

AMERICAN MUSEUM *Novitates*

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, N.Y. 10024
Number 2790, pp. 1-11, figs. 1-24, map 1
August 13, 1984

The Spider Family Homalonychidae (Arachnida, Araneae)

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ABSTRACT

The genus *Homalonychus* and two species, *H. selenopoides* Marx and *H. theologus* Chamberlin, are redescribed. They occur in the low deserts of southwestern United States, northwestern Mexi-

co, and all of Baja California. *Megapyge rufa* Caporiacco is transferred from the Homalonychidae to the Thomisidae.

INTRODUCTION

In this revision I update our knowledge of the family Homalonychidae. Simon in 1893 described the subfamily Homalonychinae for the genus *Homalonychus* and misidentified the type species. Subsequent species descriptions by Chamberlin (1924) were inadequate and only one male was described. In addition, the subfamily Megapyginae, placed in the Homalonychidae by Caporiacco (1948), seemed out of place. Finally, field trips throughout the areas where *Homalonychus* occurs provided sufficient material for the present study.

Marx in 1891 described *Homalonychus* stating that it showed "affinities with the family Sparassidae by the arrangement of the eyes (*Parhedrus* Simon) and by the flat body and toothless claws (*Selenops*)"; these genera are now placed in the Pisauridae and Selenopidae, respectively. Later, Simon (1893) estab-

lished the subfamily Homalonychinae for *Homalonychus* in the Zodariidae where it remained until 1923 when Petrunkevitch raised it to family rank, a status which has been accepted by most arachnologists up to the present time.

In 1947 Caporiacco described *Megapyge* and indicated its relationship to *Homalonychus*. In 1948 he described the subfamily Megapyginae for the genus *Megapyge* and placed it in the Homalonychidae. An examination of the type specimen indicates that this species probably belongs to the group Diaeae of Simon (1895), or Dietinae of Petrunkevitch (1939), within the family Thomisidae.

The suprafamily classification for spiders remains in a state of flux with constant changes in status of families. Mello-Leitão (1941, pp. 107-108) placed Homalonychidae

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in a "posição incerta" under Ctenoidea; Caporiacco (1938) and Gerhart and Kaestner (1938) used Homalonychiformia for Homalonychidae and Cithaeronidae; Lehtinen (1967, p. 294) placed it in the Pisauroidae; whereas Homann (1971, p. 266) objected to Lehtinen's classification and specifically separates Homalonychidae from the Pisauroidae solely on the basis of comparative eye structure. Lehtinen made his assignment because of a combination of the following: "eye pattern, presence of feathery hairs, notched trochanterae and basic pattern of male and female organs." This seems to be a weak argument. For instance, a similar eye pattern can be found in the Zodariidae; plumose (feathery) hairs are found only on adult male *Homalonychus*; notching of the trochanter is much less distinct and different (Roth, 1964, p. 765, figs. 19–21) than in the Pisauridae, and is useful as a family or generic character only when consistent among a number of taxa and, contradictorily, not considered of value for classification by Lehtinen (1967, p. 332); and similarities of the genitalia (simple palpus, distal embolus, membranous conductor, and median apophysis) of *Zodarium pallidum* Denis (1950, fig. 7) to *Homalonychus* show a relationship closer to at least some zodariids.

Homalonychus fits well with Petrunkevitch's (1939, p. 169) description of the Zodariidae, falling within the range of all the characteristics provided. However, he overlooked the cheliceral boss in some zodariids, the presence of triangular endites and absence of a serrula in both families, the presence of a scopula on the chelicera of *Homalonychus*, and the presence of the trochanteral notch in *Homalonychus*, a character shared by zodariids which may or may not be significant at the family level. The main difference is the presence of smooth paired tarsal claws, considered by Lehtinen (1978, p. 265) as "synapomorphies, with at least generic value." Similar tarsal claws are found also in the zodariids *Cryptothele* and "*Homalonychus*" *joyaus* Tikader as well as in some *Selenops* (Muma, 1953), "*Prodidomidae*" (Cooke, 1964), and phrurolithines. For the present it seems preferable to retain the Homalonychidae as a separate family.

See Roth and Brame (1972) for definition of terms and explanations of fractions used in descriptions.

