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SCHARFFIA, A REMARKABLE NEW GENUS OF SPIDERS FROM EAST AFRICA (ARANEAE, CYATHOLIPIDAE)

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ABSTRACT. The new genus *Scharffia* (Araneae, Cyatholipidae), comprising the new species *Scharffia chinja*, *Scharffia holmi*, *Scharffia nyasa* and *Scharffia rossi*, is described.

Discovered in southern Africa near the end of the last century (Simon 1894; Cambridge 1903), the Cyatholipidae comprise rich faunas in the cool-temperate southern latitudes of Africa (Griswold 1987) and Australasia (Forster 1988). They are typical denizens of the "Afromontane" forests (White 1978; Griswold 1991) of the mountains and Cape coasts of South Africa and, as is the case with many other animals and plants, their occurrence in the moist, montane forests making up the "Afromontane archipelago" in tropical Africa should come as no surprise. Cyatholipids have recently been described from Madagascar (Griswold 1997): herein I describe the first cyatholipids recorded from tropical Africa.

Most collection records suggest that *Scharffia* favor wet forests. They are common in montane forests (i.e., above 800 m elevation) and typically absent from nearby lowland forests (though at least *S. chinja* new species has been collected beneath 300 m elevation). *Scharffia* rossi new species was collected in dry savanna far from forest, and, like *Cyatholipus hirsutissimus* Simon 1894 and *Ulwembua denticulata* Griswold 1987 (Griswold 1987), indicates that the family is not entirely restricted to forests.

As is typical of cyatholipids, *Scharffia* hang beneath sheet webs (Figs. 2–4; Davies 1978; Forster 1988; Griswold et al. in press) and were rarely collected away from webs (e.g., in pitfalls or by sifting). The function of the elongate, annulate abdominal petiole (Fig. 1) is unknown; but, to the casual observer, it renders the spiders remarkably similar to ants. The awl-shaped abdomen of the *S. chinja* population at Mazumbai in the West Usambara Mountains of Tanzania (Fig. 19) makes them strikingly similar to *Crematogaster* ants. Nevertheless, this resemblance is not enhanced by hanging beneath sheet webs, nor do spiders collected on beating sheets move like ants: mimicry is a doubtful explanation for their remarkable abdominal modification. The sclerotized petiole may function in carapace-abdomen stridulation, as recorded in the cyatholipid sister group Synotaxidae (Forster, Platnick & Coddington 1990; Griswold et al. in press).

METHODS

Prior to examination with a Hitachi S-520 Scanning Electron Microscope all structures were critical point dried. Vulvae were cleaned by exposure to trypsin, bleached in 5% sodium hypoclorite (Chlorox™), stained with Chlorazol Black, and mounted in Hoyer's Medium for examination and photography. Examination was via Wild M5Apo and Leitz Ortholux II microscopes; and photography of vulvae was by an Olympus PM-10AK attached to the Leitz Ortholux II. Small structures were examined in temporary mounts as described in Coddington (1983).

Abbreviations are listed in Table 1. All measurements are in mm. For the key and diagnoses the ratio of the length of the palpal bulb (LPB)/ length of the median lobe of the tegulum (MLT) is based on the measurements: LPB = distance from distal margin of the apical lobe (A) of the tegulum to the proximal-most extent of the embolic curve; MLT = distance from distal margin of the apical lobe (A) of the tegulum to the proximal margin of the median lobe. Specimens measured were chosen to encompass largest and smallest individuals.

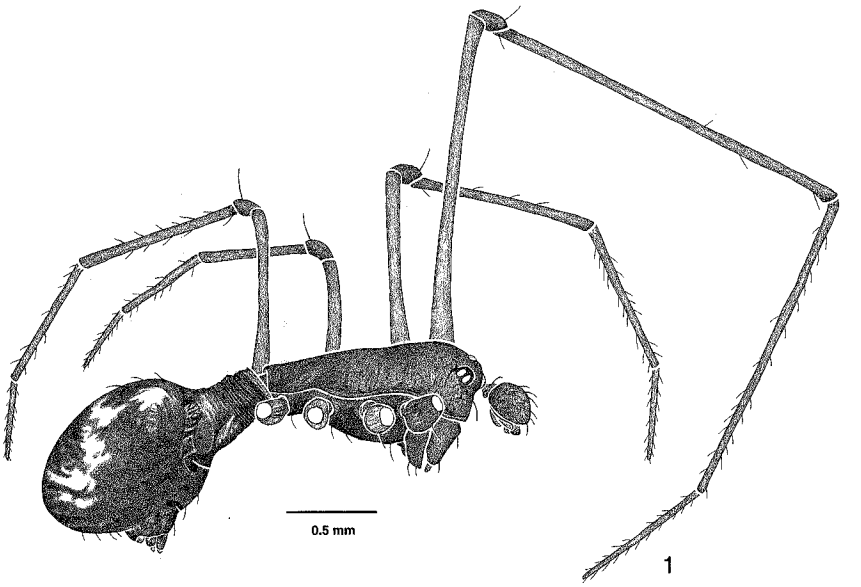


Figure 1.—***Scharffia rossi*** new species, holotype male, lateral view.

TAXONOMY

Cyatholipidae Simon 1894

Cyatholipeae Simon 1894: 711, based on *Cyatholipus hirsutissimus* Simon 1894. Roewer 1942: 967.
Cyatholipinae, Wunderlich 1978: 33.
Teemenaaridae Davies 1978: 42, based on *Teemenaarus silvestris* Davies 1978.
Cyatholipidae Platnick 1979: 116. Brignoli 1983: 231. Griswold 1987: 501. Forster 1988: 7. Platnick 1989: 181. Platnick 1993: 172. Wunderlich 1993: 234.

Diagnosis.—Colulate, entelegyne araneoids that share with the Synotaxidae a cup-shaped paracymbium (Figs. 27, 35) and posteriorly broadly truncate sternum, and differing in having a retromedian cymbial process (Figs. 12, 27) and very broad posterior respiratory groove (Figs. 10, 21). For full description see Griswold (1987) and Forster (1988).

Scharffia new genus

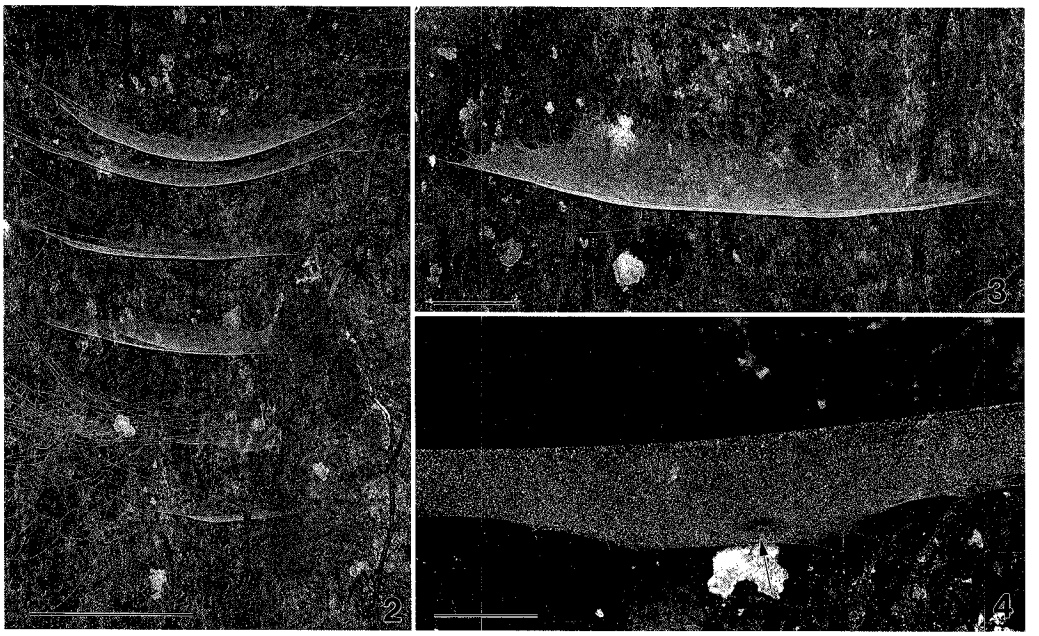
Type species.—*Scharffia chinja* new species.

Etymology.—Named in honor of Nikolaj Scharff, Afromontane arachnologist and collector of many new and interesting Cyatholipidae; gender feminine.

Note.—*Scharffia* has been previously mentioned as "an undescribed genus occurring in montane forests from Malawi to Kenya" related to the Malagasy *Alaranea* (Griswold 1997, p. 82).

Diagnosis.—Distinguished from all Cyatholipidae by having the sternum elongate, prolonged between coxae IV, with length greater than 1.15× width (Figs. 8, 21, 36), and from all genera except *Alaranea* by having the anterior portion of abdomen of both sexes forming a sclerotized, annulate petiole, in most species elongate (Figs. 11, 16–22).

