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Thirteen Previously Unrecorded Spiders Detected by Citizen Scientists from Puerto Rico and the U. S. Virgin Islands: a Contribution to the Spider Fauna 100 Years After Petrunkevitch's Work

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Abstract—The rapid detection of exotic species is instrumental for their successful control and eradication. This is especially important in areas with limited resources available to mitigate any potentially detrimental impacts. Since Puerto Rico and the United States Virgin Islands lack local arachnologists specialized in spiders, I explored citizen scientists' photographic records to determine their usefulness in detecting spiders not recorded in scientific literature for the region. From citizens photographs I identified 13 spiders that have not been previously recorded in the region. I determine six spiders preliminarily to species, i. e., *Cithaeron praedonius* O. Pickard-Cambridge, 1872, *Falconina gracilis* (Keyserling, 1891), *Habronattus paratus* (G. W. Peckham & E. G. Peckham, 1896), *Kapogea isosceles* (Mello-Leitão, 1939), *Micrathena similis* Bryant, 1945, and *Phidippus regius* C. L. Koch, 1846, and six to genera, all previously not recorded from the region, i. e., *Mazax*, *Mastophora, Metacyrba*, *Microdipoena*, *Uloborus,* and *Ummidia.* These findings represent the addition of the families Halonoproctidae, Cithaeronidae, and Symphytognathidae to the region. Citizen scientists often lack the knowledge to identify their photographed spiders; however, from their photographs I found a few more unrecorded spiders (13 vs. 8) than what arachnologists had published in the last 20 years. This shows that observations by citizen scientists may be an underutilized source of data that can increase and accelerate the rate of detection of previously unknown spiders to a region.

The Caribbean is a Hotspot of Biodiversity (Myers et al. 2000) that is impacted by a suite of abiotic disturbances such as forest-destroying hurricanes, seasonal droughts, and changes in land use, but also by biotic disturbances such as invasive species and non-native diseases. Powerful storms or wind currents can bring biotic elements from neighboring islands or continents that may alter or disturb naïve ecosystems. For example, Caribbean grasshoppers in the genus *Schistocerca* evolved from the African locust (*Schistocerca gregaria* Forsskål, 1775), which reached the Americas after the Cretaceuos period during favorable wind events coincidental with their period of maximum dispersal and which has been observed recently crossing the atlantic (Rosenberg and Burt 1999; Lovejoy et al. 2006).

Despite being wingless, spiders can also travel long distances carried by wind while dangling by long silk threads used like comets—a technique called ballooning. Using this technique, spiders are some of the first invertebrates to colonize new islands or areas that have been catastrophically destroyed (Edwards 1986). Spiders are also transported by people during their travel and commerce. Although, spiders have soft bodies that preserve poorly, shipwrecks have preserved evidence of spider maritime transportation as early as the 1500s (Shidner 2011). Something that is usually inferred from the best understood geographic origin of a species, the introduction of some spider to Puerto Rico and the United States Virgin Islands (USVI) has likely been human-mediated. But, irrelevant of the way in which spiders arrived, those today considered "introduced" represent one in every 10 spiders found in Puerto Rico and the USVI (author review of World Spider Catalog data). Although not a large number, introduced species to the region (hereafter "the region") include *Latrodectus geometricus* C. L. Koch, 1841, a spider with a venom reported to affect people on rare occasions (Offerman et al. 2011). While it is unclear whether a second, i. e., *L. mactans* (Fabricius, 1775), is either native or was introduced (Levi 1959). Also, the introduced *Cyrtophora citricola* (Forsskål, 1775) may cause branch dieback on trees harboring colonies of the spider because foliage collected on their webs can sometimes block sunlight, (Cárdenas-Murillo et al.

FIGURE 1. New spiders documented in citizen scientist observations during the last 20 years in the Puerto Rico and the US Virgin Islands. Taxa include: 1. *Ummidia* sp.; 2. *Kapogea isosceles*; 3. *Mastophora* sp.; 4. *Micrathena similis*; 5. *Cithaeron praedonius*; 6. *Falconina gracilis*; 7. *Mazax* sp.; 8. *Microdipoena* sp.; 9. *Habronattus paratus*; 10. *Phidippus regius*; 11. *Metacyrba* sp.; 12. Symphytognathidae; and 13. *Uloborus* sp.

1997; Levi 1997). Introduced spiders represent an important faunistic component found in people's homes and buildings, where all four synanthropic species of Pholcidae in the region were introduced (author review of World Spider Catalog data).