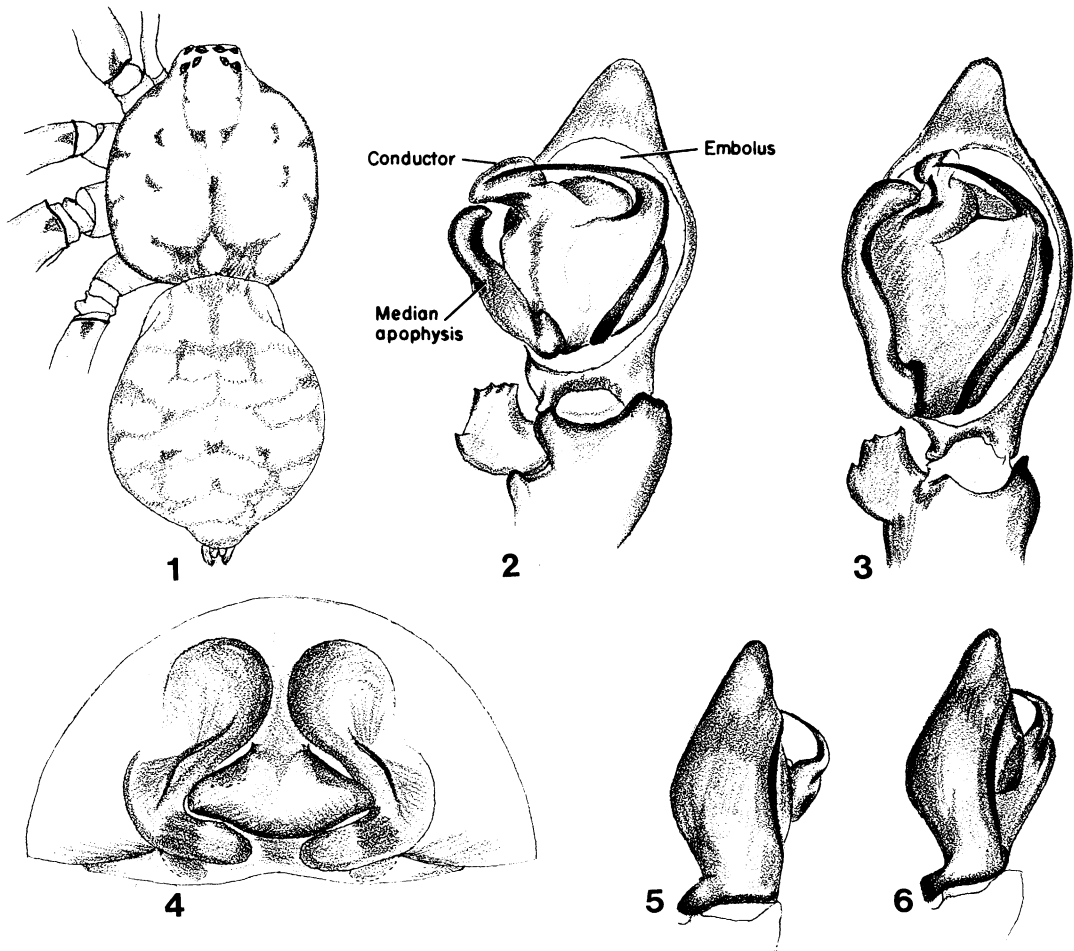
ACKNOWLEDGMENTS

Numerous people contributed to this paper, and I extend my heartfelt thanks to all of them, but I am especially indebted to these following: Dr. Norman Platnick, American Museum of Natural History (AMNH), New York; Dr. Herbert Levi, Museum of Comparative Zoology (MCZ), Harvard University, Cambridge, Mass.; and Drs. Wojciech Pulawski and Paul Arnaud, California Academy of Sciences (CAS), San Francisco, California, for the long-term loan of specimens; Ms. Sarah Mascherini of the Museo Zoologico de "La Specola" for the loan of the type of *Megapyge rufa* Caporiacco; Ms. Wynne Brown, Knoxville, Tennessee, who made the initial drawings, transcribed the majority of data and labeled vials; Ms. Patricia Wittig, Rutgers University, New Jersey, who donated her time and completed figures 2–13; Mr. Allan Johnson, Department of Biology, University of Illinois at Chicago Circle, Chicago, Illinois, who obtained most of the scanning electron micrographs (figs. 13–16, 18–21); Dr. Willis J. Gertsch, of Portal, Arizona, for sharing his broad background to help solve archaeological problems, and finally to my wife, Barbara, who listened to my taxonomic problems, gave encouragement, typed and retyped this manuscript, and took part in many phases of its preparation.

HOMALONYCHIDAE SIMON

Homalonychinae Simon, 1893, pp. 411–413.
Homalonychidae: Petrunkevitch, 1923, p. 175; 1939, p. 180. Comstock, 1913, p. 355; 1948, p. 339. Mello-Leitão, 1941, pp. 107–108.

DIAGNOSIS: The combination of convergent endites, the absence of a serrula, and the absence of teeth on the paired tarsal claws separates Homalonychidae from all other families of spiders. The family consists of one genus containing two closely related species confined to the warm and low deserts of southwestern United States and northwestern Mexico (map 1).



FIGS. 1-6. 1. *Homalonychus* sp., dorsal view. 2, 5. *H. selenopoides*. 3, 4, 6. *H. theologus*. 2, 3. Palp, ventral view. 4. Epigynum, ventral view. 5, 6. Cymbium, dorsal view.