Description.—Total length 2.25–3.25. Carapace typically trapezoidal or diamond-shaped in dorsal view (Fig. 20), may be prolonged posteriorly (Fig. 32), length 1.58–2.43× width, posterior margin truncate, low, maximum height 0.35–0.57× width, texture rugose (Fig. 9); thoracic fovea typically shallow, diamond-shaped to indistinct; ocular area with PER width 2.18–2.93× OAL, 2.25–2.80× OQP, OQP 0.87–1.20× OQA; diameter AM 1.09–1.87× PM, distance PM-PL 1.20–2.25× PM diameter; clypeal height 1.86–2.80× AM diameter, cheliceral length 1.35–2.54× clypeal height; chelicerae unmodified or with small basal protuberance, promargin with four, retromargin with three teeth (Fig. 6). Sternum rugose to pustulate (Fig. 8), length 1.15–1.58× width, coxae surrounded by pleural and sternal sclerotizations (Figs. 1, 5, 8). Abdomen oval to triangular, with short, slender setae, bases of anterior setae unmodified, sclerotized from epigastric furrow to and surrounding pedicel to form short-to-long annulate petiole (Figs. 11,



Figures 2–4.—Webs of ***Scharffia chinja*** new species, from Amani. 2, Webs on tree buttress (Scale bar = 10.0 cm); 3, Web, close up (Scale bar = 5.0 cm); 4, Underside of web with spider (arrow) (Scale bar = 1.0 cm).

26), spinnerets surrounded by yellow-brown sclerotization with dark radial streaks (Figs. 21, 36). Legs unmodified, long (Figs. 1, 18) to extremely long (Fig. 43), ratio 1-2-4-3, female femur I length 2.42–4.67× carapace width, male 2.51–9.48. Male palpus with retrolateral cymbial process (RMP) pointing ventrad (Figs. 12, 27), smaller than paracymbium (PC); palpal bulb (Figs. 14, 27–29) with dentate median lobe (MLT), apex (A) a small, smooth to pustulate lobe; conductor (C) median, longitudinal, simple (Figs. 28, 29, 57) or with accessory process (Figs. 14, 52), smooth; embolus (E) thick, making simple curve, origin apical between 10-11 o'clock, ridged; parembolic process (PP) present (Figs. 14, 15, 53) or absent (Figs. 28, 56), thick and fleshy with a median attenuate projection, lacking teeth, with or without pustules; sperm duct with curlicue near embolic base. Epigynum (Figs. 23–26) with scape (S) and median hood (MH) with slender septum between copulatry openings (CO), atrial furrows (AT) extending behind scape. Vulva (Figs. 37–40) with sclerotized, simple, narrow to hemispherical lateral afferent duct (AD), fertilization duct (FD) posterior to spermathecal head (HS).

Composition.—Four species.

Distribution.—East Africa from Malawi to Kenya (Fig. 58).

KEY TO SPECIES OF *SCHARFFIA*

1 Abdomen with petiole length greater than 0.24 of carapace length (Figs. 1, 18, 20) 2
– Abdomen with petiole length less than 0.17 of carapace length (Figs. 41–43) ..... *nyasa*
2(1) Posterior portion of carapace elongate, forming parallel-sided neck, carapace length greater than twice width (Figs. 1, 32); embolus without parembolic process (Figs. 30, 34); conductor simple; epigynal scape twice as long as wide (Fig. 33) 3
– Carapace diamond-shaped in dorsal view (Figs. 19, 20), posterior portion tapering, carapace length less than twice width; embolus with parembolic process (Fig. 44); conductor double; epigynal scape much wider than long (Fig. 46) ..... *chinja*
3(2) Length palpal bulb less than 2× that of the median lobe of the tegulum (MLT), tegulum nearly hidden between MLT and embolus (Figs. 30, 56) ..... *rossi*
– Length palpal bulb greater than 2.5× MLT, tegulum clearly visible between MLT and embolus (Figs. 28, 34) ..... *holmi*

Table 1.—List of anatomical abbreviations used in the text and figures.

A	apical lobe of tegulum
AD	vulval afferent duct
AER	anterior eye row
AL	anterior lateral eyes
AM	anterior median eyes
AT	epigynal atrium
C	conductor
CB	cymbium
CO	copulatory opening
E	embolus
EF	epigastric furrow
FD	fertilization duct
HS	spermathecal head
LPB	length palpal bulb
MH	epigynal median hood
ML	epigynal median lobe
MLT	median lobe of tegulum
MS	epigynal median septum
OAL	ocular area length
OQA	ocular quadrangle, anterior
OQP	ocular quadrangle, poseterior
PC	paracymbium
PER	posterior eye row
PL	posterior lateral eyes
PM	posterior median eyes
PP	parembolic process
RMP	retromedian cymbial process
S	epigynal scape
ST	subtegulum
T	tegulum
TL	ventromedian tegular lobe

Scharffia chinja new species
(Figs. 2–23, 25, 38, 40, 44–46, 58)

Types.—Male holotype and female paratype from intermediate rain forest at Uzungwa Scarp Forest Reserve above Chita village, elev. 1050 m, Uzungwa Mts., Iringa Region, Tanzania, 5 November 1984 (N. Scharff) (ZMUC).

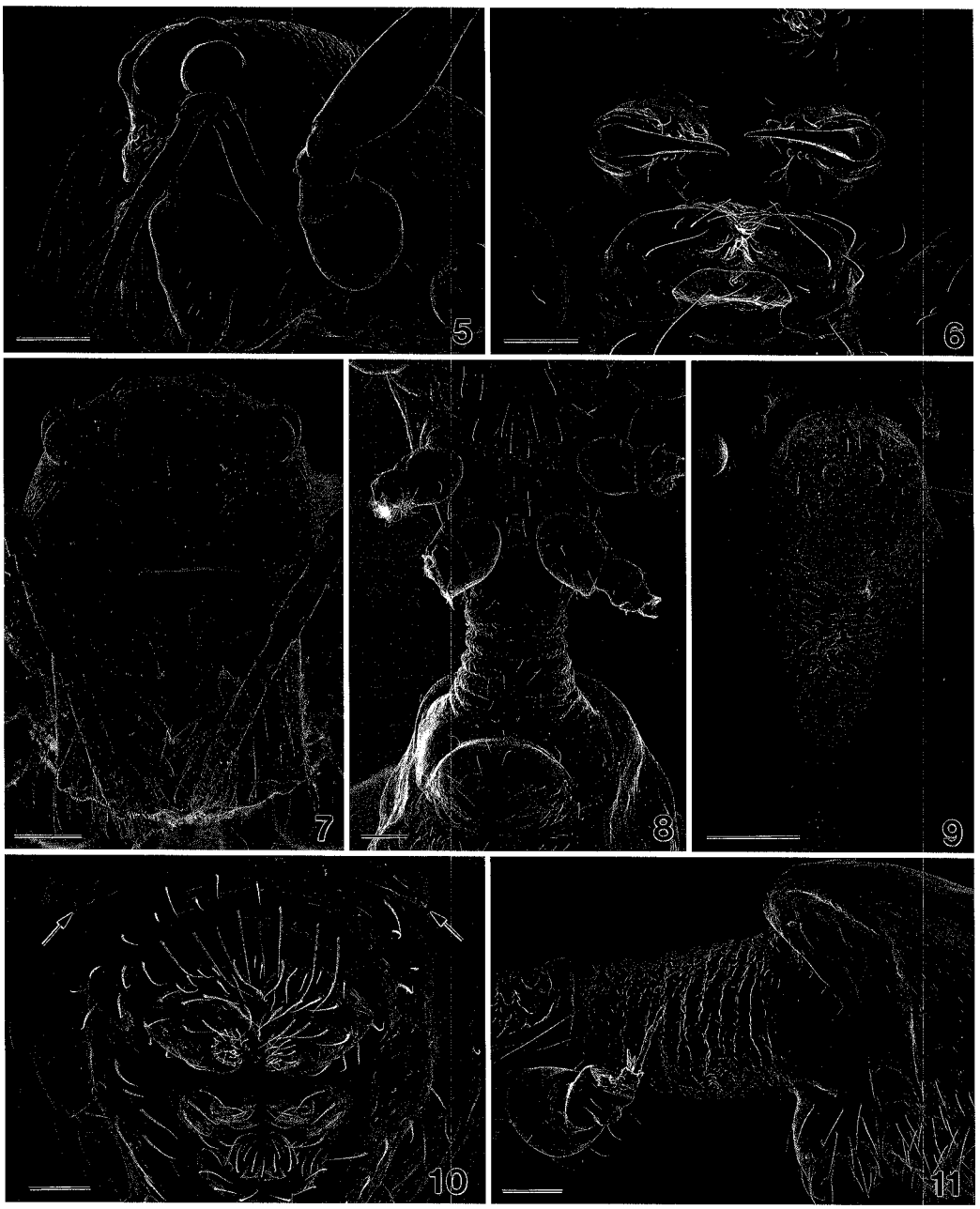
Etymology.—The specific epithet is an arbitrary combination of letters.

