



Two new species of *Kiekie* Polotow & Brescovit, 2018 (Araneae: Ctenidae) from the highlands of Panama

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Abstract

Two new species, *Kiekie almae* sp. n. and *K. dietrichi* sp. n. are described based on both sexes collected in highlands of Central America (Panama). Live males and females of both species were photographed *in situ*. A distribution map of all Panamanian *Kiekie* species is given based on new and literature-derived records.

Key words: Cteninae, Central America, wandering spiders, biodiversity

Introduction

Ctenidae Keyserling, 1877, commonly known as wandering spiders or tropical wolf spiders, comprise a family of spiders predominantly found in tropical and subtropical regions, with 593 species and 48 genera (WSC 2023). The family is most diverse in the Neotropical Realm, where 266 species from 27 genera are known up to date (WSC 2023). However, those figures do not mean the Neotropical ctenids are sufficiently known. For instance, despite the publication of several revisions dealing with Panamanian ctenids in recent years (Arizala *et al.* 2021; Brescovit & Simó 2007; Polotow & Brescovit 2014; 2018), the fauna of this family in Panama remains insufficiently studied. Only 14 species of wandering spiders from six genera are known from Panama (WSC 2023).

Kiekie Polotow & Brescovit, 2018 is a relatively small genus of Ctenidae, comprising 11 named species (WSC 2023). This genus was recently established by Polotow & Brescovit (2018), who transferred 2 species from *Ctenus* Walckenaer, 1805, and described nine additional species as new to science. No new species of *Kiekie* have been discovered since then. The genus is primarily distributed in Central America, with the exception of one species, *K. antioquia* Polotow & Brescovit, 2018, known from South America (Colombia). Biology is unknown for the majority of species, but apparently all species are inhabitants of leaf litter and are active during twilight and nighttime. Previously, only one species of the genus, *K. montanensis* Polotow & Brescovit, 2018, was known from high mountain regions (Panama and Costa Rica). The discovery of two new species from the highland region of Panama (Totumas Mt., 1900 m) suggests the possibility of finding additional highland species of this genus in the future. Thus, the aims of the present paper are to diagnose and describe these new species.

Material and methods

Specimens were photographed using a Nikon DSRi2 camera attached to a Nikon SMZ25 stereomicroscope at the Far Eastern Federal University (Vladivostok, Russia). Photographs of the collected specimens were taken in dishes filled with ethanol or silicon-based lubricant, with soft white paper or cotton at the bottom. Living specimens were photographed with a Nikon D850 DSLR camera with Tamron SP 90mm f/2.8 Di Macro 1:1 VC USD macro lens. Photos of habitats were taken with a Nikon Z6 mirrorless camera with Laowa 15mm f/4 Wide Angle Macro lens. Digital images were montaged using Zerene Stacker (<https://zerenesystems.com/cms/stacker>) software package. Epigynes were cleared in a boiling KOH/water solution. Distribution map was produced using SimpleMapp

(Shorthouse 2010). All measurements are in millimeters. Spination pattern is given in the following formula: the sum of all spines is listed for the prolateral, dorsal and retrolateral sides; ventral spines are listed in pairs, from proximal to distal. Length of leg segments were measured on the retrolateral side, and shown total (femur, patella, tibia, metatarsus, tarsus). All examined material is deposited in the Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU; curator K.G. Mikhailov) and Far Eastern Federal University (FEFU; curator M.M. Omelko). The terminology and format of description follows Polotow & Brescovit (2018) with some modifications.

Abbreviations:

Eyes: ALE—anterior lateral eye, AME—anterior median eye, PLE—posterior lateral eye, PME—posterior median eye.

Leg segments: Fe—femur, Mt—metatarsus, Pa—patella, Ti—tibia.

Spination: d—dorsal, p—prolateral, r—retrolateral, v—ventral.

Copulatory organs: *C*—conductor, *CD*—copulatory duct, *CO*—copulatory opening, *E*—embolus, *EB*—embolic base, *FD*—fertilization duct, *LT*—lateral tooth, *MA*—median apophysis, *MP*—median plate of epigyne, *Pr*—median plate projection, *RTA*—retrolateral tibial apophysis, *SD*—sperm duct, *Re*—receptacle, *St*—subtegulum, *Te*—tegulum.

Taxonomy

Family Ctenidae Keyserling, 1877

Genus *Kiekie* Polotow & Brescovit, 2018

Type species. *Ctenus sinuatipes* F.O. Pickard-Cambridge, 1897, from Central America (Panama).