HOMALONYCHUS MARX

Figures 1, 14-24

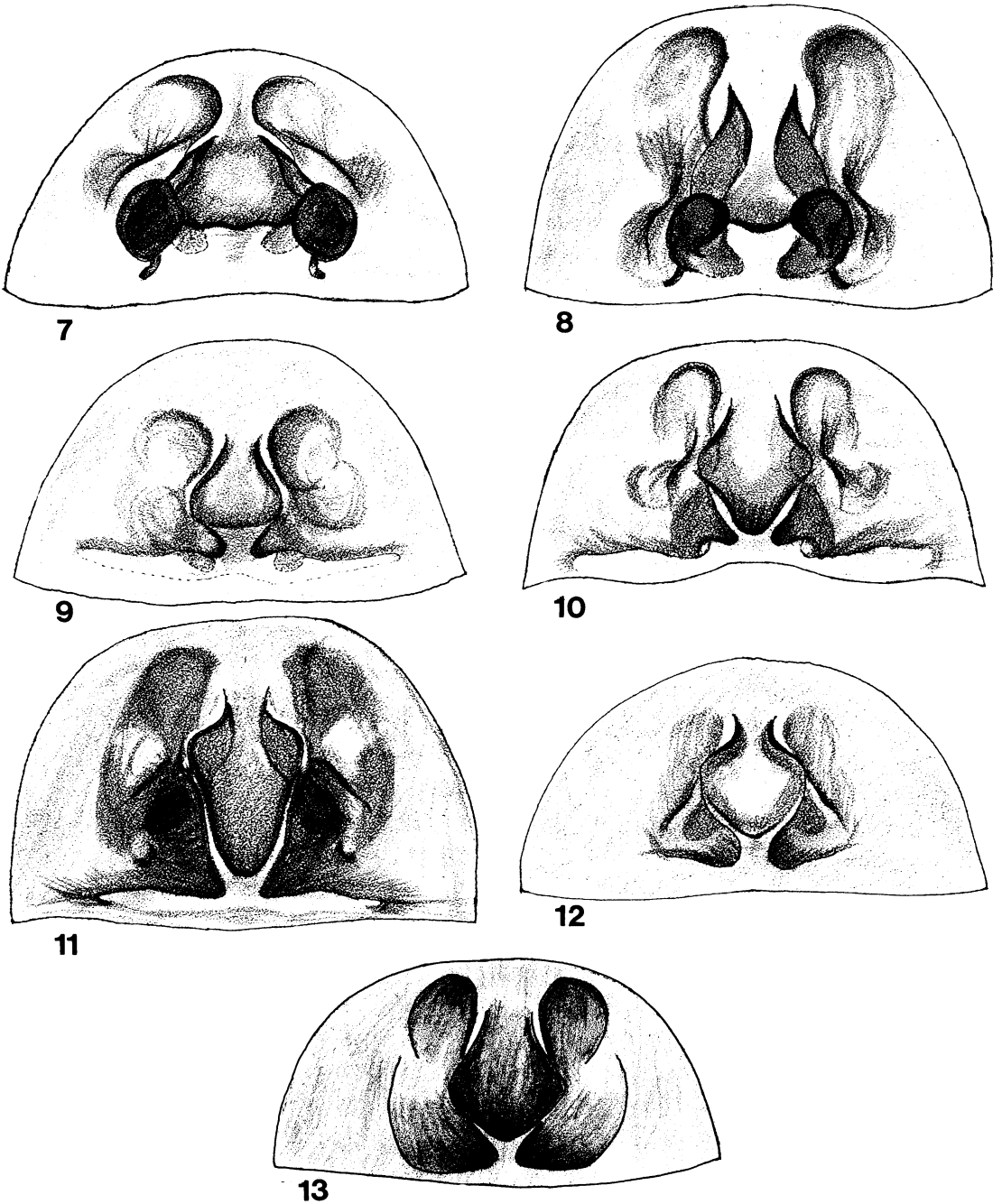
Homalonychus Marx, 1891, p. 9, figs. 1-6 (type species by monotypy *Homalonychus selenopoides* Marx). Petrunkevitch, 1939, p. 180. Simon, 1893, pp. 411-413.

MISPLACED SPECIES: *Homalonychus joyaus* Tikader (1970, pp. 6-7, fig. 2), described from Sikkim, India, probably belongs to the Zodariidae as suggested by Brignoli (1976, p. 211) and accepted by Tikader (*in litt.*, 1979) and the present author.

DESCRIPTION: Adult length 6.5-9.0 mm. (♂), 7.0-12.8 mm. (♀). Body and legs usually cov-

ered with fine soil (fig. 15) except in mature males. Color: integument orange-brown; chelicerae, sternum, mouthparts, clypeus, and side of head darker; carapace spotted (fig. 1), usually with dark spot on edge opposite each leg, anterior spots blending into clypeal area, posterior spots blending into dark area on posterior declivity of carapace; femur with four dorsal black spots, basal spot triangular, distal one incomplete; femoral bands faded, almost lacking in many specimens.

Integument of carapace, appendages, and abdomen of female and immature male densely covered with short serrate setae (fig. 16) or pilose hairs (figs. 20-22). Abdomen



FIGS. 7-13. 7. *H. theologus*, epigynum, dorsal view. 8-13. *H. selenopoides*. 8. Composite dorsal view of epigyna from Yuma and Pinal counties, Arizona. 9-13. Variations in epigynum, ventral view: 9, Caborca, Sonora, Mexico; 10, 13 mi. N. Ogilby, eastern Imperial County, California; 11, Picacho, eastern Imperial County, California; 12, Saline Valley, Inyo County, California; 13, Cuevito, Sonora, Mexico.

and carapace with patches of setae (figs. 15-18), variable in size, denser and darker over

dark spots. Carapace with longer and more slender, bristly setae in dense patches on pos-

terior slope, usually covered by abdomen. Some abdominal patches with longer setae 25 μ dia. and 210 μ long, smooth and flattened or swordlike. Anal tubercle (fig. 19) covered with pilose hairs. Abdomen with similar scattered hairs (figs. 20–22). Mature males similar but lacking short serrate setae on carapace and legs except dorsally on abdomen near base. Carapace with hairs 380 μ –650 μ long, plumose over basal quarter.

Head narrow, distinctly differentiated from carapace; thoracic furrow longitudinal, deep. Carapace rounded laterally, widest opposite thoracic furrow and swollen dorsally.

Eyes, eight, all secondary eyes with canoe-shaped tapetum (Homann, 1971, p. 217). Anterior eye row almost two-thirds as wide as PER, procurved (6/6), PER strongly recurved (10/6). ALE smallest, two-thirds diameter of AME, posterior eyes nearly equal, slightly larger than AME, PME largest.

Clypeus high, three to four times as wide as AME. Chelicerae setose, small, straight, free at base with distinct boss; margins smooth; carina of promargin raised twice to form two widely separated minute tubercles, barely visible at 64 \times , larger nearest base of claw; fang small, lacking serrations; scopula an overlapping fringe of 6 or 7 long curved setae. Labium wider than long, truncate at tip. Endites quadrate, obliquely truncate, strongly convergent, scopula present; serrula absent. Sternum slightly longer than wide, truncated anteriorly, narrowly rounded between hind coxae; latter separated by half their diameter.