The spiders from the region were first reviewed and studied broadly and in detail 100 years ago by the arachnologist Alexander Petrunkevitch (1926, 1929, 1930a, 1930b). Petrunkevitch added about 100 species to the region's fauna, a contribution that has not been surpassed. Petrunkevitch collected spiders during the last week of July and the first week of September of 1925 when he visited Saint Thomas and Saint Croix. In Puerto Rico, he collected from the last week of August 1925 to February 1, 1926. He was followed by Elizabeth Bryant (1942a, 1942b, 1947a, 1947b), another important contributor to the region's arachnofauna, who recorded an additional 38 species. From then on, reports of new spider detections have occurred at a slower pace, typically by arachnologists specialized in specific spider families.

A paucity in the detection of exotic species can affect timely efforts aimed at stopping their establishment. Also, we cannot argue against the risk of losing species before they disappear, especially in areas considered to be within biodiversity hotspots. To the 100 spider species added to the region's fauna 100 years ago by Petrunkevitch in his five-month stay, about 100 more have been added, and 100 more may remain to be discovered, these may be new species, overlooked native species, and exotic species. This work attempts to elucidate data contributed by citizens in the form of photographs to learn if their records can help overcome some of these limitations, while signaling regional taxonomical needs to arachnologists.

MATERIALS AND METHODS

The area covered in this work includes the United States territories within the Puerto Rican insular bank, i. e., Puerto Rico and the USVI and their satellite islands (Fig. 1). Islands without new records are not shown. I examined the region's citizen scientists' photographic records from three organism occurrence recording tools that require users to provide at least the date and location for the record. These were iNaturalist ,with 8,000 observations since 2005 (inaturalist.org), the citizen naturalists' groups Arañas y otros arácnidos de Puerto Rico with over 600, and Biodiversidad de Puerto Rico with approximately 2,000 observations each since 2014. Although iNaturalist initiated recordings in March of 2008, observations from previous years have been added by observers. I also studied approximately 250 personal observations and about 350 from Alfredo Colón-Archilla, a well-known Puerto Rican nature photographer. Together with a revision of scientific literature this allowed summarizing spider detections by citizens against visiting scientists within the last 20 years.

Colón-Archilla and I used an Olympus OM-D EM-I and II, respectively, with an Olympus 60mm f/2.8 lens, while devices used by observers are unknown. Since specimens were not collected, identifications are based on the most likely species and are subject to revision. I identified each spider using published descriptions of

FIGURE 2. A male spider resembling *Ummidia* sp. (left) photographed by iNaturalist user Scott Hardage (2023, Saint Thomas, USVI; https://www.inaturalist.org/observations/194135756), and (right) a close up of its tibia II (without) and III with a saddle depression (black arrows), which contrasts with the lack of a similar depression in the other tibia (yellow arrow).

similar Caribbean spiders, those of rapidly spreading spiders within the Caribbean, or of those recent disseminating in other areas if needed. Since photos often lacked microscopic diagnostic characters such as genitalia, setae, and underparts, species-level identification often preceded their placement in higher taxonomic ranks. I based my preliminary determinations from the subset of diagnostic characters presented in the photographs, which were usually limited to dorsal views of the spiders. I provide links to iNaturalist observation showing the spider as supporting data. The most current name for each spider was obtained from World Spider Catalog (version 26, 2025).

NEWLY DETECTED SPIDERS IN PUERTO RICO AND THE U. S. VIRGIN ISLANDS

Halonoproctidae Pocock, 1901; new record

***Ummidia* Thorell, 1875**; new record

Puerto Rico and USVI citizen scientist records

Documented from one 2022 record from Saint John (https://www.inaturalist.org/observatio5ns/10628041) and another in 2023 from Saint Thomas (https://www.inaturalist.org/observations/194135756).