Diagnosis.—Distinguished from *nyasa* new species by having the abdominal petiole greater than 0.24 carapace length (Figs. 18, 20); males distinguished from *rossi* new species and *holmi* new species by having a parembolic process and double conductor (Figs. 44, 45); females distinguished from *holmi* by having a broad scape (Fig. 46) and hemispherical afferent ducts (Figs. 38, 40).

Description.—*Male (holotype):* Total length 2.64. Carapace, clypeus, chelicerae, sternum, labium, and palpal coxae dark red-brown, unmarked except for dusky maculations on clypeus; palpi dark yellow-brown, unmarked; coxae, trochanters, and legs yellow-brown, unmarked except for subbasal brown annulus on femur IV; abdomen dark gray, dorsum with narrow longitudinal and broad transverse white markings forming cross. Carapace 1.21 long, 0.61 wide, 0.29 high, prolonged posteriorly to meet abdominal petiole; PER 0.38 wide, AER 0.37 wide, OAL 0.17; ratio AM:AL:PM:PL, 1.6:1.2:1.0:1.2, PM diameter 0.05. Clypeus 0.18 high, chelicerae 0.26 long. Sternum 0.58 long, 0.47 wide; labium 0.10 long, 0.16 wide; palpal coxae 0.18 long, 0.14 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.64 + 0.25 + 2.23 + 2.13 + 0.91 = [8.13]; II: 1.81 + 0.23 + 1.57 + 1.49 + 0.72 = [5.82]; III: 0.87 + 0.17 + 0.64 + 0.62 + 0.40 = [2.70]; IV: 1.32 + 0.19 + 1.06 + 0.87 + 0.42 = [3.80]; Palp: 0.26 + 0.10 + 0.08 + (absent) + 0.26 = [0.70]. Palp (Figs. 12–15, 44, 45) with RMP narrowly triangular, PC narrow, deeply concave in lateral view; tegulum apex pustulate, MLT large, convex, dentation restricted to narrow longitudinal band; C large, with small narrow secondary process; PP present, lacking pustules.

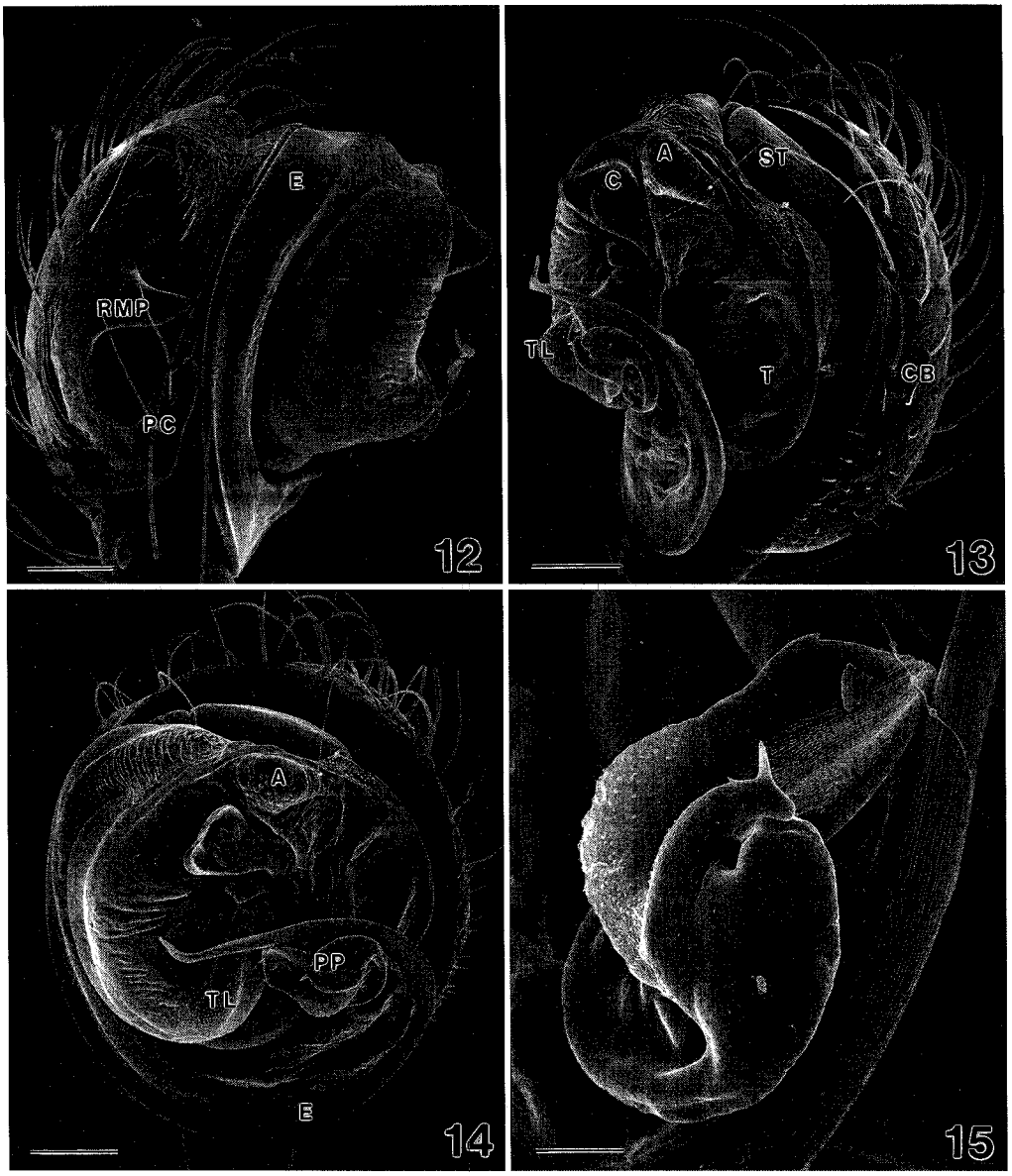
Variation: (n = 7). Total length 2.34–2.89; ratios of carapace length/width 1.74–2.00, height/width 0.35–0.52, PER/OQP 2.37–2.64, PER/OAL 2.19–2.80, OQP/OQA 0.87–1.07, diameter AM 1.18–1.60 times PM; ratios of clypeal height/AM diameter 2.12–2.61, cheliceral length/clypeal height 1.35–1.87; ratio of sternum length/width 1.15–1.46; ratio of femur I length/carapace width 4.00–5.01. The shape of the soft part of the abdomen ranges from nearly round (Figs. 17, 22) to triangular (Figs. 16, 18, 20) to heart- to awl-shaped (Fig. 19: dorsal view of Mazumbai specimen). Markings also vary greatly: the dorsum may be all dark, have lateral light spots (Fig. 17) or a narrow to broad transverse median band (Fig. 22); a narrow to broad longitudinal median band may be present anteriorly (Fig. 19), separate from transverse band (Fig. 20) or connected to it to form a light cross (Fig. 16).

Female (paratype): Total length 2.58. Markings as in male except white markings of abdomen not forming cross, longitudinal dorsal mark attenuate anteriorly, with anterolat-



Figures 5–11.—***Scharffia chinja*** new species, female, from Uzungwa. 5, Carapace, lateral; 6, Mouthparts, ventral; 7, Face; 8, Sternum and petiole, ventral; 9, Carapace, dorsal; 10, Spinnerets and posterior spiracle (arrows); 11, Abdominal petiole, lateral. (Scale bars for Figs. 5–8, 11 = 100 μm; Fig. 9, 250 μm; and Fig. 10, 50 μm.)

