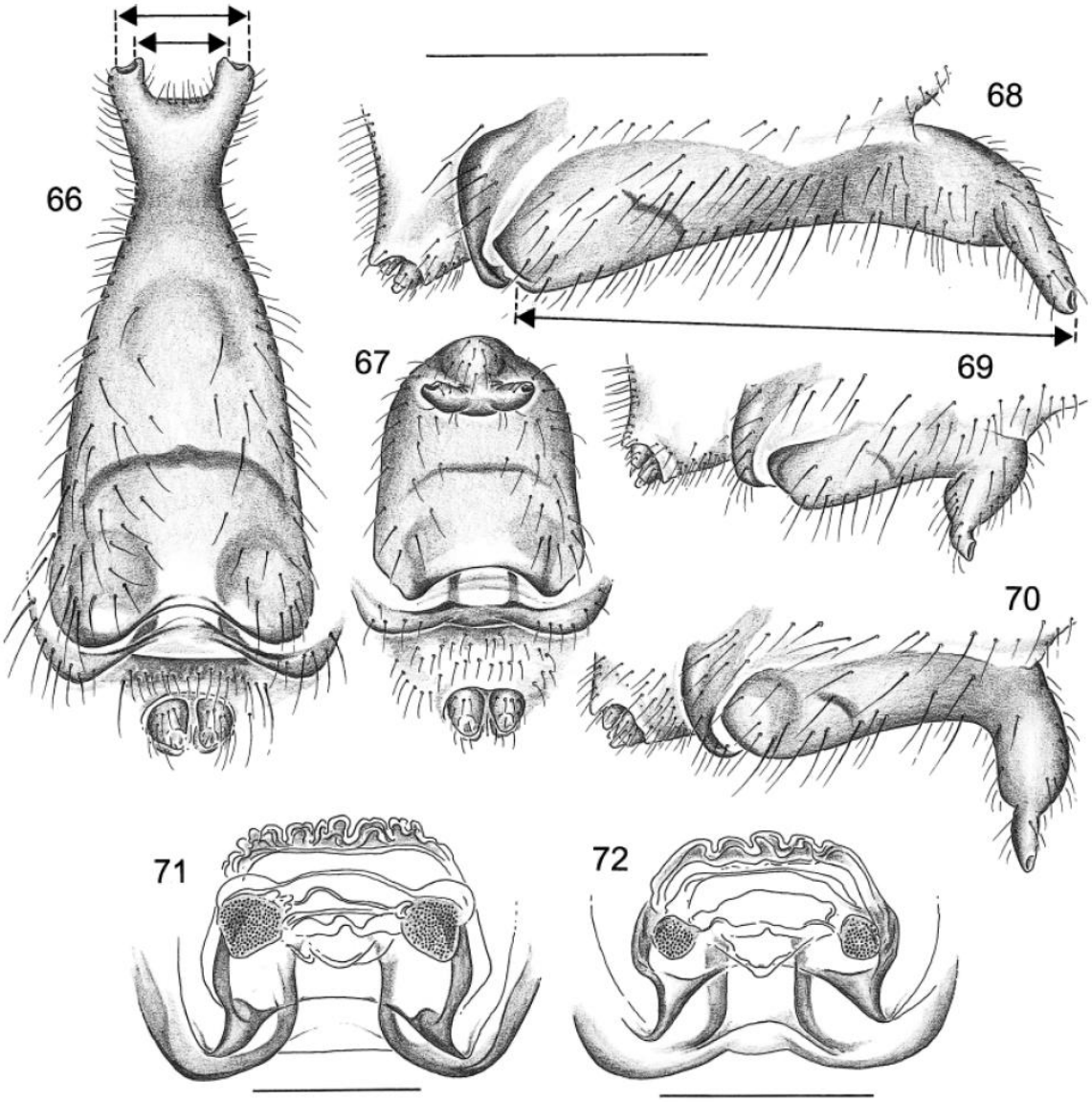
All attempts at observing the copulation of these spiders failed. Even though two of the females used were virgin (one macrogyne, one microgyne), and they were each con-



Figs. 62–65. *C. antraia,* male. **62, 63.** Left palp, prolateral (62) and retrolateral (63) views (bar = "palpal femur length"). **64.** Left procursus, prolateral view (bar = "procursus length"). **65.** Left genital bulb, retrolateral view. Scale lines: 1 mm (62, 63), 0.5 mm (64, 65).

fronted with four different males at different times, no male showed the least sign of courtship. This was no different under red light, nor in absolute darkness (with intermittent flashes of red light to check whether the position of the spiders had changed).