Remarks

Known Mygalomorph taxa in the region include common and easily recognized genera in the families Dipluridae and Theraphosidae. It also includes a species known from a single specimen identified as *Bolosthromus fauna* (Simon, 1889), a South American spider in the family Cyrtaucheniidae, from Saint Thomas. Petrunkevitch (1926) considered that *B. fauna* could have represented a distinct species. Citizen scientists photographed two spiders resembling Caribbean Halonoproctidae (Fig. 2). Spiders in this family have a deep and strongly procurved fovea and an elevated cephalic region (Godwin et al. 2018), characters that are shared with some Cyrtaucheniidae (Duperre, 2023). The only genus in the family Halonoproctidae present the Caribbean is *Ummidia*. Unique within that family, *Ummidia* species have a saddle-like depression dorsally on tibia III (Fig. 2; Godwin and Bond 2021), a character not found in Cyrtaucheniidae. *Ummidia* spiders perform ballooning when young (Fisher et al. 2014), therefore undescribed *Ummidia* spiders from Guana (De los Santos et al. 2022), Sint Marten, Saint Barthelemy, and Saint Kitts may be close enough to allow inter-island dispersion through ballooning. Although, provided photographs do not present additional microscopic characters supporting generic placement within *Ummidia*, the morphology of the abdomen and carapace, and a dorsally depressed area on tibia III (Fig. 2), are macroscopic characters diagnostic to this genus. How-

FIGURE 3. Female spider resembling *Kapogea isosceles* Mello-Leitão, 1939 (top left) photographed by the author (2007, Camuy, Puerto Rico), a male (top right, bottom left), and a resting female (bottom right), photographed by Alfredo Colón-Archilla (2022, Arecibo, Puerto Rico), used with permission.

ever, specimen examination is necessary to determine if the spider belongs to an undescribed genus in the Halonoproctidae with similar saddle-like depression dorsally on tibia III and the species designation.

Araneidae Clerck, 1757

***Kapogea* Levi, 1997**; new record

***Kapogea isosceles* (Mello-Leitão, 1939)**; new record

Puerto Rico and USVI citizen scientist records

Recorded from Puerto Rico in 2007 by the author, and in 2022 by Mr. Alfredo Colón-Archilla (Fig. 3).

Remarks

Useful in separating *Kapogea* from the most similar genus in the region, the invasive *Cyrtophora* Simon, 1864, the female has the following generic dorsal characters seen in Fig. 3 and other pictures examined by the author: 1) a posterior eye row straight, 2) thick legs (length of tibia and patella I is 5–7 X the width of tibia I, 3) similar to three of the four species, including *Kapogea isosceles*, it has two white lines present dorsally in the abdomen, 4) a shield-shaped abdomen, and 5) an abdomen that is not apically notched (Fig. 3; Levi, 1997, 2002). From the two described species present in the Greater Antilles, the photographed species resembles *Kapogea isosceles* from South America, The Bahamas, Cuba, and Hispaniola. This species has two straight to slightly wavy dorsal white lines and humps at each anterior corner of the abdomen that point

FIGURE 4. Female spider resembling spiders in the genus *Mastophora* photographed by iNaturalist and Biodiversidad de Puerto Rico group contributor Alexis Reyes-Cruz (2018, Lares, Puerto Rico), used with permission. White arrow points to carapace horns.

to the sides (Levi 1997). The male (Fig. 3) externally matches the descriptions of the Cuban male (Archer 1958) with humeral cones on the abdomen and deep ruddy brown legs that become light with red annulations apically. The author has seen the web of the spider in Puerto Rico which resembles that of *Cyrtophora citricola* (Forsskål, 1775), and those of other *Kapogea* (Levi 1997). The fact that *Kapogea isosceles* was first documented from the Hispaniola in 2012 (De los Santos and Alayón 2012) may indicate either the species is a rare native or that it is a natural expansion of the species through the Greater Antilles. Whether Caribbean *K. isosceles* is distinct from South American spiders has not been investigated.

Mastophora Holmberg, 1876; new record

Puerto Rico and USVI citizen scientist records

The spider is known from Puerto Rico by three records in Biodiversidad de Puerto Rico (2015, 2018, and 2025) and a 2018 record (https://www.inaturalist.org/observations/10019344) in iNaturalist.

Remarks

Spiders in the genus *Mastophora* can be distinguished from all other Araneidae in the region by having "horns" in the back of the carapace (Fig. 4) that are usually biforked and have tubercules at the ends (Levi 2003). The congeneric *Mastophora vaquera* Gertsch, 1955 occurs in Cuba, but the species photographed more closely resembles a group of spiders with tube-shaped abdominal horns such as *M. corpulenta* (Banks, 1898), *M. diablo* Levi, 2003, *M. escomeli* Levi, 2003, *M. gasteracanthoides* (Nicolet, 1849), and *M. satan* Canals, 1931, among others. However, the only picture of its venter shows a darker spot (Fig. 4) unlike the white square described as diagnostic of the group (Levi 2003). Specimen examination is required for species determination.

Micrathena Sundevall, 1833

Micrathena similis Bryant, 1945; new record

Puerto Rico and USVI citizen scientist records

The taxon is documented from three spiders photographed in Puerto Rico in 2014 and 2016 by Mr. Alfredo Colón-Archilla.