Carapace/patella-tibia ratio of female 155, of male 230–262. Legs spined, tibia I with three pairs of large ventral spines (figs. 23–24), none distal, metatarsus I with two pairs, none distal. Legs of female nearly equal in length, leg III shortest; of male, I and IV equal, II shorter, and III shortest. Legs with many minute stout setae, some almost 0.25 mm. long, as long as some dorsal leg spines and densely set with slender smooth sub-setae, pointed distally, 57 μ –72 μ in length and separated about their length apart transversely and almost twice their length apart longitudinally along leg segments. Trichobothria present in single row on tibia and metatarsus. Metatarsus and tarsus spinose, with four lon-



FIG. 14. *Homalonychus* sp., burrowing in soil.

gitudinal swaths of short iridescent, simple setae, two ventral and two lateral, each five setae wide; set among larger tarsal setae. Tarsi with two dorsal rows of trichobothria, distal longest. Chemosensitive hair sensilla (Foelix and Chu-Wang, 1973, fig. 20; Tietjen and Rovner, 1982, fig. 7.3), half as long as tarsal width, in a single ventral row on male, few dorsally; female with few on tarsi, both dorsally and ventrally. Paired claws similar in width throughout length, lacking teeth. Paired accessory claws distinct, spatulate, with fine brush on distal half, extending past claw tufts. Latter in paired clumps, individual hairs with fine brush on one side of distal one-third. Palpal claw of female toothed, with three teeth. Trochanters notched, anterior portion of notch shallow, posterior part deeper (Roth, 1964, p. 761, fig. 21). Autospasy occurs readily at coxa-trochanter joint. Abdomen longer than wide, widest between posterior half and two-thirds. Lorum of pedicel with recurved notch. Spinnerets six, contiguous, anterior stout, longest, cylindrical; distal segment with about 20 two-part spinning tubes and two short cone-shaped tubes on median edge; posterior spinnerets slender, cylindrical, half diameter of anterior; distal segment conical, with three two-segmented spinning tubes; median spinnerets half length, same diameter as posterior spinnerets, with three two-segmented spinning tubes. Colulus absent. Opening of tracheal spiracle at base of spinnerets, minute, half as wide as base of anterior spinneret. Tracheae confined to abdomen (Petrunkevitch, 1939, p. 180); heart with two ostia (Petrunkevitch, 1933, p. 374).

Males usually lacking epiandrous glands and fusules (two fusules noted on one side of one specimen); two irregular patches of 10 to 20 short simple setae present anterior to epigastric furrow, near median line; slightly longer, sparsely bristly seta scattered on epigastric area with an occasional pilose seta (see Roth and Brame, 1972, p. 5); two widely spaced sets of three single slit sensilla located about half their distance from epigastric furrow.

Epigynum (figs. 4, 9–13) large, with snout median piece. Internal genitalia simple (figs. 7, 8), with two oval to round spermathecae on posterior border connected anteriorly to narrow crescent-shaped atrium on anterior angle of median piece by flattened connecting canal. Male palpus simple (figs. 2, 3, 5, 6), patella unmodified; tibia modified ecto-distally; cymbium with dorsal process at base; bulb with large straplike median apophysis attached basally by tethering membrane, free distally; distal edge of tegulum produced to form functional conductor; scythelike embolus attached distally, directed ectally across face of bulb.

NATURAL HISTORY: The homalonychids are nonweb-building, wandering spiders usually found in fine sand or soil under loose boulders, boards, or detritus. They camouflage their bodies (except for adult males) with fine soil (48 μ –120 μ in diameter, fig. 15) which adheres to the setae and integument and blends in with the surrounding soil. Similar habits are exhibited by other spiders, such as *Cryptothele* (Zodariidae), *Sicarius* (Sicariidae), *Paratropis* (Paratropididae), *Microstigmata* (Microstigmatidae), and *Bradystichus* (Bradystichidae), as well as the opilionid *Trogulus* (Trogulidae).

Homalonychus are often found slightly burrowed into the sand with legs outstretched (fig. 14), a habit similar to *Sicarus* (Sicariidae) of Chile (Reiskind, 1965). They appear to have no prey preference but with difficulty can occasionally be reared on flies and moths. Shed skins are found clinging to the underside of boulders, a position in which the live spider is never found.

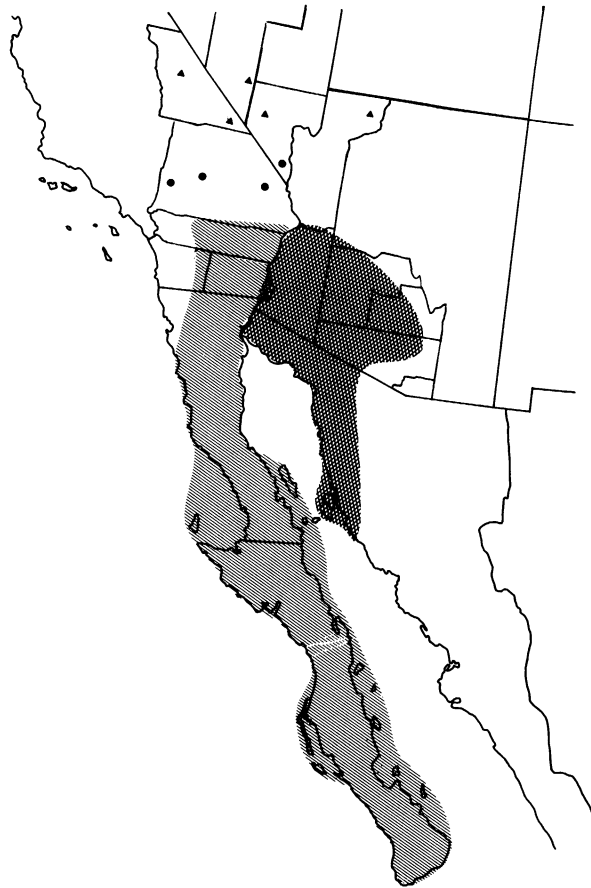
In the more than 270 collections studied, immatures were common throughout the year, females were most common from December through June and males were present