Remarks. Currently, seven species of *Kiekie* are known from Panama, including two new species described here. Almost all of them are known from both males and females, except for *K. barrocolorado* Polotow & Brescovit, 2018, which has been described based on males only. For the diagnosis and description of the genus see Polotow & Brescovit (2018). The genus has a Central American distribution, except for *K. antioquia*, which is found in South America.

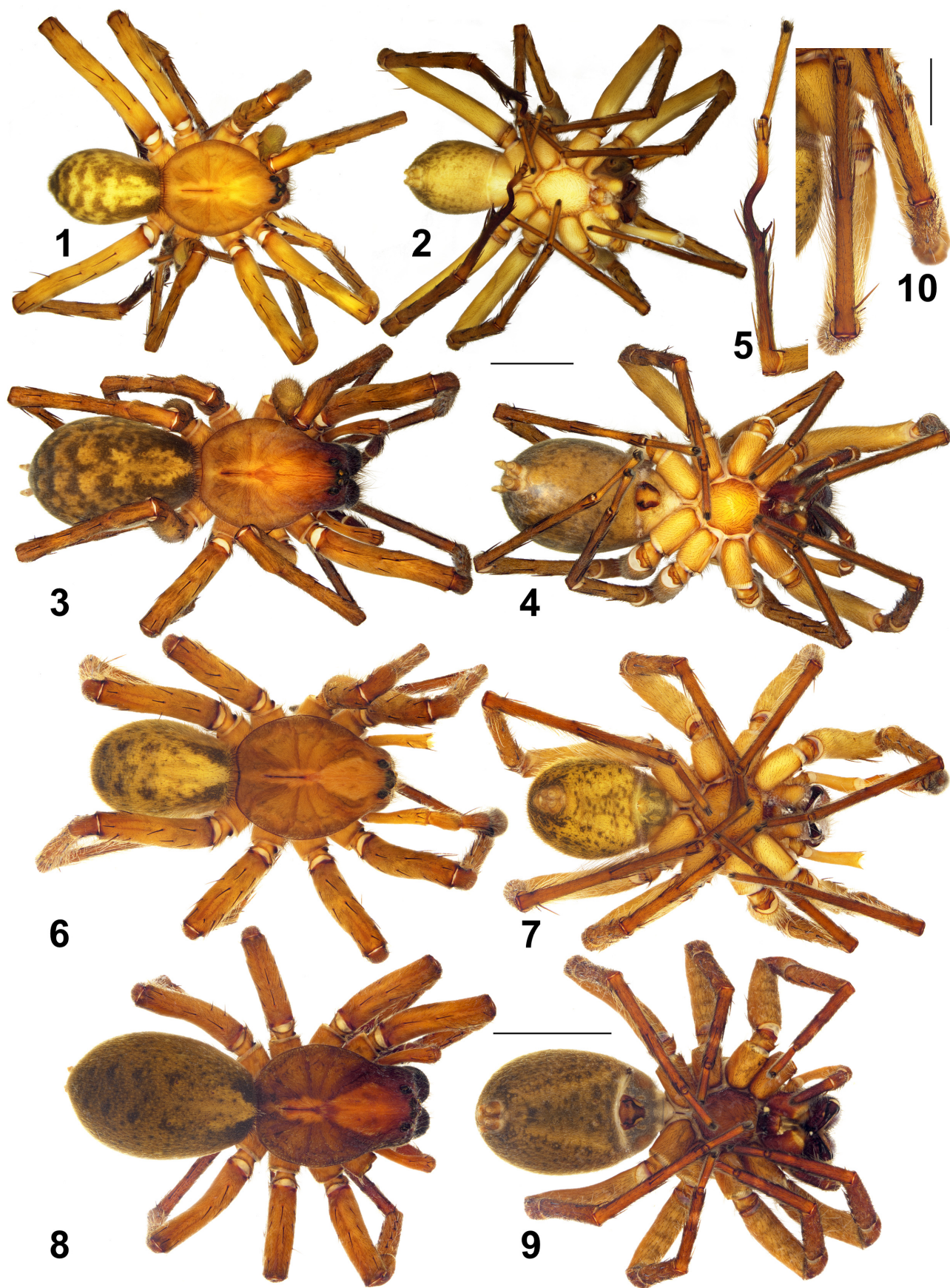
Kiekie almae sp. n.

(Figs 1–5, 11–14, 19–22, 27–30, 36–37, 40–43)

Material examined. HOLOTYPE ♂ and 3 ♀ paratypes (ZMMU), PANAMA, Chiriquí Prov., Totumas Mt., 8°53'3.24"N 82°40'41.05"E, 1900 m, 1–6.02.2022 (M.M. Omelko).