Remarks

The female spider externally resembles the shape, color variation, and small size of *Micranthena similis* (4–5mm as described by photographer), a Hispaniolan endemic that has rarely been collected and it is known only from the female (Bryant 1945: plate 4, fig. 226; Levi 1985: 493, fig. 226). Hispaniola and Puerto Rico also share the species *Micranthena militaris* (Fabricius, 1775) and other spiders known to perform ballooning (Plagens 1986; Candek et al. 2019). The male photographed by Colón-Archilla (Fig. 5) contrasts with *M. militaris*, the only other *Micrathena* species in Puerto Rico, in that is has a whitish abdomen instead of a dark one. Collections and observations of *M. similis* in

FIGURE 5. A pink pigmented female resembling *Micrathena similis* Bryant, 1945 (top) photographed by Alfredo Colón-Archilla (2014, Maricao, Puerto Rico) and a white pigmented female (bottom left) and male (bottom right) (2016, Maricao, Puerto Rico), used with permission.

Hispaniola range from 600 to 1,200 m elevation in humid forests of the Dominican Republic, suggesting the species may be restricted to these habitats. The species collection site in Maricao, Puerto Rico is a rain forest around 850 m elevation, satisfying that potential habitat requirement of the species. The spider in Puerto Rico cannot be distinguish from *M. similis* from Hispaniola from photos. Future work including examination of microscopic characters and molecular-based phylogeny is required to prove whether this is a new species. The presence of *M. similis* in Puerto Rico is important for the species conservation as it represents a potentially rare species living in a disturbance-susceptible habitat.

Cithaeronidae Simon, 1893; new record

***Cithaeron* O. Pickard-Cambridge, 1872**; new record

***Cithaeron praedonius* O. Pickard-Cambridge, 1872**; new record

FIGURE 6. Female spider resembling *Cithaeron praedonius* O. Pickard-Cambridge, 1872 photographed by Willie Santiago-López submitted to Biodiversidad de Puerto Rico group (2023, Salinas, Puerto Rico), used with permission.

Puerto Rico and USVI citizen scientist records

Recorded from a single photographic record from Puerto Rico submitted to Biodiversidad de Puerto Rico by Mr. Willie Santiago-Lopez in 2023 (Fig. 6).

Remarks

Although microscopic study is needed to separate *Cithaeron praedonius* from the region's Gnaphosidae based on spinnerets, these are larger and longer-legged spiders (Fig. 6) than the region's *Cesonia* Simon, 1893 (Gnaphosidae) and *Neozimiris* Simon, 1903 (Prodidomidae), and lack the spines present in the legs of these two most similar genera. Reports of this spider-hunting species are increasing in American countries including Brazil (Carvalho et al. 2007), United States (Edwards and Stiles 2011), Cuba (Sánchez-Ruiz and Brescovit 2013), Mexico (Cubas-Rodríguez et al. 2022), Panama (Miranda et al. 2024), and The Bahamas (Johnson 2025). Family Cithaeronidae has no native representatives in the Americas, and *C. praedonius* habitation of people's homes makes it identifiable by citizen scientists. This increases our knowledge of American invaded countries beyond what has been published in scientific literature. For instance, an iNaturalist search of the spider returns spiders identified as this species from Hawaii, U. S. A. (2014), Ecuador (2018), Nicaragua (2018), Honduras (2020), Colombia (2021), Trinidad (2021), Venezuela (2023), and Bolivia (2024) that have not been published in the scientific literature.

Corinnidae Karsch, 1880

***Falconina* Brignoli, 1985**; new record

***Falconina gracilis* (Keyserling, 1891)**; new record

Puerto Rico and USVI citizen scientist records

The presence of this genus in Puerto Rico and Vieques Island is recorded here for the first time based on four records in Biodiversidad de Puerto Rico made since 2014, and by 15 records submitted to iNaturalist since 2016, as well as author's photos from 2024 (Fig 7; https://www.inaturalist.org/observations/37316431; https://www.inaturalist.org/observations/197155734).

FIGURE 7. Female ant-mimicking spider resembling *Falconina gracilis* (Keyserling, 1891) photographed by the author (2024, Camuy, Puerto Rico).