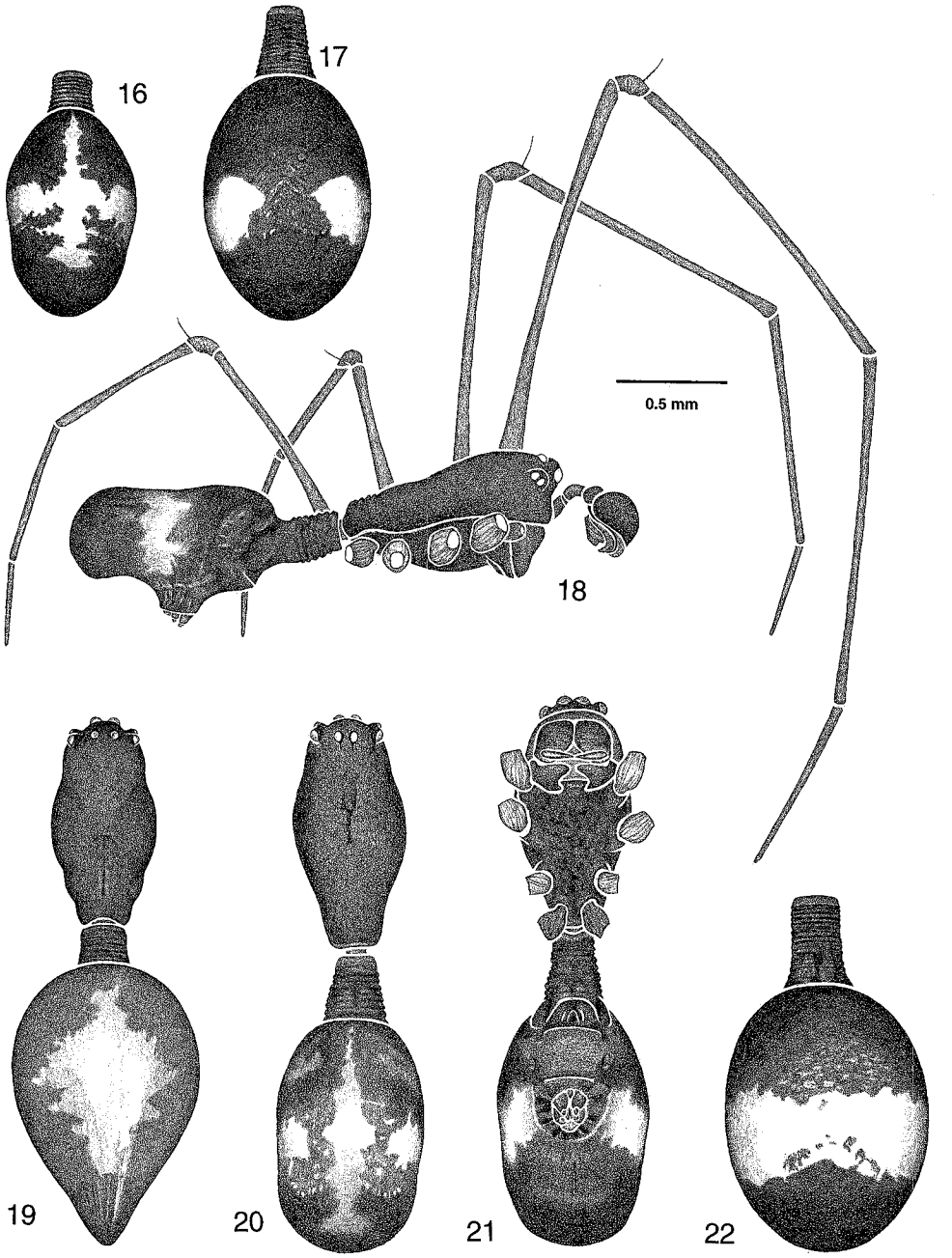
eral faint white spot and median lateral transverse band. Structure as in male; carapace 1.17 long, 0.58 wide, 0.28 high; PER 0.39 wide, AER 0.38 wide, OAL 0.17; ratio AM: AL:PM:PL, 1.6:1.2:1.0:1.4, PM diameter 0.05. Clypeus 0.17 high, chelicerae 0.33 long. Sternum 0.67 long, 0.44 wide; labium 0.11 long, 0.14 wide; palpal coxae 0.20 long, 0.16 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 1.72



Figures 12–15.—***Scharffia chinja*** new species, from Amani, right male palpus. 12, Retrolateral; 13, Prolateral; 14, Ventral; 15, Parembolic process. A = apical lobe of tegulum, C = conductor, CB = cymbium, E = embolus, PP = parembolic process, RMP = retromedian cymbial process, ST = subtegulum, T = tegulum, TL = ventromedian tegular lobe. (Scale bars for Figs. 12–14 = 60 μm, Fig. 15 = 15 μm.)

+ 0.23 + 1.55 + 1.40 + 0.74 = [5.64]; II: 1.28 + 0.21 + 1.06 + 0.96 + 0.57 = [4.08]; III: 0.70 + 0.15 + 0.53 + 0.47 + 0.34 = [2.19]; IV: 1.17 + 0.19 + 0.89 + 0.70 + 0.38 = [3.33]; Palp: 0.24 + 0.07 + 0.13 + (absent) + 0.27 = [0.71]. Epigynum as in Figs. 23, 25, 46, S convex; vulva as in Fig. 40, AD anterior, larger than or equal to HS.

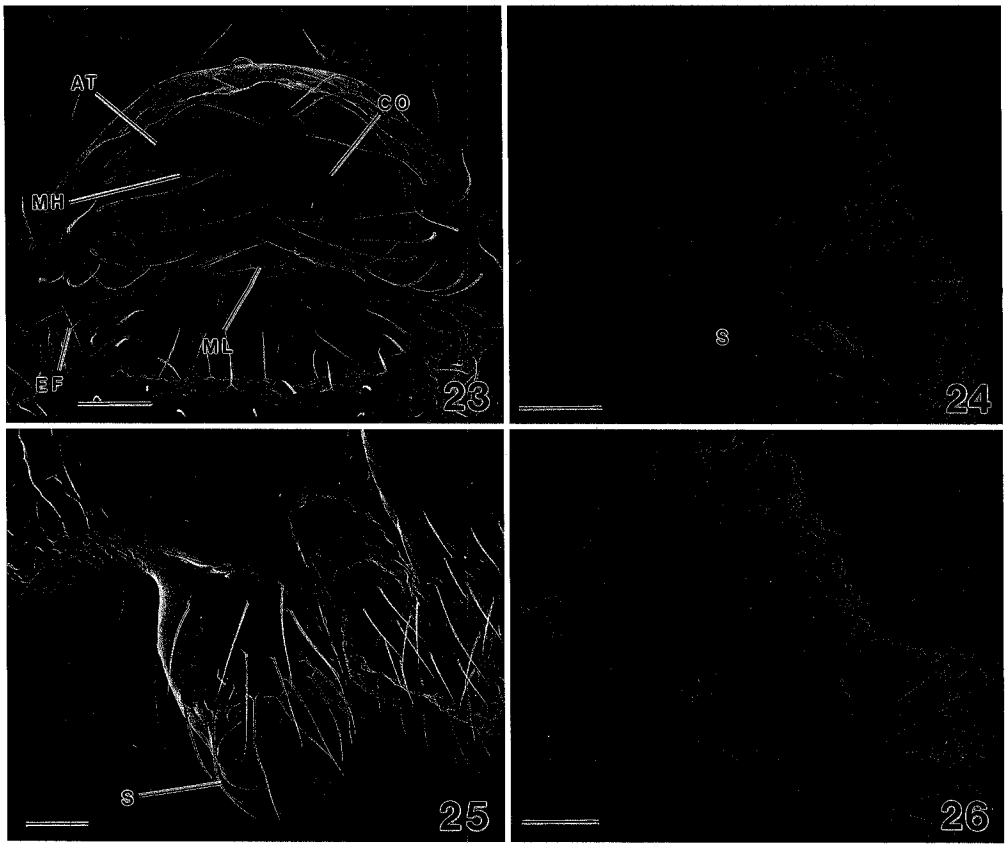
Variation: (n = 7). Total length 2.28–3.19; ratios of carapace length/width 1.81–2.07, height/width 0.49–0.56, PER/OQP 2.28–2.80, PER/OAL 2.31–2.93, OQP/OQA 0.94–1.20, diameter AM/PM diameter 1.27–1.60; clypeal height 1.86–2.80 times AM diameter, chelicerал length 1.67–2.54 times clypeal height; ratio of sternum length/width 1.14–1.58; ratio



Figures 16–22.—***Scharffia chinja*** new species. 16, 17, 22, Females, from Amani, dorsal view of abdomen; 18, Male, from from Uzungwa, lateral view; 19, Female, from Mazumbai, dorsal; 20, 21, Female, from Uzungwa; 20, Dorsal; 21, Ventral.

of length femur I/carapace width 2.42–3.26. Abdominal shape and markings vary as in male (Figs. 16, 17, 19–22). AD larger than (Fig. 38) or equal to (Fig. 40) HS.