in four April collections. One collection of males and females was made in October. Most specimens were collected in the first half of the year, probably indicating habits of the collectors rather than a temporal distribution of the spiders. Adults are known to have a longevity of at least two years. One egg sac was present in an April collection but nothing is recorded regarding either the placement of the egg sac or its description. Nothing is known about their mating habits.

DISTRIBUTION: Throughout the Mojave and Sonoran Desertscrub of the Desertscrub Formation (Brown and Lowe, 1980; Brown, 1982), in Baja California and northwestern Sonora, Mexico; California north to Inyo County; southern Nevada; and western Arizona, east to Whitmore Wash on the Colorado River and to Pima and Pinal counties (map 1).

REMARKS: Marx in his description of this species designated no types, gave no type locality, and presented no distributional data. He did provide excellent illustrations, especially of the female epigynum, sufficiently accurate for identification as *H. selenopoides*. The clues to identification are the lateral angles of the median piece of the epigynum, and Marx's figure 1d (1891) shows a truncated median piece with 65° angled sides.

A jar in the American Museum of Natural History, on long term loan from the National Museum of Natural History, has a label that reads "Cotype no. 1691. USNM, possible type of *H. selenopoides* Marx, Marx collection." Inside is a vial containing two males labeled "San Jose del Cabo, Collector Eisu (Eisen?), Mrch [sic] '92." It is doubtful that these males are cotypes for four reasons: (1) Marx described a single female and made no mention of males or other specimens. (2) They are from Baja California, whereas the illustrated epigynum is typical of the Arizona-Sonora species. (3) The cotypes were collected in March 1892, whereas the description was published in a journal dated 1891. (4) Banks (1910, p. 15), who may have had access to the type of *H. selenopoides* as Custodian of Arachnida at the National Museum of Natural History, gave "Western States" as the distribution in his "Catalog of Nearctic Spiders." He also corrected Marx's erroneous locality of *Lutica maculata* Marx, published



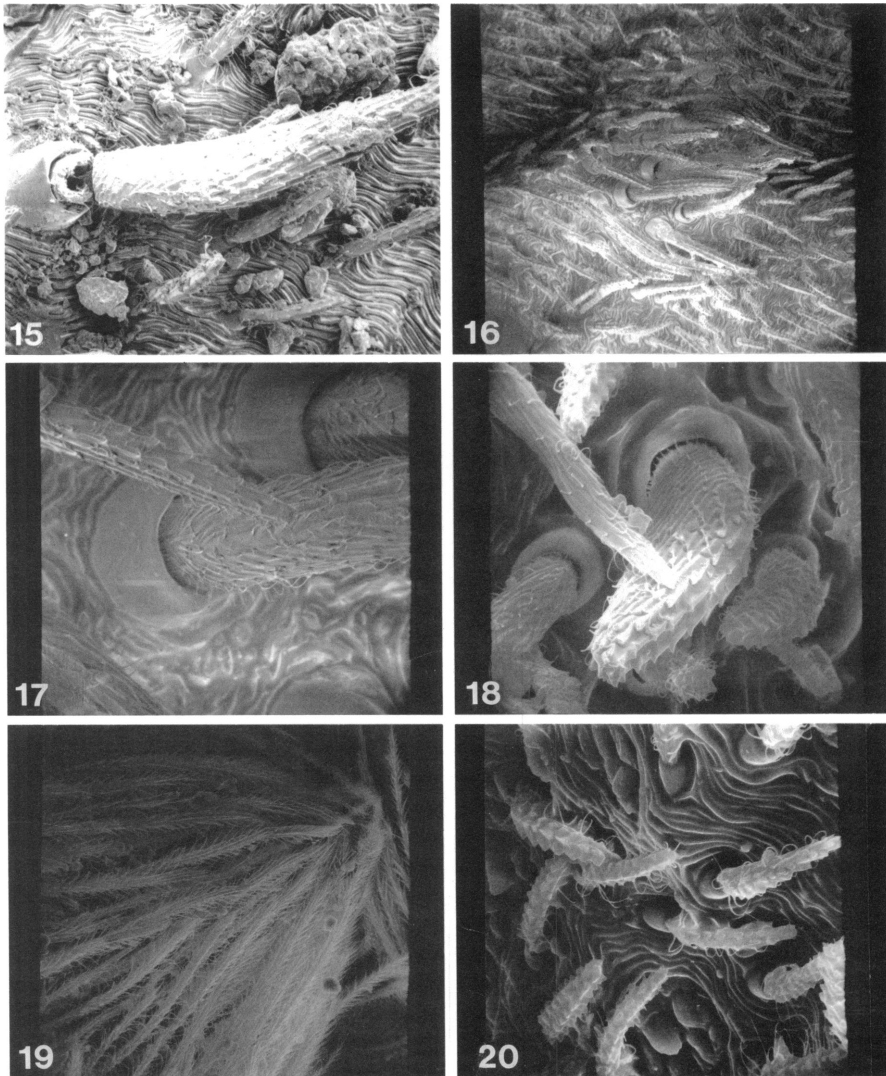
MAP 1. Southwestern United States and northwestern Mexico showing general distributions of *H. selenopoides* (cross hatching; triangles indicate limited collections) and *H. theologus* (slanted lines; circles indicate limited collections).

in the same paper as *Homalonychus*, another hint that he had access to specimens described in Marx's 1891 paper. Since none of the collections studied contain other specimens of *Homalonychus* collected earlier than 1921, it appears that the only specimens in existence in 1910 were the type (from Arizona?, and lost) and specimens from Baja California (USNM "cotypes"; Simon 1893, p. 413; and Banks, 1898, p. 214).