Remarks

Falconina gracilis has recently been documented in several countries outside South America, including the southern U. S. A. (Valle et al. 2013), and Cuba (García and Bonaldo 2023). High-resolution images and descriptions of the species are published (García and Bonaldo 2023), which aids its photographic species determination. Although more definite diagnostic characters are microscopic, based on their genitalia and are not seen in the available photographs, García and Bonaldo (2023) give one external diagnostic character based on markings that do not resemble described *Falconina* within the covered region. These are two or three pairs of white patches in the middle of abdomen with an anterior pair usually larger and two to three apical white chrevron-shaped spots near the spinnerets (Fig. 7). These markings make *F. gracilis* distinguishable within the known fauna of its genus. Given the ubiquitous recent sightings this may represent an introduced species to the region.

***Mazax* O. Pickard-Cambridge, 1898**; new record

Puerto Rico and USVI citizen scientist records

The presence of *Mazax* sp. in Puerto Rico is documented from two records submitted to Biodiversidad de Puerto Rico since 2016, by three submitted to iNaturalist since 2021, one record made to Arañas y arácnidos de Puerto Rico in 2023, and by one observation by the author in 2023 (Fig. 8; https://www.inaturalist.org/observations/77904266).

Remarks

Spiders in the genus *Mazax* resemble ants more closely than any other genus in the region. They differ from spiders in the closest genus *Castianeira* Karsch, 1880 by the presence of a clearly visible, long, and rugose abdominal pedicel and by having and abdominal glossy, scutum bulging strongly anterodorsally (Reiskind 1969; Silva-Junior et al. 2024). The species resemble *M. spinosa* (Simon, 1898) in the unicolored dark carapace that lacks plumose setae (Fig. 8). In one of the iNaturalist photos, a pair of long petiole spines can be seen with difficulty; however, the number of ventral spines on Tibiae-I used to diagnose the species cannot be examined from available photographs. The species has been documented from the Lesser Antilles (Simon 1898; Reiskind 1969) and Navassa Island (east of Haiti) (Alayón-García 2001). Also, the genus *Mazax* was recently documented from Hispaniola (De los Santos and Alayón 2012).

Mysmenidae Petrunkevitch, 1928

***Microdipoena* Banks, 1895**; new record

Puerto Rico and USVI citizen scientist records

Known from Puerto Rico from spiders photographed by the author in 2024 (Fig. 9).

Remarks

The genus *Microdipoena* contains 20 species of small spiders distributed in the Oriental, Ethiopian, and Australian biogeographic regions, and the species *Mi-*

FIGURE 8. Female ant-mimicking spider resembling *Mazax* (left) photographed by the author (2023, Camuy, Puerto Rico) and another female (center) submitted to iNaturalist by Wes Gapp (2021, Lares, Puerto Rico; https://www.inaturalist.org/observations/77904266). A male *Mazax* sp. (righ) photographed by Kurt Miller (2023, Mayagüez, Puerto Rico), black arrow points to the spider's pedicel.

FIGURE 9. Female Mysmenidae resembling spiders in the genus *Microdipoena* photographed by the author (2024, Camuy, Puerto Rico). Females of this genus are minute (approx. 1 mm), and the males are even smaller. The abdomen's spot pattern can be diagnostic in species of this genus.

crodipoena guttata Banks, 1895 which is considered native to the Americas. However, the presence of that species in the Ethiopian region may indicate the species may have been introduced to the Americas. Females share an abdomen with a whitish ventral ring around the spinnerets that was seen by the author (Lopardo and Hormiga 2015). *Microdipoena guttata* occurs from the U. S. A. to Paraguay (World Spider Catalog) and the Caribbean, where it has been recorded from Cuba (1977), Jamaica (1960), and Martinique (2022). Additionally, the genus *Microdipoena* was documented from Hispaniola (Hormiga et al. 2007). *Microdipoena guttata* females have abdominal spotting as figured in Levi (1956: 8, fig. 30) that matches that of the photographed spider (Fig. 9). However, microscopic specimen examination would be required to confirm both genus and species of this small spider.

Salticidae Blackwall, 1841

***Habronattus* F. O. Pickard-Cambridge, 1901**

***Habronattus paratus* (G. W. Peckham & E. G. Peckham, 1896)**; new record

FIGURE 10. A male (left) and a female (right) spider resembling *Habronattus paratus* (G. W. Peckham & E. G. Peckham, 1896) photographed by the author (2006 and 2007, respectively, Isabela, Puerto Rico). Black arrow points to the white line of setae posterior to male's anterior median eyes and white arrow to the red area under female's anterior eyes of *H. paratus*.