Spiderlings were reared in batches of siblings in larger containers filled at the bottom



Figs. 66–72. *C. antraia,* female epigyna. **66, 67.** Ventral views, macrogyne (66) and microgyne (67) (bars in fig. 66: distances between inner and outer margins of pockets). **68–70.** Lateral views, macrogyne (68), microgyne (69), and intermediate morph (70) (bar in fig. 68: ''epigynum length''). **71, 72.** Dorsal views, macrogyne (71) and microgyne (72). Scale lines: 1 mm (66–70, all drawn to same scale), 0.5 mm (71, 72).

with ordinary New York backyard soil, where they fed on the tiny arthropods emerging from the soil until they reached the size to capture *Drosophila* flies. Flies were reared in the same containers as the spiders, guaranteeing an almost continuous supply of food. Evidence for cannibalism was seen very rarely considering the partly crowded conditions (up to about 20 specimens in a 26 × 16 × 8-cm container). Time between emerging from the egg-sac and molting to maturity was about 17–27 weeks, but there were still some juveniles in the containers when the experiment had to be interrupted. Micro- and macrogyne mothers produced offspring of both morphs in the laboratory (fig. 76).

MATERIAL EXAMINED: CUBA: *Pinar del Rio:* Ceja de Francisco, Cueva de la Lechuza: Types above; Sierra de Quemados, Gran

TABLE 1
Measurements of *C. antraia* Specimens from the Type Locality[a]

	N	Mean, μm	SD, μm	Range, μm	CV[b]
Male					
Chelicerae[c]	12	360	21	330–390	6.0
Procursus length (fig. 64)	15	930	28	870–990	3.1
Palpal femur length (fig. 63)	15	1400	31	1340–1480	2.3
Carapace width	15	1630	73	1500–1810	4.6
Tibia 1 length (dorsally)	14	8460	374	7930–9070	4.5
Female					
Epigynum pockets, inner margins (fig. 66)	27	300	49	230–400	16.8
Epigynum pockets, outer margins (fig. 66)	27	400	50	320–480	13.1
Epigynum length (fig. 68)	27	1110	567	530–1960	53.1
Carapace width	27	1390	152	1130–1680	11.3
Tibia 1 length (dorsally)	26	6510	829	5200–8000	13.2

[a]Means and ranges are rounded to the nearest 10.
[b]CVs are corrected for bias, i.e., [1 + (1 + 1/4N)CV].
[c]Distance between tips of fang apophyses.

Caverna de Santo Tomás, Cueva de Catacumbas, Mar. 20, 1993 (L. Roque), 1♂, in IES; Sierra de Quemados, Gran Caverna de Santo Tomás, Cueva de Antorcha, Mar. 19, 1993 (R. Travieso), 1♂, in IES; Sierra de San Carlos, Sistema Cavernario Majaguas-Cantera, Cueva de las dos Anas, Oct. 13, 1990 (A. Pérez González), 1♂ 2♀ (macrogynes) 1 juvenile, in IES; "Gramales, Cueva de los Murcielagos", Oct. 1991 (A. Pérez González), 1♂, in IES; Viñales, Sistema Cavernario Palmarito, Apr. 16, 1998 (collector unknown), 2♀ (one macrogyne; epigynum missing in other female), in IES; "Cueva ?Mogalogeus (Catacumba)", Mar. 30, 1993 (E. Chong), floor, 1♂ 1♀ (macrogyne) 1 juvenile, in IES; Sierra del Infierno, Cueva del Campamento, Aug. 1992 (A. Pérez González), 2♀ (microgynes), in IES; Sierra de la Guira, Los Pinos Parque, Jan. 1995 (L. F. Armas), 1♀ (macrogyne), in IES.