Etymology. The specific name is a matronym in honor of Alma Dietrich, wife of Jeffrey Dietrich, the owner of the Mount Totumas Cloud Forest resort, near where the new species was collected.

Diagnosis. Males of *Kiekie almae* sp. n. are similar to those of *K. dietrichi* sp. n. in having elongated, comma-shaped median apophysis, but can be easily distinguished by the strongly modified (curved) metatarsi IV (vs. unmodified; cf. Figs 5, 10) and the median apophysis (*MA*) located along the longitudinal axis of the cymbium (vs. diagonal position; cf. Figs 20, 24). By general conformation of male palp and shape of epigyne's median plate in females, the new species is also similar to *K. panamensis* Polotow & Brescovit, 2018. Males of *K. almae* sp. n. can be easily distinguished by the RTA's base shifted proximally from the distal edge of the palpal tibia (vs. located adjacent to the distal edge; cf. Fig. 13 and fig. 13B in Polotow & Brescovit 2018). Females of *K. almae* sp. n. can be distinguished from those of *K. panamensis* by the median plate (*MP*), which is of equal width at the anterior and posterior edges (vs. the anterior edge significantly narrower than the posterior; cf. Fig. 27 and fig. 13C in Polotow & Brescovit 2018). The female of the new species is also similar to that of *K. antioquia* but differs from it by the rounded projections (*Pr*) of the median plate (vs. pointed) and a slightly curved posterior edge of the septum (vs. strongly curved; cf. Fig. 27 and fig. 14A in Polotow & Brescovit 2018).



FIGURES 1–10. General appearance (1–4, 6–9) and legs (5, 10) of *Kiekie almae* **sp. n.** (1–5) and *K. dietrichi* **sp. n.** (6–10). 1, 6—male, dorsal; 2, 7—ditto, ventral; 3, 8—female, dorsal; 4, 9—ditto, ventral; 5—metatarsus IV; 10—metatarsi III–IV. Scale bars: 1–4, 6–9=5 mm; 10=2mm.

Description. Male holotype (Figs 1–2, 5, 36). Total length 15.10. Carapace 7.73 long, 6.12 wide. Opisthosoma 7.35 long, 4.87 wide. Coloration in ethanol: carapace light brown, with narrow yellow median band, diamond-shaped near the ocular area. Lateral bands yellowish. Fovea thin, dark brown. Chelicerae brown, almost black. Sternum light brown without pattern. Labium light brown. Maxillae yellowish. Dorsal part of the opisthosoma with a complex pattern, consisting of a yellow cardiac mark, a pair of oblique stripes next to it, as well as a series of ca. 4 transverse stripes. Lateral sides of the opisthosoma yellow with a number of small gray spots. Ventral part yellow with some tiny grayish spots. Spinnerets uniformly yellow. Eye sizes and interdistances: AME 0.28, ALE 0.26, PME 0.42, PLE 0.41; AME–AME 0.22, AME–ALE 0.32, PME–PME 0.11, PME–PLE 0.23, AME–PME 0.12, ALE–PLE 0.18, clypeus height at AME 0.34, at ALE 0.65.

Leg measurements: I 34.29 (9.23, 3.35, 9.89, 8.47, 3.35), II 31.75 (8.37, 3.33, 8.95, 7.75, 3.35), III 28.33 (7.66, 2.84, 7.60, 7.48, 2.75), IV 35.94 (9.13, 3.15, 9.81, 10.18, 3.67). Femora of all legs dorsally light brown, ventrally yellow. Other segments light brown with barely visible annulation, except for metatarsi IV dark brown with light distal part, modified, strongly curved and with large spines (Fig. 5). For legs spination see Table 1.

TABLE 1. Palp and leg spination of male of *Kiekie almae* sp. n.

| | Fe | Pa | Ti | Mt |
|---------|----------|-------|------------------------|-----------------|
| Leg I | 3d 3p 4r | 1p 1r | 2d 4p 3(2)r 2-2-2-2v | 2p 2r 2-2-2v |
| Leg II | 3d 4p 4r | 1p 1r | 2d 3(4)p 2r 2-2-2-2-2v | 2p 2r 2-2-2v |
| Leg III | 3d 4p 4r | 1p 1r | 2d 2p 2r 2-2-2v | 1d 4p 4r 2-2-2v |
| Leg IV | 3d 4p 3r | 1p 1r | 3d 2p 2r 2-2-2v | 2d 4p 6r 1-2v |

Living male with dark brown carapace (median band light brown) and black opisthosoma with a light brown pattern (Fig. 36).