Puerto Rico and USVI citizen scientist records

Determinations were based on two spiders photographed by the author in 2006 and 2007 (Fig. 10), six submissions made to iNaturalist, and three to the Biodiversidad de Puerto Rico group since 2021.

Remarks

Males of this species have white scales forming a line behind the anterior eye row (Fig. 10) that is absent and is characteristic of males of *Habronattus pretiosus* Bryant, 1947b (Griswold 1987). *Habronattus facetus* (Petrunkevitch, 1930) would be the most similar spider documented from the region since it somewhat resembles the dorsal pattern of *H. paratus* males; however, not of females. A female character that is not described in the literature, but which is uncommon on the usually drab (cryptic) females of this genus, is that female *H. paratus* have a red area under each anterior median eye that is lined on their sides by white setae (Fig. 10). This character is not present in any of the females of Greater Antillean *Habronattus*. Males also have a unique spotting pattern that is also characteristic (Fig. 10). *Habronattus paratus* is a Central American species that may have been overlooked of represents a new arrival to the Caribbean islands. iNaturalist observations shows the species in Jamaica (2022), Dominican Republic (2023), Guadeloupe (2014), and Martinique (2022).

***Metacyrba* F. O. Cambridge, 1901**; new record

Puerto Rico and USVI citizen scientist records

Recorded from Puerto Rico by a single observation submitted to iNaturalist (Fig. 11) by contributor hidono in 2023 (https://www.inaturalist.org/observations/166724884).

Remarks

Spiders in genus *Metacyrba* have characteristic dorsal color and markings while a genitalia that is indistinct thus less useful in distinguishing species (Edwards 2005). Generic characters include a near flat carapace, dark dorsal color, and an abdominal pair of paramedian longitudinal white lines of only a few setae thick (Barnes 1958; Edwards 2005). The species *Meta-*

FIGURE 11. A female Salticidae resembling spiders in the genus *Metacyrba* photographed by iNaturalist contributor hidono (2023, Quebradillas, Puerto Rico; https://www.inaturalist.org/observations/166724884).

cyrba taeniola (Hentz, 1846) has been reported from Cuba and Hispaniola, which was considered doubtful by Edwards (2005). The *Metacyrba* sp. documented from Puerto Rico has reddish-brown femora (Fig. 11) unlike the black femora of *M. taeniola*. Similar to *M. pictipes* Banks, 1903 it has lighter apical leg segments (Fig. 11) however, the abdominal lines are entire and not broken into dots posterior to the middle as in that species. The photographed spider is unlike those of described *Metacyrba* within the Caribbean. Examination of the region's specimens is required to determine the species.

***Phidippus* C. L. Koch, 1846**; new record

***Phidippus regius* C. L. Koch, 1846**; new record

Puerto Rico and USVI citizen scientist records

Recorded in Puerto Rico since 2006 by the author (Fig. 12), by over 50 submissions since 2015 in Biodiversidad de Puerto Rico, and from 23 records in iNaturalist since 2018 (https://www.inaturalist.org/observations/9746607).

Remarks

Spiders in the genus *Phidippus* have an anterior eye row usually with a posterior fringe of long black setae, iridescent chelicerae, and abdominal spots in four different arrangements defined as types by Edwards (2004). This is the only species in this genus from the Caribbean that has round abdominal spots in pattern III (Edwards, 2004) (Fig. 12, right) instead of the narrow spots in *P. audax* (Edwards, 2004) documented from Cuba (Alayón-García, 1995).

Symphytognathidae Hickman, 1931

Puerto Rico and USVI citizen scientist records

The presence of spiders in the family Symphytognathidae in Puerto Rico was documented by their minute webs, built in moist habitats (Coddington 1986; Griswold et al. 1998, and this publication, Fig. 13).

Remarks

Spiders in the family Symphytognathidae are some of the smallest in the world, their chelicera is at least partly fused and females either have only one or lack pedipalps completely (Forster and Platnick 1977). Webs of the photographed spider are horizontal and have only a few accessory radii, some of which anastomose before the central anchor point at the hub (Fig. 13). These are characteristic of Symphytognathidae spiders in the genus *Anapistula* Gertsch, 1941 and *Patu* Marples, 1951 (Griswold et al. 1998). Similar webs of a Symphytognathidae from the same location as those in Fig. 13 in Puerto Rico were considered to represent a spider in the genus *Anapistula*; however, the spider was not seen then (Griswold et al. 1998). Differently from *Anapistula secreta* Gertsch, 1941 from The Bahamas and Jamaica, the spider shown in Fig. 13 appears to have six instead of four eyes, but better im-