KEY TO SPECIES

Median piece of epigynum long, as long as to 1.3 times as long as wide, pointed posteriorly, sometimes bowed or truncated (figs. 9-13), anterior

sides converging anteriorly at a 60°-70° angle. Embolus long (fig. 2), about as long as median apophysis; conductor large, about twice as wide as width of median apophysis. Distribution: Southern Nevada and adjacent Inyo County in California, western Arizona and western Sonora. (See species description for exceptions in eastern Imperial County, California) *selenopoides* Marx
 Median piece of epigynum short, 1.6 to 2 times as wide as long, bowed posteriorly (fig. 4) with sides converging anteriorly at a 35°-50° angle. Embolus short (fig. 3), about 2/3 as long as median apophysis; conductor small, about as wide as width of median apophysis. Distribution: Baja California and California south of Inyo County. (See species description for exceptions in southern Nevada) *theologus* Chamberlin



FIGS. 15–20. Scanning electron micrographs of abdomen of *Homalonychus* sp. 15. Abdominal integument lightly covered with soil particles, 520 \times . 16. Patches of coarse abdominal setae, 200 \times . 17. Same, patch 1, 1000 \times . 18. Same, patch 2, 1000 \times . 19. Dorsal view of pilose setae on anal tubercle, 515 \times . 20. Abdominal hairs near anterior end of abdomen, 1000 \times .

Homalonychus selenopoides Marx

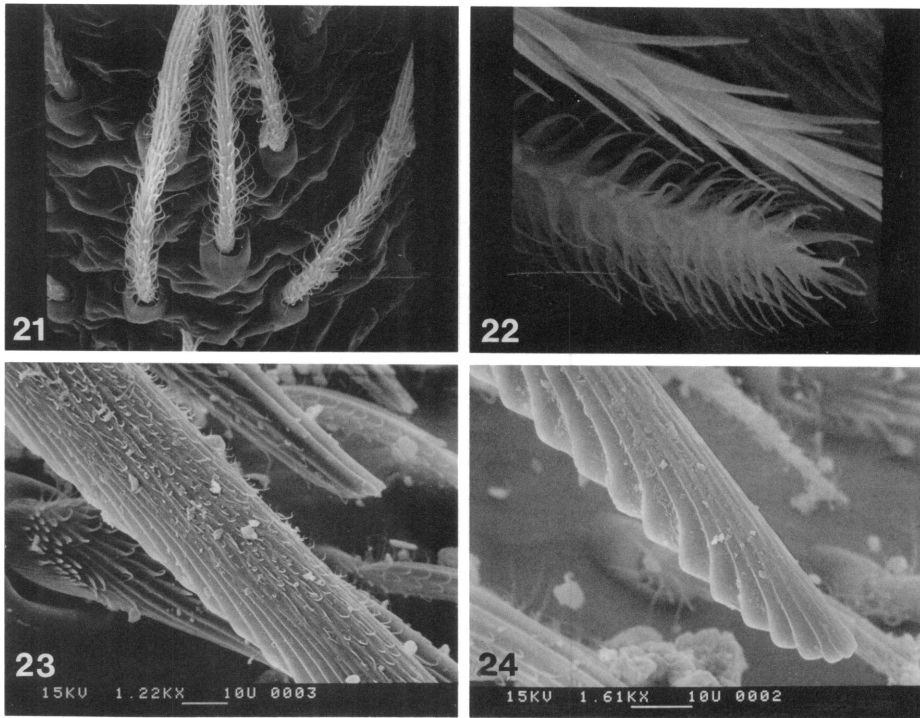
Figures 2, 5, 8–13

Homalonychus selenopoides Marx, 1891, p. 3, pl. 1, figs. 1a–f (female holotype, apparently lost, no locality given). Comstock, 1913, p. 325, figs. 316a–f (♀); 1948, p. 339, figs. 316a–f (♀).

H. positivus Chamberlin, 1924, pp. 630–631, fig. 68 (female holotype and male allotype from Guaymas, Sonora, in CAS, examined). NEW SYNONYMY.

FEMALE (25 mi. W Sonoita, Sonora, Mexico, Dec. 28, 1960, V. Roth, AMNH): Total length 8.6 mm., carapace length, 4.5 mm., width, 3.7 mm., posterior eye row width 1.2 mm. Ratio of eyes AME/ALE/PME/PLE = 6/5/6/6. Clypeus wider than diameter of AME (20/6).

Carapace/patella-tibia ratio, 155. Lengths of patellae-tibiae I and IV 7.0 mm. and 7.3 mm. Only spines of 0.25 mm. in length or



FIGS. 21–24. Scanning electron micrographs of abdomen of *Homalonychus* sp. 21. Anterior dorsal abdominal setae, 1000 \times . 22. Anterior dorsal abdominal setae, 5150 \times . 23. Plumose-laminar tibia I ventral spine, 1220 \times . 24. Tip of above, 1610 \times .

more are recorded below. Spination: femur I, prolateral 1-1-1; tibiae I–IV, ventral 2-2-2-2, distal small, prolateral and retrolateral 1-1-1; metatarsus I, ventral 2-2-2, small, prolateral and retrolateral 1-0-1.