Palp as shown in Figs 11–14, 19–22. Tibia ca. 3.2 longer than wide, with 3 very long spines, longest ca. 0.67 of tibia length. RTA long, hook like with its base shifted proximally from the distal edge of the tibia. Cymbium length/width ratio ca. 1.9. Tip of cymbium about 0.3 of cymbial length, shorter than bulb. Subtegulum (*St*) large, oval, mainly hidden by embolus (*E*). Sperm duct (*SD*) clearly visible mainly in retrolateral and apical view. Median apophysis (*MA*) comma-shaped in ventral view, cup-shaped in prolateral view, not reaching conductor (*C*). *MA* located along the longitudinal axis of the cymbium. Conductor (*C*) open fan-shaped, ca. 1.2 times wider than long, covering the embolus tip. *E* with wide base (*EB*), starting at 7 o'clock position, thin, with slightly curved tip.

Female (Figs 3–4, 37). Total length 20.19. Carapace 9.34 long, 7.07 wide. Opisthosoma 10.49 long, 7.12 wide. Coloration in ethanol. Carapace brown (somewhat darker than in males) with narrow yellowish median band, widened and barely visible in ocular area. Lateral bands thin, poorly visible. Fovea thin, black. Chelicerae dark brown, almost black, number of teeth like in male. Sternum light brown without pattern, with dark edges. Labium dark brown, almost black. Endites dark brown with yellow outer edges. Dorsal part of the opisthosoma with a complex pattern, consisting of a poorly visible yellow cardiac mark, a pair of small oblique stripes next to it, as well as a series of ca. 4 paired spots. Lateral sides brown with poorly visible spots, ventral brown with a few small grayish spots. Spinnerets light brown. Eye sizes and interdistances: AME 0.42, ALE 0.32, PME 0.46, PLE 0.42; AME–AME 0.27, AME–ALE 0.41, PME–PME 0.16, PME–PLE 0.52, AME–PME 0.23, ALE–PLE 0.26, clypeus height at AME 0.57, at ALE 0.95.

Leg measurements: I 34.16 (9.35, 4.05, 9.79, 7.85, 3.12), II 31.78 (8.74, 3.79, 8.87, 7.36, 3.02), III 28.53 (7.93, 3.33, 7.19, 7.36, 2.72), IV 36.64 (9.42, 3.46, 9.45, 10.66, 3.65). Femora of all legs brown dorsally, yellow ventrally. Other segments brown with barely visible annulation. For legs spination see Table 2.

TABLE 2. Palp and leg spination of female of *Kiekie almae* sp. n.

| | Fe | Pa | Ti | Mt |
|---------|-----------------|-------|--------------------|----------------|
| Leg I | 3(4) d 3p 3(4)r | 1r | 1p 1r 2-2-2-2-2v | 2-2-2v |
| Leg II | 3d 4p 4r | 1p 1r | 2p 1r 2-2-2-2-2v | 2-2-2v |
| Leg III | 3d 4p 4r | 1p 1r | 2(3)d 2p 2r 2-2-2v | 4p 4r 2-2-2v |
| Leg IV | 3d 3(5) p3 | 1p 1r | 3d 2p 2r 2-2-2v | 4p 6r 1-1-2-2v |



FIGURES 11–18. Male palp of *Kiekie almae* sp. n. (11–14) and *K. dietrichi* sp. n. (15–18). 11, 15—prolateral; 12, 16—ventral; 13, 17—retrolateral; 14, 18—dorsal. Scale bars=0.5 mm. Abbreviations: RTA—retrolateral tibial apophysis.