FIGURE 12. Immature male *Phidippus regius* C. L. Koch, 1846, photographed by the author (2006, Camuy, Puerto Rico).

ages are needed to clear this. Only *Anapistula boneti* Forster, 1958 of Mexico has six eyes; however, in that species and described six-eyed *Patu* spp., the posterior eye row is recurved while it appears to be procurved on this (Fig. 13). Both *Anapistula* and *Patu* species have six eyes in three diads and their females lack pedipalps matching the photographed spider (Forster and Platnick 1977). However, characters such as the limits of fused chelicerae used in generic determinations are not clearly seen in the photograph (Fig. 13), thus microscopic examination of specimens is needed to determine the spider's genus.

Uloboridae Thorell, 1869

Uloborus Latreille, 1806; new record

Puerto Rico and USVI citizen scientist records

First photographed in Puerto Rico on April 30, 2023 in Dorado, Puerto Rico by iNaturalist contributor Din-Go OcTavius (Fig. 14), and on April 22, 2025 a second specimen with egg sacs was photographed in Quebradillas, Puerto Rico by Irma N. Avila-Pellens and posted to Biodiversidad de Puerto Rico.

Remarks

Spiders in this genus have a tuft of setae (calamistrum) occupying half to two-thirds of length of fourth protibia Muma and Gertsch (1964). Also, the cephalic region of their prosoma at the anterior lateral eyes is half as wide as the carapace at its widest (Opell 1979). Two similar species in this genus are documented in the Caribbean *U. glomosus* (Walckenaer, 1841) and *U. trilineatus* Keyserling, 1883. Both species have a narrow, mid-longitudinal light band in their prosoma, have similar leg tufts and banding patterns, and build similar eggs sacs. The distribution of the spider suggests it is more likely *U. trilineatus*; however, I am not able to determine the Puerto Rican spiders to species from the photographs.

DISCUSSION

Citizen scientists represent an increasing force of volunteers that share millions of species records through online photographic records. The combined citizen science efforts from iNaturalist participants, those in two other online species documentation resources, those made by the first author, and by another nature photographer, document 13 previously unrecorded spiders from Puerto Rico and the USVI region during a 20-year period. This number of records exceeded the number of known spiders detected by arachnologists visiting the region during the same period (Fig. 15; author literature review), increasing the known spider biodiversity in the region.

Puerto Rico and the USVI currently do not have resident spider experts, and rely on the work performed by visiting arachnologists to document new species and to record introduced spiders to the region. Although their contributions are invaluable, publications documenting new spider records on these islands can take

FIGURE 13. Symphytognathidae spider webs and its builder, an apparent six-eyed spider, photographed by the author (2008, Rio Grande, Puerto Rico).

FIGURE 14. Uloboridae spider resembling the genus *Uloborus* (dorsal, left and ventral, right) photographed by iNaturalist contributor DinGo OcTavius (2023, Dorado, Puerto Rico; https://www.inaturalist.org/observations/168335014), used with permission.

several years after the species first arrived. For example, I photographed the invasive spider *Cyrtophora citricola* from Puerto Rico in 2008, but its occurrence was first reported in a 2010 publication (De Armas 2010). Moreover, some of the new spiders documented here have been shared in citizen scientists' forums for a long time. For instance, 19 years have passed since I first photographed the jumping spiders *Habronattus paratus* and *Phidippus regius* in the region. Since then, pictures of these spiders have been submitted over 60 times in iNaturalist and other online resources, yet the species presence have not yet been published in the scientific literature. This may indicate photographic sources of data may be either underutilized or that experts that have seen them do not consider them to show enough detail to identify to a species level, which is a valid argument.

While *Cithaeron praedonius* and *Falconina gracilis* represent likely introduced spiders from outside the Caribbean, the remaining species are native to neighboring islands. Thus, their presence may be either native, or are recent natural expansions with or without the aid of people. All six spiders preliminarily identified to genus, i. e., *Mastophora*, *Mazax*, *Metacyrba*, *Microdipoena*, *Uloborus*, and *Ummidia* also occur in the broader Caribbean. Although I did not describe any new species, the *Metacyrba* sp. and the spider in the family Symphytognathidae may represent new ones.

It is evident that citizen's photographic records benefit from being revised by an arachnologist or someone familiar with the region's spider fauna or someone able to use diagnostic key and published descriptions. This is noticeable in the time it has taken to diagnose the newly documented species.