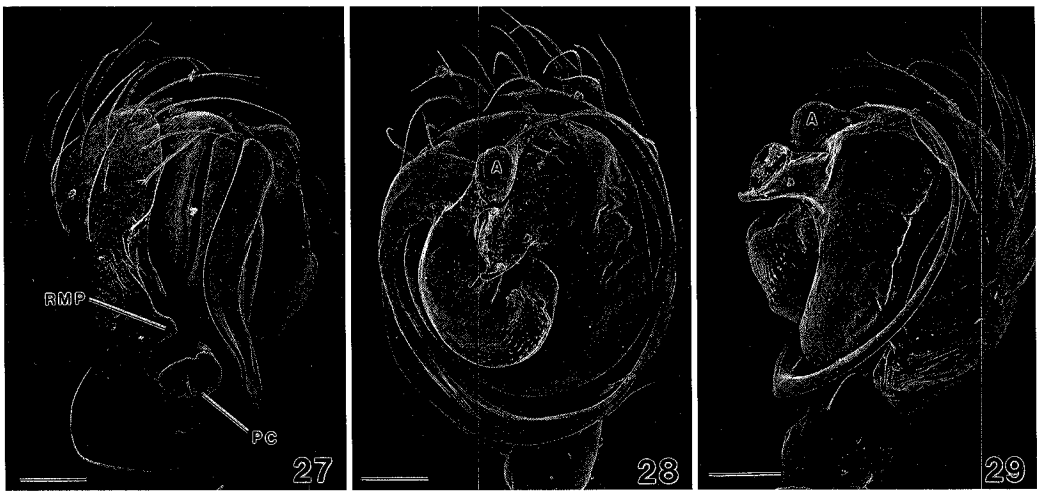
Natural history.—The spiders hang beneath sheet webs in shaded areas in forest (Figs. 2–4). In addition to juveniles and adult females, adult males may be found in intact webs, and both sexes may occur in the same web.



Figures 23–26.—*Scharffia* female epigynum and abdominal petiole. 23, 24, Ventral; 25, 26, Lateral; 23, 25, ***Scharffia chinja*** new species, from Uzungwa; 24, 26, ***Scharffia nyasa*** new species. AT = epigynal atrium, CO = copulatory opening, EF = epigastric furrow, MH = epigynal median hood, ML = epigynal median lobe, S = epigynal scape. (Scale bars for Figs. 23, 25 = 50 μm, Fig. 24 = 100 μm, Fig. 26 = 75 μm.)

Distribution.—Eastern Arc mountains and nearby lowlands of Tanzania (Fig. 58).

Additional material examined: **TANZANIA**: *Coast Region:* Kisarawe District: Kazimzumbwe Forest Reserve, 20 km SW Dar-es-Salaam, 6°57′S,39°03′E, elev. 120–280 m, January–February 1991, 1♂2♀ (Frontier Tanzania Expedition) (ZMUC). *Tanga Region:* East Usambara Mts. (all C. Griswold, D. Ubick, & N. Scharff, 1995, CAS and ZMUC): Amani, 5°05′S,38°38′E, elev. 950 m, 27 October–9 November, 50♂63♀; Mbomole Hill, 5°05′S,38°37′E, elev. 1000 m, 5–8 November, 2♂15♀; Kwamkoro Forest Reserve, 5°10′S,38°35′E, elev. 950 m, 6 November, 8♂13♀; Sangarawe Forest, 38°35′E,5°06′S, elev. 990 m, 5–6 November, 1♂3♀; Segoma Forest Reserve, 4°58′S,38°45′E, primary rain forest, 17 February 1987, S. Mahunka, T. Pòcs, & A. Zicsi, 1♀ (HMNH); West Usambara Mts., Mazumbai, 4°49′S, 38°30′E, elev. 1400–1600 m, 10–20 November 1995 (C. Griswold, D. Ubick, & N. Scharff), 15 ♂45♀ (CAS, ZMUC); 1 August 1980, M. Stoltze and N. Scharff, 1♂1♀ (ZMUC). *Morogoro Region:* Uzungwa Mts.: Mwanihana Forest Reserve (all N. Scharff, 1984, ZMUC): elev. 500–700 m, 7–16 September, 1♂; elev. 500–600 m, 11–14 September, pitfalls, 1♀; elev. 700 m, 7 September, litter, 1♀; elev. 1400 m, 27 September, 1♀; elev. 1650 m, 25–29 September, litter, 1♀; elev. 1800–1850 m, 28–29 September, netted, 1♀. Mwanihana Forest Reserve above Sanje (all M. Stoltze & N. Scharff, ZMUC): elev. 600 m, 3 August 1982, 1♀; elev. 700 m, 10 September 1984, 1♀; 12 September 1984, netted, 2♂; elev. 750 m, 1 August 1981, 5♂; elev. 1000 m, 1 August 1981, 2♀; 1 August 1982, 1♂3♀; elev. 1250 m, 25 July 1982, 1♂1♀; elev. 1650 m, 18 August 1982, litter, 1♂2♀; pitfall, 3♀. *Iringa Region:* Uzungwa Scarp Forest Reserve above Chita village (all N. Scharff, 1984, ZMUC): elev. 1050 m, 26 October, litter, 1♀; elev. 1300 m, 2–6 November, 1♀; elev. 1300 m, 3



Figures 27–29.—***Scharffia holmi*** new species, holotype male, right palpus. 27, Retrolateral; 28, Ventral; 29, Prolateral. A = apical lobe of tegulum, PC = paracymbium, RMP = retromedian cymbial process. (Scale bars for Figs. 27–29 = 50 μm.)

November, litter, 1♀; elev. 1400 m, 4 November, netted, 1♀; 10 November, netted, 2♀; elev. 1500 m, 9 November, litter, 1♂; 11 November, netted, 1♂2♀; elev. 1600 m, 10 November, 1♀; elev. 1650 m, 13 November, netted, 1♂1♀. *Mbeya Region:* Mt. Rungwe SW, elev. 1900 m, 20 August 1984, M. Stoltze & N. Scharff, 1♂ (ZMUC).

Scharffia holmi new species
(Figs. 27–29, 32–36, 39, 58)

Types.—Male holotype and two female paratypes from Mount Elgon, Kenya, elev. 2300 m, 23 December 1937, Å. Holm (UUZM).

Etymology.—Named in honor of Åke Holm, collector of the type and student of African montane spiders.

Diagnosis.—Distinguished from all *Scharffia* except *S. rossi* new species by lacking a parembolic process (Figs. 28, 34), having a simple conductor, and having the cephalothorax prolonged posteriorly to form a parallel-sided neck (Fig. 32), and from *rossi* new species by having the length of the palpal bulb greater than 2.5× length of median lobe of tegulum (MLT), with the tegulum clearly visible between MLT and embolus (Figs. 28, 34). The epigynum is unique in *Scharffia* in having a narrow scape (Fig. 33) twice as long as wide, and the vulva unusual in Cyatholipidae in having a lateral afferent duct that is smaller than the spermethecal head (Fig. 39).

Description.—*Male (holotype):* Total length 2.40. Carapace, chelicerae, palpal coxae, labium and sternum dark red-brown, unmarked except for dusky maculations along lateral margin of carapace and forming short longitudinal band anteriad of thoracic fovea; ocular area dark gray surrounding AM and between AM and AL, clypeus dark gray in center from beneath AM to oral margin; coxae, trochanters and legs yellow-white, unmarked except for faint dark mark at base of femur IV; palpi gray-brown, unmarked; abdomen dark gray, dorsum with diffuse longitudinal dark spot in center surrounded by paler cuticle. Carapace 1.15 long, 0.54 wide, 0.23 high, greatly prolonged posteriorly to form narrow neck meeting abdomen; PER 0.35 wide, AER 0.34 wide, OAL 0.14; ratio AM:AL:PM:PL, 1.5:1.0:1.12:1.25, PM diameter 0.05. Clypeus 0.15 high, chelicerae 0.25 long. Sternum 0.70 long, 0.46 wide; labium 0.09 long, 0.13 wide; palpal coxae 0.16 long, 0.10 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 1.36 + 0.19 + 1.28 + 1.23 + 0.66 = [4.72]; II: 1.02 + 0.17 + 0.83 + 0.76 + 0.49 = [3.25]; III: 0.66 + 0.15 + 0.47 + 0.47 + 0.34 = [2.09]; IV: 0.70 + 0.17 + 0.72 + 0.59 + 0.38 = [2.56]; Palp: 0.23 + 0.07 + 0.07 + (absent) + 0.22 = [0.59]. Palp (Figs. 27–29, 34, 35) with RMP short, blunt, PC broad in lateral view; tegulum apex low, smooth, MLT small and denticulate over median oval area, tegulum exposed beneath; C simple, single; PP absent.

Female (paratype): Total length 2.47. Markings and structure as in male (Figs. 32, 36). Carapace 1.20 long, 0.54 wide, 0.26 high; PER 0.35 wide, AER 0.34 wide, OAL 0.14; ratio AM:AL:PM:PL, 1.5:1.37:1.0:1.5, PM diameter 0.04. Clypeus 0.11 high, chelicerae 0.27 long. Sternum 0.69 long, 0.45 wide; labium 0.10 long, 0.14 wide; palpal coxae 0.19 long, 0.13 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 1.38 + 0.21 + 1.21 + 1.15 + (missing) = [?]; II: 1.02 + 0.18 + 0.85 + 0.76 + 0.49 = [3.28]; III: 0.70 + 0.17 + 0.47 + 0.45 + 0.38 = [2.17]; IV: 0.98 + 0.16 + 0.79 + 0.66 + 0.36 = [2.95]; Palp: 0.21 + 0.08 + 0.10 + (absent) + 0.23 = [0.62]. Epigynum as in Fig. 33, S narrow; vulva as in Fig. 39, AD lateral, smaller than HS.