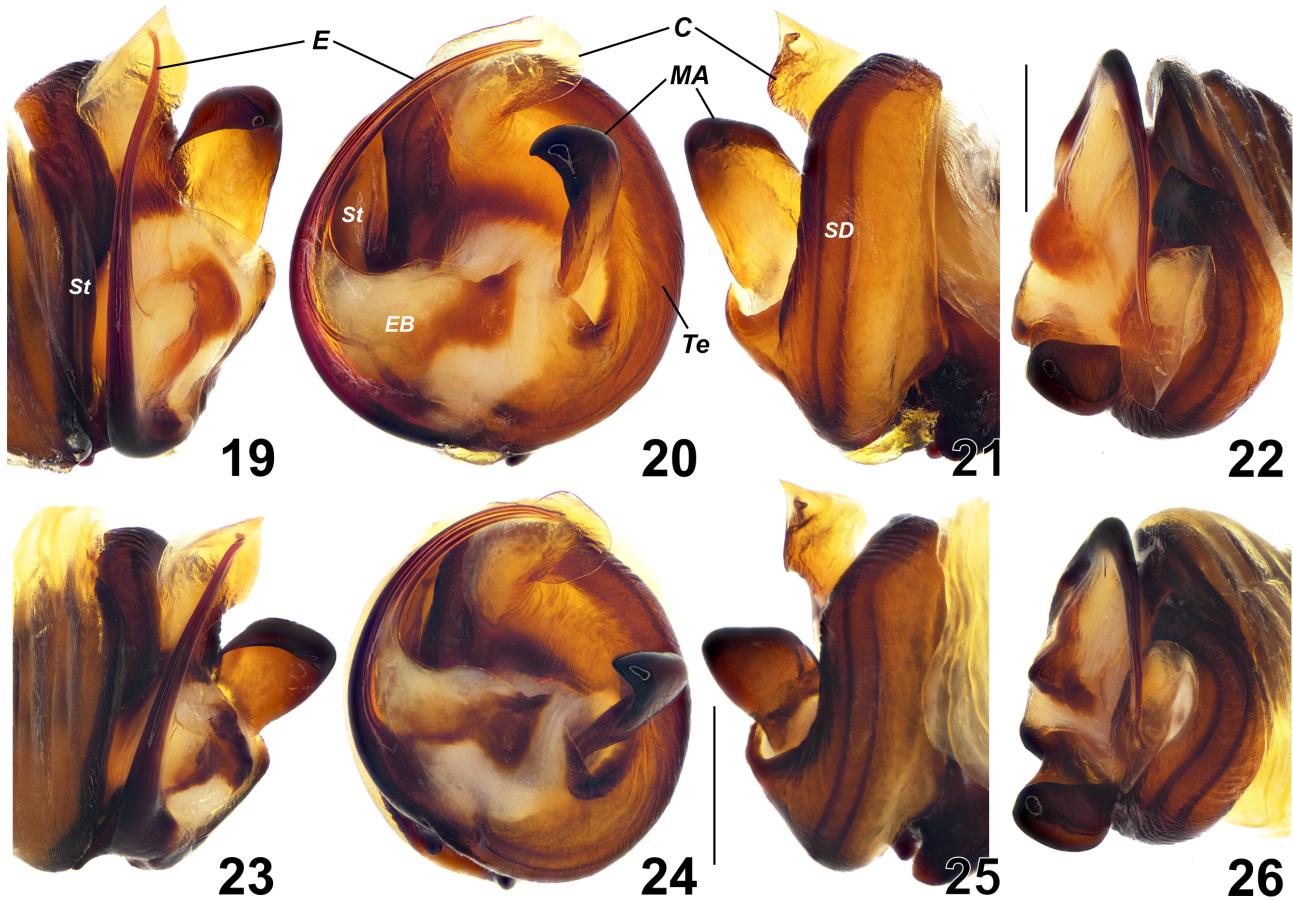
Living female with dark brown carapace (median band brown) and black, slightly shiny opisthosoma with light brown pattern (see Fig. 37).

Epigyne as shown in Figs 27–30. Epigynal plate 1.2 times wider than long. Median plate (*MP*) with rounded anterior edges and 2 large, rounded projections (*Pr*) medially. Lateral teeth (*LT*) large, well developed, slightly curved in ventral view, with pointed tips in posterior view. Receptacles (*Re*) large, kidney-shaped. Copulatory ducts (*CD*) slightly curved. Fertilization ducts (*FD*) short.

Biology. All specimens were found in the litter of primary cloud forest (Figs 40–41).

Notes. The species exhibits a noticeable sexual size dimorphism, with the female being 25% larger than the male (by total length). Among other species in the genus, such dimorphism is reliably known only for *K. montanensis* and *K. panamenensis*.

Distribution. Type locality only (Figs 42–43).



FIGURES 19–26. Bulb of *Kiekie almae* sp. n. (19–22) and *K. dietrichi* sp. n. (23–26). 19, 23—prolateral; 20, 24—ventral; 21, 25—retrolateral; 22, 26—apical. Scale bars=0.5 mm. Abbreviations: C—conductor, E—embolus, EB—embolic base, MA—median apophysis, SD—sperm duct, St—subtegulum, Te—tegulum.