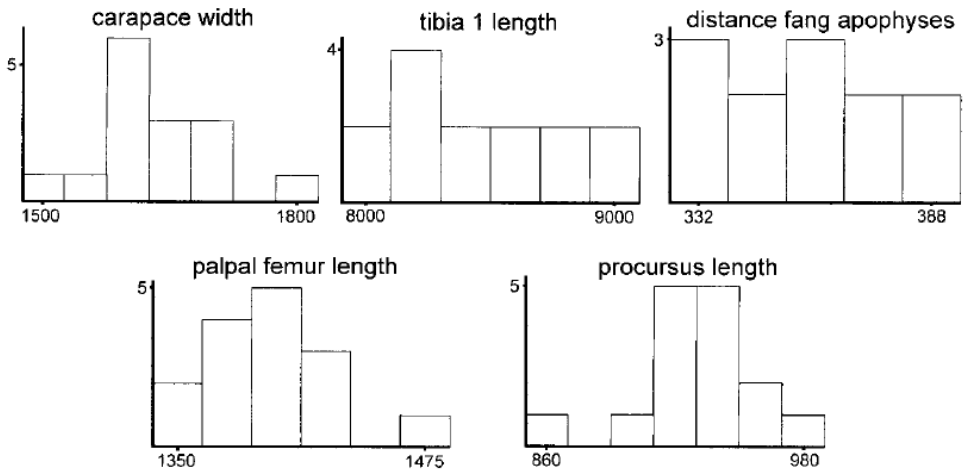


Fig. 73. Frequency distributions of some characters measured in 15 male *C. antraia* collected at the same locality on the same day. Measurements in micrometers.

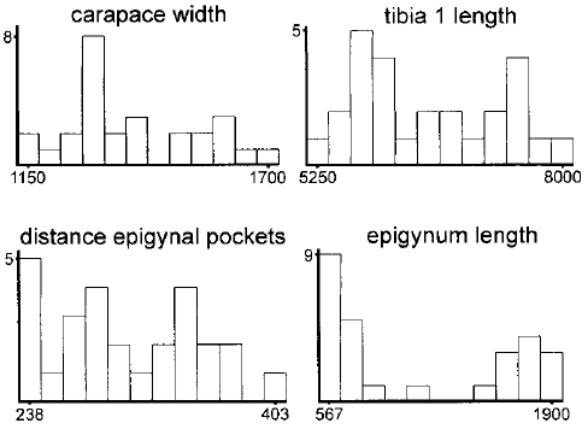


Fig. 74. Frequency distributions of some characters measured in 27 female *C. antraia* collected at the same locality on the same day. Note the distinct bimodality in epigynum length, with single intermediate morph. Measurements in micrometers.