Epigynum polymorphic (figs. 8–12) with triangular to diamond-shaped median piece bowed, rounded to pointed distally, as long as to 1.3 times longer than wide, clasped posteriorly by a pair of medially projecting spurs. Lateral sclerotized plates with more or less distinct stabilizing pits. Openings to spermatheca slitlike, converging at a 60°–70° angle on anterior side of median piece.

Spermathecae of internal epigynum globular, lumen twice as long as wide, teardrop-shaped. Atrium separated by half width at center, divergent at tip.

MALE (Apache Gap, 10 mi. N Apache Junction; April 24, 1961, W. J. Gertsch, AMNH): Similar to female, head smaller, carapace broader, legs longer with longer dorsal spines. Total length 7.7 mm., carapace

length, 3.4 mm., width, 3.0 mm., posterior eye row width, 1.2 mm. Carapace/patella-tibia ratio 230. Length of patella-tibia I and IV 7.8 mm. Spination: femora I–IV dorsal, three near base, eight others irregularly scattered laterally and dorsally with one dorsal at tip; tibiae I–IV, ventral 2-2-2-2, prolateral and retrolateral 1-1-1, dorsal 1-1-0-1; metatarsus I, ventral 2-2-2; pro and retrolateral 1-1-1, dorsal 1-1-0-0. Abdomen similar to that of female, as long as carapace.

Male palpus (figs. 2, 5): tibia sculptured distally with smooth mesal-dorsal carina, ventral tooth and broad chisel-like ectal truncated process toothed distally; base of cymbium with short blunt dorsal tubercle, rounded at tip. Embolus slender, almost as long as median apophysis; conductor large, almost twice as long as wide.

DISTRIBUTION: Southern Nye County in Nevada and Inyo County in California, southern Arizona from Phoenix area and Tucson west to the Colorado River and into

the extreme eastern part of Imperial County of California and south along the coast in western Sonora to Guaymas and Tiburon Island in the Gulf of California. All published records and references to this species from California and Baja California to date refer to *H. theologus*.

DISCUSSION: The more than 70 collections of *H. selenopoides* studied showed much variation in the female genitalia. In the area in California where the two species overlap (eastern Imperial County), the female genitalia showed the greatest variation (figs. 10–11). No differences were noted in the male palpus of specimens from the same area. The females of the northern populations have the median piece of the epigynum more rounded. This piece is often diamond-shaped or rounded distally in Guaymas specimens (fig. 13), and in Arizona specimens it is intermediate, varying from truncate (fig. 9) to pointed.

Homalonychus theologus Chamberlin

Figures 3, 4, 6, 7

Homalonychus selenopoides (misidentification): Simon, 1893, pp. 411–413, figs. 372–377 (♂).

Homalonychus theologus Chamberlin, 1924, pp. 631–632, fig. 69 (female holotype from San Jose del Cabo, Baja California Sur, Mexico, in MCZ, examined).

FEMALE (Pisgah Crater, San Bernardino County, California, Oct. 6, 1962, Norris and Heath, AMNH): Total length 8.5 mm.; carapace length 4.2 mm., width 3.8 mm.; posterior eye row width 1.2 mm. Ratio of eyes AME/ALE/PME/PLE = 5/4/6/6. Clypeus wider than diameter of AME (21/6).

Carapace/patella-tibia ratio 164. Lengths of patellae-tibiae I and IV 6.9 mm. and 7.0 mm. Spination as in *H. selenopoides*.

Epigynum (fig. 4) similar to that of *H. selenopoides* but median piece short, 1.6–2.0 times as wide as long, truncated or bowed posteriorly with sides converging anteriorly at 35°–50° angle. Spermatheca of internal epigynum (fig. 7) with globular lumen. Atrium widely separated at base and middle, convergent at tip.

MALE (same locality and collectors, Oct. 6, 1961, AMNH): Similar to female, head smaller, carapace broader, legs longer with

longer dorsal spines. Total length 7.0 mm., carapace length 3.5 mm., width 3.4 mm., posterior eye row width 1.1 mm. Carapace/patella-tibia ratio 262. Lengths of patellae-tibiae I and IV 9.2 mm. and 9.0 mm. Spination as in *H. selenopoides*.

Male palpus (figs. 3, 6): ectal process of tibia toothed on dorsal corner and along ventral side, with one or two teeth midway between (fig. 3); base of cymbium with short dorsal tubercle slightly constricted at base or abruptly arising from base, usually truncated distally. Embolus slender, as long as median apophysis; conductor small, about as wide as long.

DISTRIBUTION: Southern California in Imperial County and in the eastern part of Riverside, San Bernardino, and San Diego counties, south throughout Baja California, and the adjacent islands, Cedros and Santa Margarita in the Pacific Ocean and the following in the Gulf of California: Angel de la Guarda, Cerralbo, Espiritu Santo, Gaviota, Mejia, Navidad, Patos, Pazante, San Diego, San Francisco, San Jose, San Marcos, and Santa Cruz. One collection (AMNH) labeled "Nelson, Colo." probably refers to Nelson in southern Clark County, Nevada, near the Colorado River. This is the only record of *H. theologus* for Nevada.