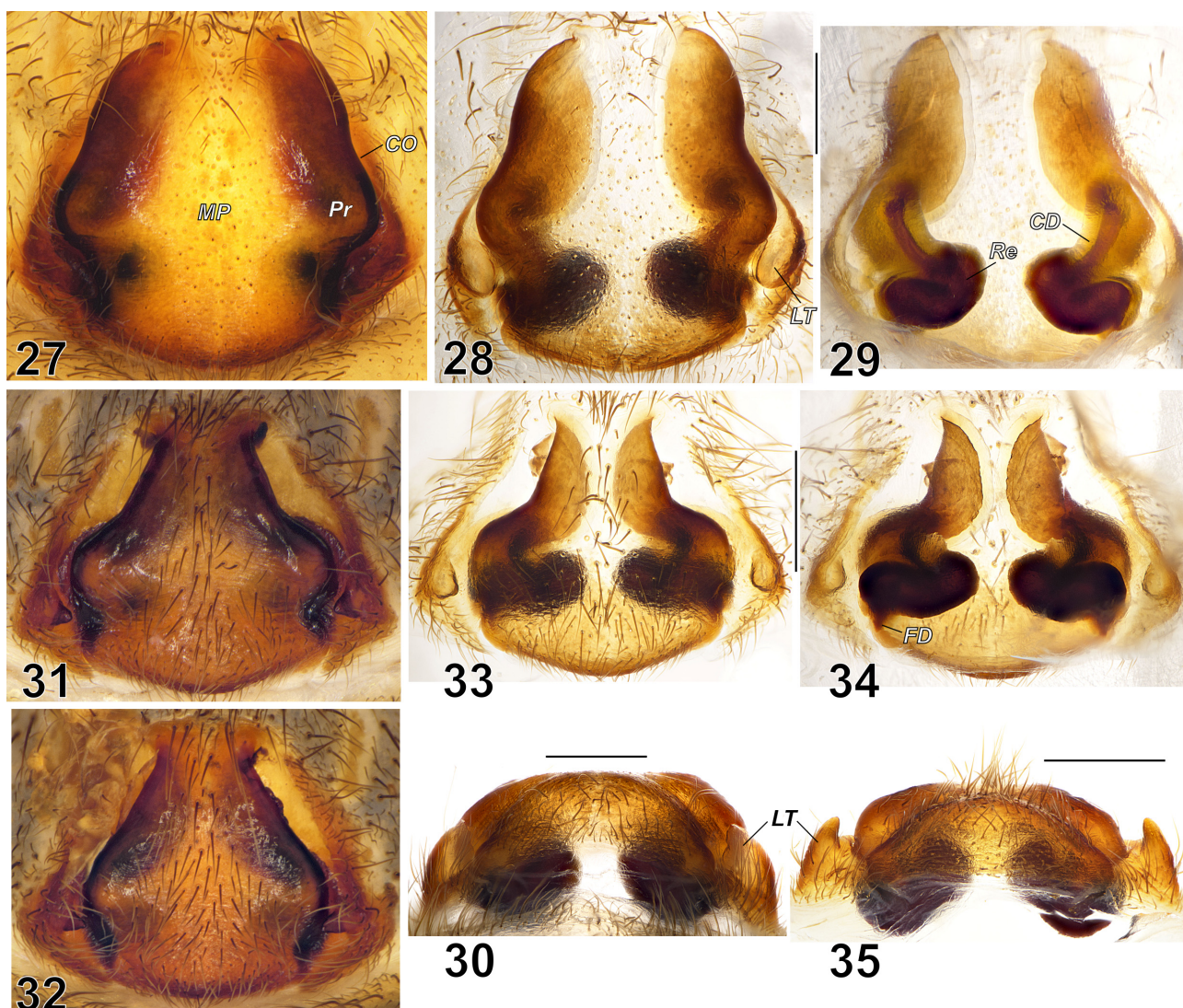
Kiekie dietrichi sp. n.

(Figs 6–10, 15–18, 23–26, 31–35, 38–39, 40–43)

Material examined. Holotype ♂ and paratypes 4♀ (ZMMU), PANAMA, Chiriquí Prov., Totumas Mt., 8°53'3.24"N 82°40'41.05"E, 1900 m, 6–9.02.2022 (M.M. Omelko).

Etymology. The specific name is a patronym in honor of Jeffrey Dietrich (Volcan, Panama), the owner of the Mount Totumas Cloud Forest resort, near where the new species was collected.

Diagnosis. Males of *K. dietrichi* sp. n. are very similar to those of *K. almae* sp. n. (see the diagnosis of the latter species). Both sexes of the new species are also similar to *K. montanensis*. Males of the new species can be easily distinguished by the large, curved RTA with a sharp tip (vs. tiny, straight, tip bifurcated; cf. Fig. 17 and fig. 9B in Polotow & Brescovit 2018), and the females are distinguished by kidney-shaped receptacles (*Re*) (vs. pear-shaped; cf. Fig. 34 and fig. 9D in Polotow & Brescovit 2018). In addition, by the shape of epigyne's median plate the female of the new species is similar to that of *K. curvipes* (Keyserling, 1881), but can be easily distinguished by the small lateral tooth of epigyne (*LT*), pointing towards each other (vs. large, pointing downwards; cf. Figs 31–32 and fig. 6B in Polotow & Brescovit 2018).