Variation: (n = 2). Total length 2.47–2.72; ratios of carapace length/width 2.25–2.43, height/width 0.49–0.57, PER/OQP 2.36–2.44, PER/OAL 2.54–2.60, OQP/OQA 0.93–0.94, diameter AM/PM 1.50–1.87; clypeal height 2.36–2.44 times AM diameter, cheliceral length 2.06–2.36 times clypeal height; ratio of sternum length/width 1.45–1.53; ratio of length femur I/carapace width 2.55–3.03.

Natural history.—Unknown.

Distribution.—Known only from the type locality (Fig. 58).

Material examined.—Only the type specimens.

Scharffia nyasa new species
(Figs. 24, 26, 37, 41–43, 47–53, 58)

Types.—Male holotype and female paratype from *Widdringtonia* evergreen forest at 2000 m on Lichenya Plateau on Mt. Mulanje, Malawi, 7 November 1981, R. Jocqué (MRAC 156.180).

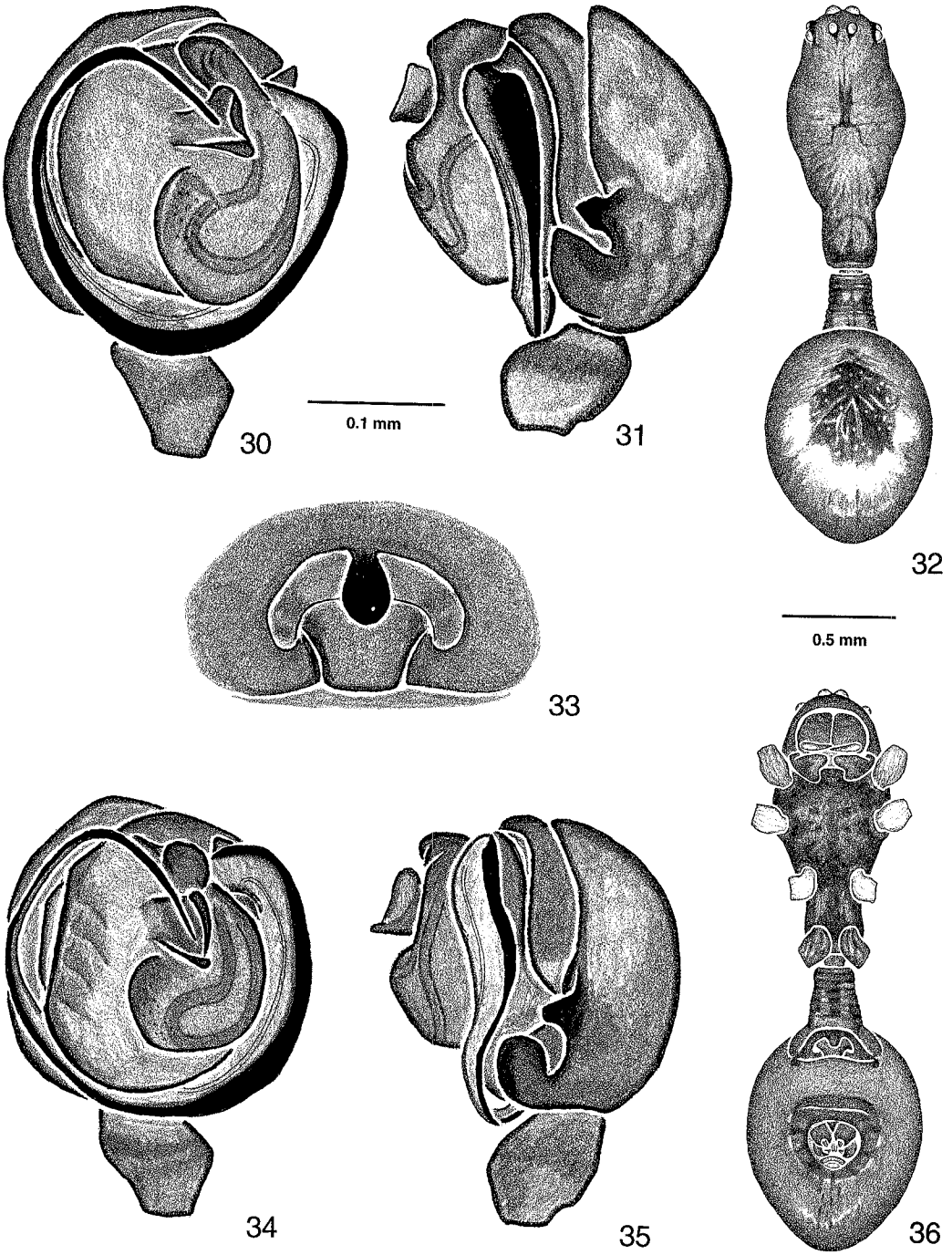
Etymology.—An old name for Malawi.

Diagnosis.—Distinguished from all other *Scharffia* by having the petiole short, length less than 0.17 carapace length (Figs. 24, 41–43); also leg I extremely long (Fig. 43), femur I of female greater than 3.5, that of male greater than 5.4 times carapace width.

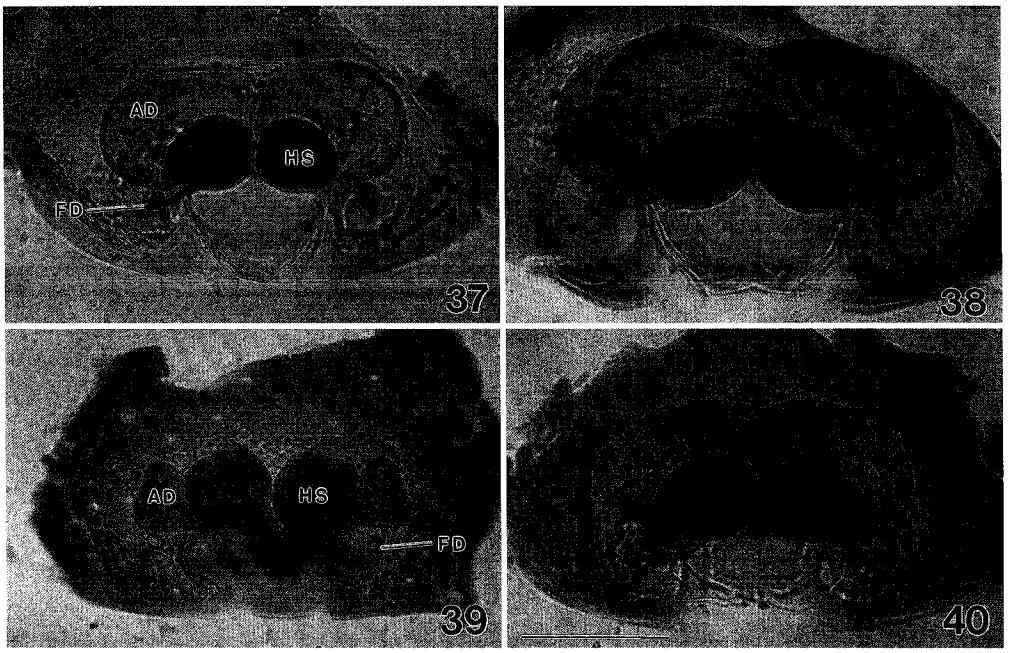
Description.—*Male (holotype):* Total length 2.49. Carapace, palpal coxae, labium and sternum dusky red-brown, chelicerae dark yellow-brown, unmarked except for maculations along margin of carapace and anteriad of thoracic fovea; coxae, trochanters and bases of legs yellow-white, legs shading to yellow-brown distally on femora to tarsi, unmarked except segments lighter at joints, palpi yellow-gray, cymbium dark red-brown; abdomen with dorsum black with central longitudinal light band, sides white shading to gray ventrally (Fig. 43). Carapace 0.98 long, 0.62 wide, 0.26 high, not prolonged posteriorly; PER 0.34 wide, AER 0.31 wide, OAL 0.15; ratio AM:AL:PM:PL, 1.2:1.0:1.0:1.1, PM diameter 0.05. Clypeus 0.15 high, chelicerae 0.29 long. Sternum 0.53 long, 0.45 wide; labium 0.10 long, 0.15 wide; palpal coxae 0.18 long, 0.14 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 3.40 + 0.23 + 3.23 + 3.57 + 1.21 = [11.64]; II: 1.55 + 0.19 + 1.34 + 1.15 + 0.66 = [4.89]; III: 0.83 + 0.17 + 0.62 + 0.57 + 0.40 = [2.59]; IV: 1.38 + 0.19 + 1.06 + 0.85 + 0.47 = [3.95]; Palp: 0.24 + 0.10 + 0.08 + (absent) + 0.28 = [0.70]. Palp (Figs. 48–53) with RMP broadly triangular, PC narrow, sharply angled in lateral view; tegulum apex raised, pustulate, MLT large, with produced transverse denticulate ridge; C narrow at base, smooth, with small, narrow secondary process; PP present, pustulate.