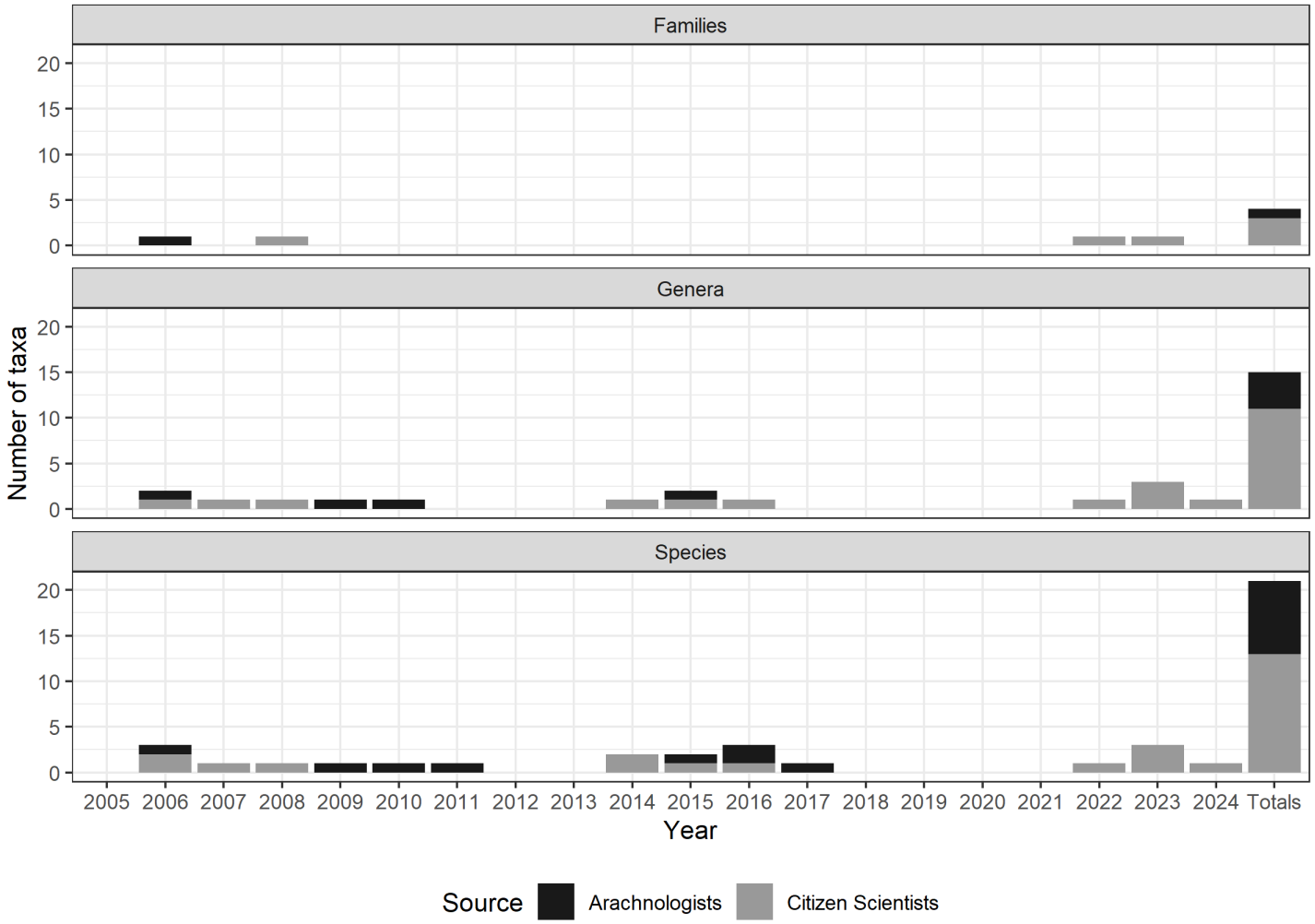

FIGURE 15. Comparison of new spiders detected in Puerto Rico and the US Virgin Islands by citizen scientists and by arachnologists in the last 20 years. Although not all spiders were determined to species, all taxa represent an additional new species to the region.

Although spider taxonomy is not the focus of citizens submitting records, they contribute data that can help specialists detect when new fauna arrives in a novel ecosystem. Citizen science reports should be considered by arachnologists and experts in other groups of organisms as a tool that can complement the rigorous studies required to detect and describe new spiders and can be used to improve the speed at which new species detections are made as well as to improve spider knowledge in a region.

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