FIGURES 27–35. Epigyne of *Kiekie almae* sp. n. (27–30) and *K. dietrichi* sp. n. (31–35). 27, 31–32—intact, ventral; 28, 33—macerated, ventral; 29, 34—ditto, dorsal; 30, 35—ditto, posterior. Scale bars=0.5 mm. Abbreviations: CD - copulatory duct, CO—copulatory opening, FD—fertilization duct, LT—lateral tooth, MP—median plate, Pr—median plate projection, Re—receptacle.

Description. Male (Figs 6–7, 38). Total length 13.01. Carapace 6.86 long, 5.33 wide. Opisthosoma 5.97 long, 4.27 wide. Coloration in ethanol. Carapace light brown, with narrow yellowish median band, diamond-shaped and 2 tiny dark spots in ocular area. Lateral bands poorly visible, wavy. Fovea thin, black. Chelicerae dark brown. Sternum brown without pattern, with dark edges. Labium brown. Endites yellowish. Dorsal part of opisthosoma light brown with poorly visible cardiac mark and number of irregular gray spots. Lateral sides yellowish with a number of gray spots, ventral part yellowish with a number of tiny gray spots. Spinnerets yellowish. Eye sizes and interdistances: AME 0.34, ALE 0.24, PME 0.40, PLE 0.31; AME–AME 0.23, AME–ALE 0.29, PME–PME 0.18, PME–PLE 0.36, AME–PME 0.11, ALE–PLE 0.12, clypeus height at AME 0.27, at ALE 0.58.

Leg measurements: I 25.19 (6.84, 2.78, 7.18, 6.12, 2.27), II 23.21 (6.52, 2.65, 6.38, 5.49, 2.17), III 20.69 (5.79, 2.64, 5.07, 5.12, 2.07), IV 28.53 (7.71, 2.60, 7.09, 8.51, 2.62). Femora of all legs light brown dorsally, yellowish ventrally. Other segments brown without annulation. Metatarsi IV not modified but with long lateral setae. Same setae on metatarsi III (Fig. 10). For legs spination see Table 3.

TABLE 3. Palp and leg spination of male of *Kiekie dietrichi* **sp. n.**

| | Fe | Pa | Ti | Mt |
|---------|-------------|-------|----------------------|--------------------|
| Leg I | 3d 4p 4r | 1p 1r | 2d 3p 2r 2-2-2-2v | 1p 2-2-2v |
| Leg II | 3d 4p 4r | 1p 1r | 2d 3(4)p 2r 2-2-2-2v | 0(3)p 1(2)r 2-2-2v |
| Leg III | 3d 4p 4r | 1p 1r | 3d 2p 2r 2-2-2v* | 1d 4p 4r 2-2-2v* |
| Leg IV | 3d 4p 2(3)r | 1p 1r | 3d 2p 2r 2-2-2v* | 1d 4p 4r 2-1-2-2v* |

*- segments covered with long setae especially thick on Mt IV

Live male with dark brown carapace (median band light brown with 2 black lateral spots anteriorly) and brown opisthosoma with a series of small black spots (see Fig. 38).

Palp as shown in Figs 15–18, 23–26. Tibia ca. 2.6 longer than wide, with 3 very long spines, longest ca. 0.7 of tibia length. RTA long, hook like in retrolateral view with its base near the distal edge of the tibia. Cymbium length/width ratio ca. 2. Tip of cymbium about 0.28 of cymbial length, shorter than bulb. Subtegulum (*St*) large, oval, almost completely hidden by embolus (*E*) in ventral view. Sperm duct (*SD*) clearly visible mainly in retrolateral and apical view. Median apophysis (*MA*) comma-shaped in ventral view, cup-shaped in prolateral view, far not reaching conductor (*C*). *MA* diagonally positioned relative to longitudinal axis of the cymbium. Conductor (*C*) open fan-shaped, ca. 1.2 times wider than long with folded anterior edge, covering the embolus tip. *E* with wide base (*Eb*), starting at 7 o'clock position, thin, its tip slightly curved.