Variation: (n = 5). Total length 2.49–3.23; ratios of carapace length/width 1.58–1.73, height/width 0.40–0.48, PER/OQP 2.28–2.71, PER/OAL 2.22–2.29, OQP/OQA 0.93–1.08, diameter AM/PM 1.09–1.50; clypeal height 2.28–2.71 times AM diameter, cheliceral length 1.72–2.00 times clypeal height; ratio of sternum length/width 1.15–1.23; ratio of length femur I/carapace width 5.42–9.48 (Fig. 43).

Female (paratype): Total length 2.68. Markings and structure as in male except abdomen with dorsum dark gray enclosing long median and short anterolateral longitudinal white bands, sides white, venter yellow-gray (Figs. 41–42). Carapace 1.00 long, 0.57 wide, 0.26 high; PER 0.36 wide, AER 0.35 wide, OAL 0.15; ratio AM:AL:PM:PL, 1.3:1.1:1.0:1.1, PM diameter 0.05. Clypeus 0.11 high, chelicerae 0.28 long. Sternum 0.55 long, 0.44 wide; labium 0.10 long, 0.17 wide; palpal coxae 0.17 long, 0.13 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.68 + 0.25 + 2.45 + 2.51 + 1.02 = [8.91]; II: 1.51 + 0.21 + 1.19 + 1.06 + 0.62 = [4.58]; III: 0.81 + 0.17 + 0.59 + 0.57 + 0.38 = [2.52]; IV: 1.34 + 0.19 + 1.00 + 0.87 + 0.45 = [3.95]; Palp: 0.21 +



Figures 30–36.—*Scharffia*. 30, 31, ***Scharffia rossi*** new species, holotype male, left male palpus; 30, Ventral; 31, Retrolateral; 32–36, ***Scharffia holmi*** new species. 32, 33, 36, Paratype female; 32, Dorsal; 33, Epigynum, ventral; 36, Ventral; 34, 35, Holotype male, left male palpus; 34, Ventral; 35, Retrolateral. (Left scale bar for Figs. 30, 31, 33–35, right scale bar for Figs. 32, 36.)



Figures 37–40.—*Scharffia*, cleared female vulvae, dorsal view. 37, ***Scharffia nyasa*** new species; 38, ***Scharffia chinja*** new species, from Kazimzumbwe; 39, ***Scharffia holmi*** new species, paratype; 40, ***Scharffia chinja*** new species, from Uzungwa. AD = vulval afferent duct, FD = fertilization duct, HS = spermathecal head. (Scale bar (Fig. 40, applies to all) = 0.1 mm.)

0.08 + 0.11 + (absent) + 0.27 = [0.67]. Epigynum as in Figs. 24, 26, 47, S broad and truncate; vulva as in Fig. 37, AD anterior, larger than HS.

Variation: (n = 4). Total length 2.68–3.00; ratios of carapace length/width 1.65–1.76, height/width 0.38–0.46, PER/OQP 2.40–2.46, PER/OAL 2.25–2.43, OQP/OQA 0.93–1.16, diameter AM/PM 1.20–1.40; clypeal height 2.40–2.46 times AM diameter, cheliceral length 2.00–2.45 times clypeal height; ratio of sternum length/width 1.19–1.25; ratio of length femur I/carapace width 3.67–4.67.

Natural history.—Data on collection labels indicate occurrence in montane forest, where specimens were collected in litter and by sweeping.

Distribution.—Known only from the type locality (Fig. 58).

Additional material examined.—MALAWI: *Mt. Mlanje* (all R. Jocqué, 1981, MRAC): Thuchila Hut, Nambiti stream, elev. 2000 m, 11 November, 1♂1♀; Lichenya Plateau, *Widdringtonia* evergreen forest, elev. 2000 m, 4 November, 3♂2♀, 4–6 November, 1♀, 5 November, 1♀, 7 November, 1♀, 19 November, 1♂3♀, 21 November, 8♂30♀.

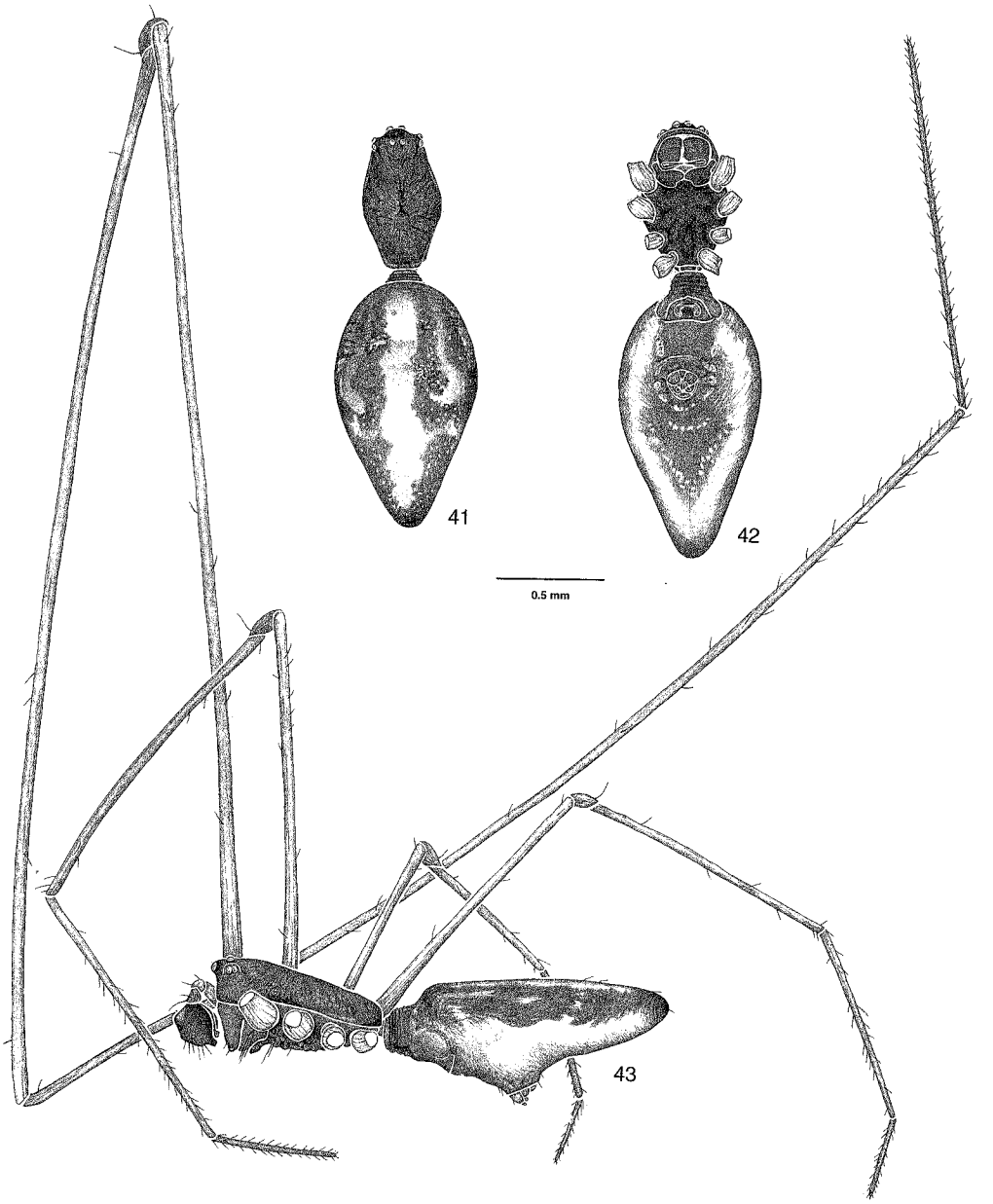
Scharffia rossi new species
(Figs. 1, 30, 31, 54–58)

Type.—Male holotype from 1750 m at Naabi, Serengeti Plain, Tanzania, 25 October 1957, E. Ross and R. Leech (CAS).

Etymology.—In honor of Edward S. Ross, collector of this and many other new and interesting African arthropods.