LITERATURE CITED

- Banks, Nathan
1898. Arachnida from Baja California, and other parts of Mexico. Proc. California Acad. Sci., ser. 3, vol. 1, no. 7, pp. 205–308, pls. 13–17.
1910. Catalogue of Nearctic spiders. Bull. U.S. Natl. Mus., vol. 72, pp. 1–80.
- Brignoli, Paolo Marcello
1976. On some recent papers about Indian spiders. Bull. British Arachnol. Soc., vol. 3, pp. 211–213.
- Brown, David E. (ED.)
1982. Biotic communities of the American Southwest, United States and Mexico. Desert Plants, vol. 4, pp. 1–342.
- Brown, David E., and Charles H. Lowe
1980. Biotic communities of the southwest. General Tech. Report RM78, Rocky Mtn. Forest and Range Exp. Sta. Forest Serv. USDA Map.
- Caporiacco, L. di
1938. Il sistema degli Araneidi. Arch. zool.

- itali., vol. 25; Suppl., *Attualita Zool.*, vol. 4, pp. 35–155, 1 fig.
1947. Diagnosi preliminari di specie nuove di Aracnidi della Guiana Britannica raccolte dai professori Beccari e Romiti. *Monitore Zool. Italiano* Firenze, vol. 56, no. 1–6, pp. 20–34.
1948. Arachnida of British Guiana collected in 1931 and 1936 by Professors Beccari and Romiti. *Proc. Zool. Soc. London*, vol. 118, pp. 607–747, figs. 1–169.
- Chamberlin, Ralph V.
1924. The spider fauna of the shores and islands of the Gulf of California. *Proc. California Acad. Sci.*, vol. 12, pp. 561–694, 140 figs.
- Comstock, J. H.
1913. The spider book. Garden City, New York, Doubleday Page and Co., pp. VII–XV, 1–721, 770 figs.
1948. The spider book. Revised by W. J. Gertsch, New York, Comstock Publishing Co., pp. V–XI, 1–729, 770 figs.
- Cooke, J. A. L.
1964. A revisionary study of some spiders of the rare family Prodidomidae. *Proc. Zool. Soc. London*, vol. 143, no. 2, pp. 257–305, 68 figs.
- Denis, Jacques
1950. *Zodariides recueillis au Maroc et en Mauritanie* par M. L. Berland. *Bull. Soc. Hist. Nat. Afrique Nord*, pp. 58–63.
- Foelix, Rainer F., and I-Wu Chu-Wang
1973. The morphology of spider sensilla. II. Chemoreceptors. *Tissue and Cell*, vol. 5, no. 3, pp. 461–478.
- Gerhardt, U., and A. Kaestner
1938. Araneae = Echte Spinnen = Webspinnen. In, Kükenthal, W., and T. Krumbach (eds.), *Handbuch der Zoologie*. Berlin, vol. 3, no. 2, pp. 497–656, figs. 627–854.
- Homann, Heinrich
1971. Die Augen der Araneae. *Z. Morph. Tiere*, vol. 69, pp. 201–272, figs. 1–35.
- Lehtinen, Pekka T.
1967. Classification of the cribellate spiders and some allied families, with notes on the evolution of the suborder Araneomorpha. *Ann. Zool. Fennici*, vol. 4, pp. 199–468, figs. 1–524, tables 1–53.
1978. Definition and limitation of supraspecific taxa in spiders. *Symp. Zool. Soc. London*, no. 42, pp. 255–271.
- Marx, George
1891. A contribution to the knowledge of North American Spiders. *Proc. Entomol. Soc. Washington*, vol. 2, no. 1, pp. 28–37, pl. I, figs. 1–6.
- Mello-Leitão, C. de
1941. Notas sobre a sistemática das Aranhas, com descrição de algumas novas espécies Sul Americanas. *Ann. Acad. Brasileira Sci.*, vol. 13, no. 2, pp. 103–127, figs. 1–7.
- Muma, Martin H.
1953. A study of the spider family Selenopidae in North America, Central America, and the West Indies. *Amer. Mus. Novitates*, no. 1619, pp. 1–55, figs. 1–75.
- Petrunkévitch, A.
1923. On families of spiders. *Ann. New York Acad. Sci.*, vol. 29, pp. 145–180, 2 pl.
1933. An inquiry into the natural classification of spiders, based on a study of their internal anatomy. *Trans. Connecticut Acad. Arts Sci.*, vol. 31, pp. 303–389, pl. I–XIII, 1 table.
1939. Catalogue of American spiders. Part one. *Ibid.*, vol. 33, pp. 133–338.
- Reiskind, Jonathan
1965. Self-burying behavior in the genus *Sicarius* (Araneae, Sicariidae). *Psyche*, vol. 72, no. 3, pp. 218–224, figs. 1–12.
- Roth, Vincent D.
1964. The taxonomic significance of the spider trochanter. *Ann. Entomol. Soc. Amer.*, vol. 57, pp. 759–766, figs. 1–30.
- Roth, Vincent D., and Patricia L. Brame
1972. Nearctic genera of the spider family Agelenidae (Arachnida, Araneida). *Amer. Mus. Novitates*, no. 2505, pp. 1–52, figs. 1–70.
- Simon, E.
1893. *Histoire naturelle des araignées*. Paris, vol. 1, pt. 2, pp. 257–488, figs. 216–490.
1895. *Histoire naturelle des araignées*. Paris, vol. 1, pt. 4, pp. 761–1084, figs. 838–1095.
- Tietjen, William J., and Jerome S. Rovner
1982. Chemical communication in lycosids and other spiders. In, Witt, Peter N., and Jerome S. Rovner (eds.), *Spider communication*. Princeton Univ. Press, Princeton, New Jersey, pp. 249–279.
- Tikader, B. K.
1970. Spider fauna of Sikkim. *Rec. Zool. Surv. India*, vol. 64, pp. 1–84, figs. 1–49.