Female (Figs 8–9, 39). Total length 15.74. Carapace 7.09 long, 5.30 wide. Opisthosoma 7.72 long, 5.21 wide. Carapace brown (somewhat darker than in males) with narrow yellowish median band, diamond-shaped and 2 small gray spots in ocular area. Lateral bands poorly visible, thin, divided into several spots. Fovea thin, black. Chelicerae dark brown, almost black. Sternum dark brown without pattern. Labium dark brown, almost black. Endites brown with yellowish outer edge. Dorsal part of opisthosoma dark brown with poorly visible yellowish cardiac mark and series of gray spots. Lateral part uniformly brown. Ventral part of opisthosoma dark brown with tiny gray spots and yellowish spots forming V-mark. Spinnerets brown. Eye sizes and interdistances: AME 0.26, ALE 0.25, PME 0.43, PLE 0.36; AME–AME 0.27, AME–ALE 0.39, PME–PME 0.19, PME–PLE 0.45, AME–PME 0.18, ALE–PLE 0.20, clypeus height at AME 0.24, at ALE 0.74.

Leg measurements: I 18.26 (5.12, 2.43, 5.00, 3.99, 1.72), II 16.93 (4.85, 2.43, 4.47, 3.58, 1.60), III 14.69 (4.30, 1.82, 3.61, 3.39, 1.57), IV 20.35 (5.51, 1.97, 5.14, 5.80, 1.93). All legs segments brown without annulation. For legs spination see Table 4. Mt and Ta I–II, Ta III–IV with dense scopula.

TABLE 4. Palp and leg spination of female of *Kiekie dietrichi* **sp. n.**

| | Fe | Pa | Ti | Mt |
|---------|----------|-----------|--------------------|-----------------|
| Leg I | 3d 3p 3r | spineless | 2-2-2-2-2v | 2-2-2v |
| Leg II | 3d 4p 2r | spineless | 2-2-2-2-2v | 2-2-2v |
| Leg III | 3d 4p 4r | 1p 1r | 3d 2p 2r 2-2-2v | 1d 3p 3r 2-2-2v |
| Leg IV | 3d 3p 1r | 1p 1r | 2(3)d 2p 2r 2-2-2v | 4p 4r 2-1-2-2v |

Epigyne as shown in Figs 31–35. Epigynal plate 1.3 times wider than long. Median plate (*MP*) with 2 more or less pronounced rounded projections (*Pr*) medially (cf. figs 31–32). Lateral teeth (*LT*) comparatively small, well developed, triangular in ventral view, with pointed tips in posterior view. Receptacles (*Re*) large, slightly curved. Copulatory ducts (*CD*) short, slightly bent. Fertilization ducts (*FD*) short, barely visible. The shape of the epigyne in *Kiekie dietrichi* **sp. n.** varies widely (cf. Figs 31–32).

Biology. All specimens were found on the litter of primary cloud forest (Fig. 40–41).

Distribution. Type locality only (Figs 40–43).

Discussion

With the description of *Kiekie dietrichi* **sp. n.** and *K. almae* **sp. n.**, collected together at an altitude of 1900 meters, the number of *Kiekie* species known from high mountains of Central America increases to three. The third species is

K. montanensis, which is known from two localities in Costa Rica and Panama. The latter species has been found up to an altitude of 3491 meters (Polotow & Brescovit 2018). It is highly probable that other high-altitude species of the genus will be discovered in the region. It is important to note that males of *K. dietrichi* **sp. n.** lack the modification of metatarsi IV, which is one of the characteristic features of the genus (Polotow & Brescovit, 2018). However, based on the structure of its copulatory organs, the new species unquestionably belongs to the *Kiekie*.

Both new species were collected at the same locality and have similar copulatory organs. The correctness of the male-female matching of these two species is confirmed by their distinctive general appearance. Males and females within each species have a similar coloration, while both species can be clearly distinguished by the patterns on their opisthosoma and carapace, which are particularly noticeable in live specimens (cf. Figs 36–37 and 38–39).



FIGURES 36–41. Live paratypes of *Kiekie almae* **sp. n.** (36–37), *K. dietrichi* **sp. n.** (38–39) and their habitats in cloud forest of Totumas Mt. (40–41). 36, 38—male; 37, 39—female.



FIGURES 42–43. Geographic distribution records of *Kiekie* species known from Panama. The frame on Fig. 42 refers to the content of Fig. 43. 1—*K. almae* sp. n., *K. dietrichi* sp. n.; 2—*K. barrocolorado* Polotow & Brescovit, 2018; 3—*K. curvipes* (Keyserling, 1881); 4—*K. montanensis* Polotow & Brescovit, 2018; 5—*K. panamensis* Polotow & Brescovit, 2018; 6—*K. sinuatipes* (F. O. Pickard-Cambridge, 1897).

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