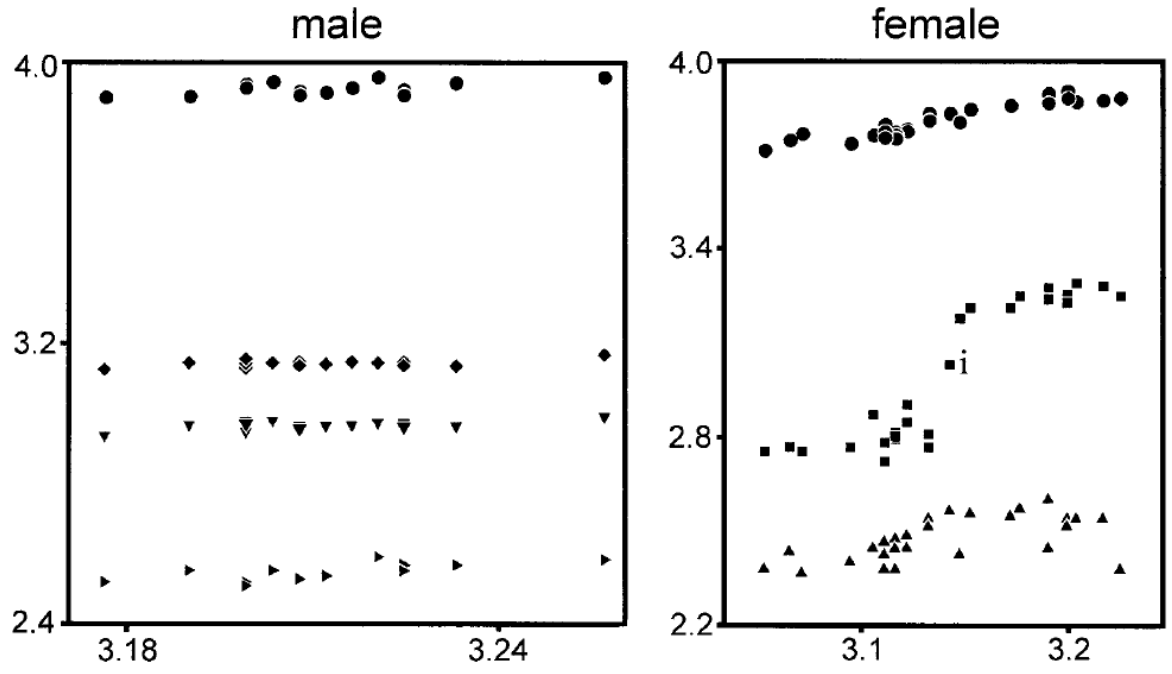


Fig. 75. Regressions of tibia 1 length (●), palpal femur length (♦), procursus length (▼), fang apophyses distance (►), epigynum length (■), and epigynal pockets distance (▲) on carapace width (measurements in micrometers, $\log_{10}$ transformed). The strong compression of the Y-axes makes all male and the bottom and top female slopes almost horizontal and quite meaningless per se, but it emphasizes the difference to the sigmoidal relation between epigynum length and carapace width. "i" = intermediate morph.

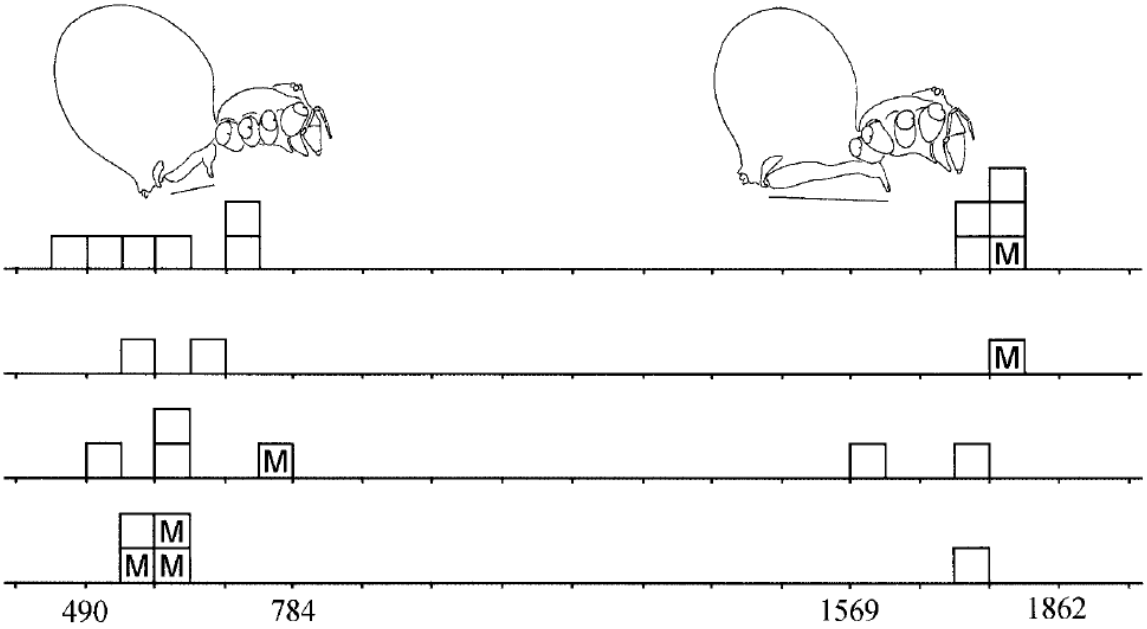


Fig. 76. Epigynum length in micrometers (cf. fig. 68) in six mothers ("M") and their daughters (□). In the lowest line the data from three mothers are pooled because their offspring were reared together in a single container. Note the absence of intermediate type females.