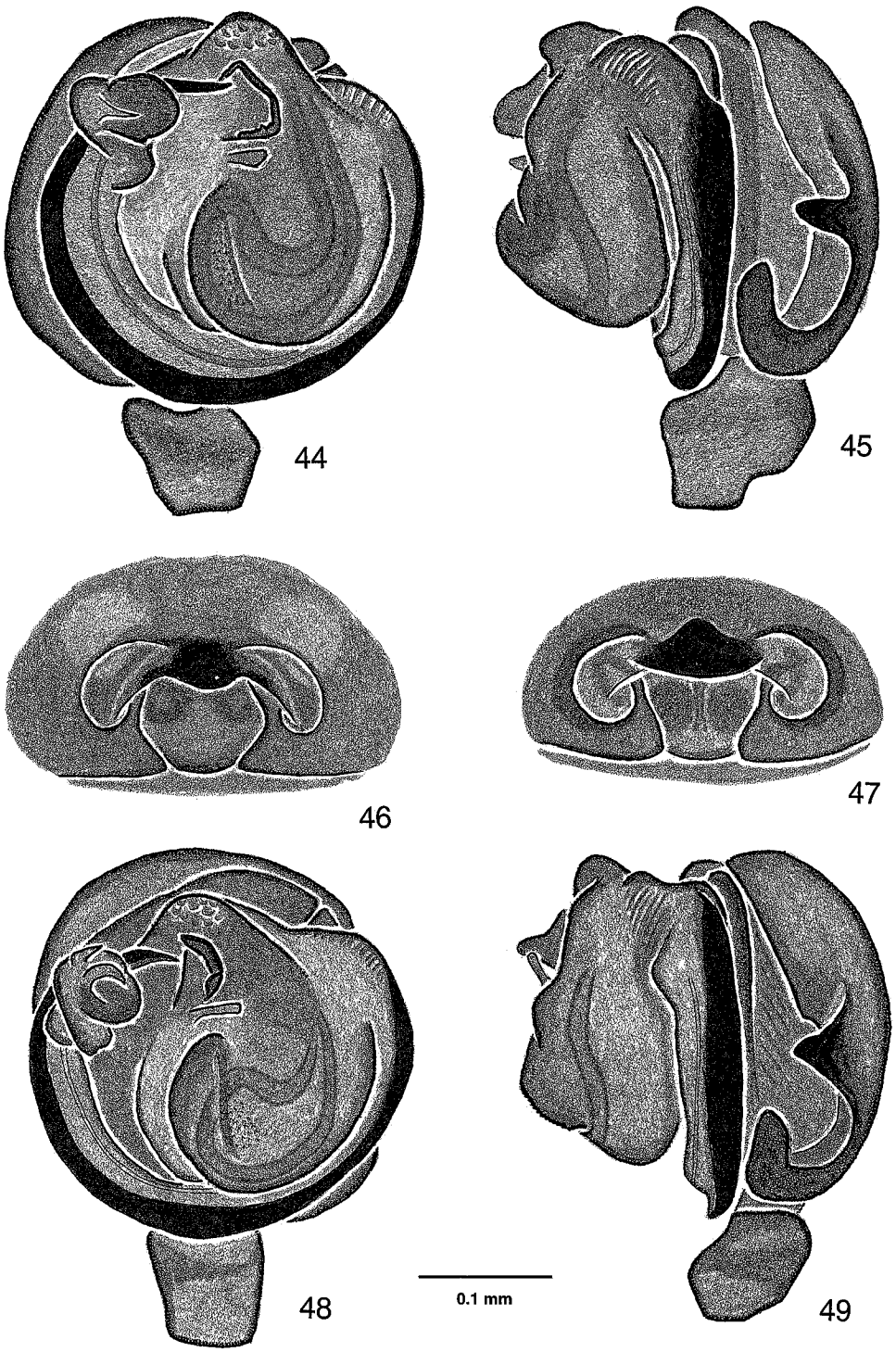
Diagnosis.—Distinguished from all *Scharffia* except *S. holmi* new species by lacking a parembolic process, having a simple conductor (Fig. 57), and having the carapace prolonged posteriorly to form a parallel-sided neck (Fig. 1), and from *holmi* new species by having the median lobe of the tegulum (MLT) large, with bulb length less than 2× length MLT, tegulum nearly hidden between MLT and embolus (Figs. 30, 56).

Description.—*Male (holotype):* Total length 2.66. Carapace, palpal coxae, labium and sternum dark red-brown, unmarked; coxae, trochanters, legs and palpi yellow-gray, unmarked except for dark basal annulus on femur IV; abdomen dark gray, venter and sides unmarked, dorsum with yellow-white outlining anteromedian parallel and postero-

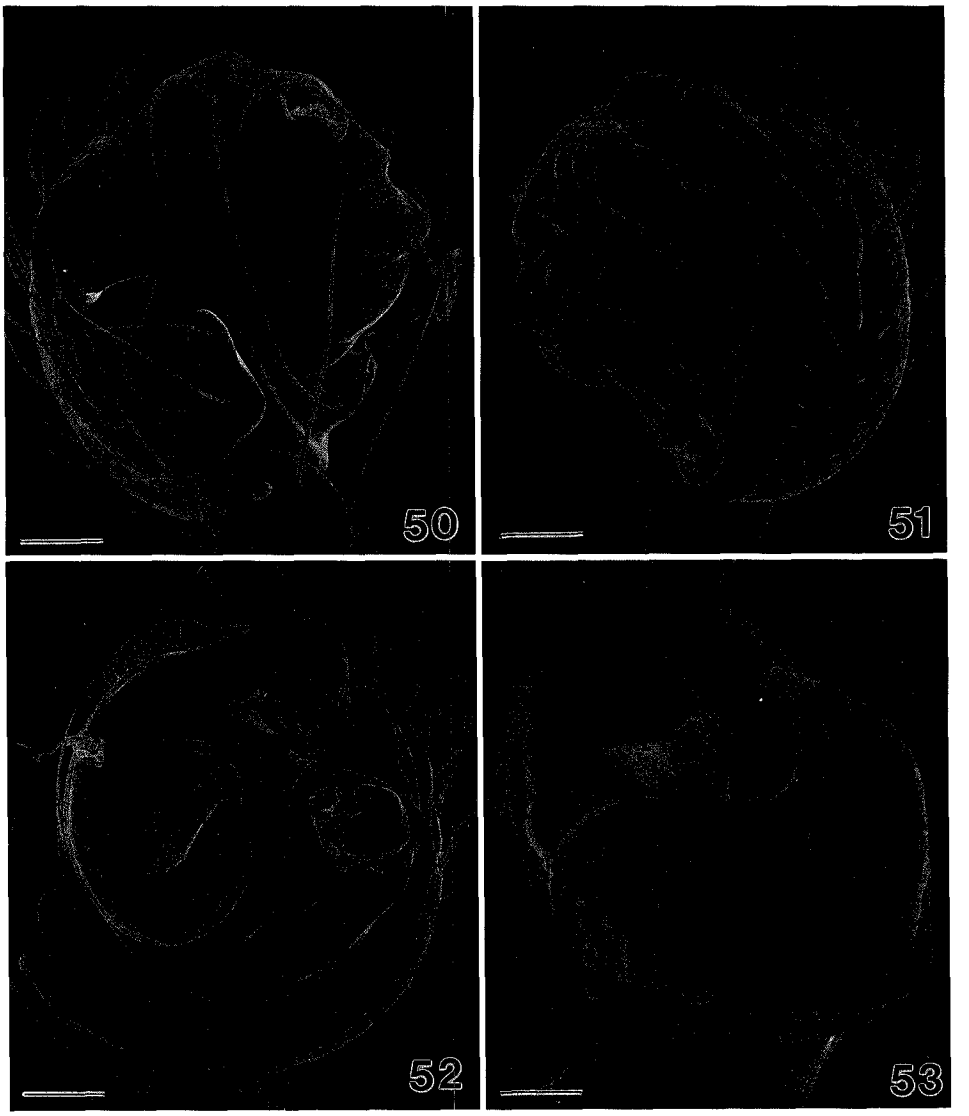


Figures 41–43.—***Scharffia nyasa*** new species. 41, Female, dorsal; 42, Female, ventral; 43, Male, lateral.

lateral converging longitudinal dark marks (Fig. 1). Carapace 1.26 long, 0.61 wide, 0.37 high, greatly prolonged posteriorly to form narrow neck meeting abdomen; PER 0.40 wide, AER 0.39 wide, OAL 0.18; ratio AM:AL:PM:PL, 1.27:1.0:1.09:1.27, PM diameter 0.06. Clypeus 0.18 high, chelicerae 0.27 long. Sternum 0.68 long, 0.59 wide; labium 0.10 long, 0.16 wide; palpal coxae 0.19 long, 0.16 wide. Leg measurements (femur + patella + tibia + metatarsus + tarsus = [Total]): I: 2.15 + 0.23 + 1.98 + 1.81 + 0.81 = [6.98]; II: 1.28 + 0.21 + 1.04 + 0.92 + 0.53 = [3.98]; III: 0.85 + 0.19 + 0.59 + 0.53 + 0.45 = [2.61]; IV: 1.21 + 0.19 + 0.91 + 0.76 + 0.42 = [3.49]; Palp: 0.23 + 0.07 + 0.10 + (absent) + 0.25 = [0.65]. Palp (Figs. 30, 31, 54–57) with RMP short, pointed, PC very broad in lateral view; tegulum apex raised, weakly wrinkled, MLT very large and sparsely den-



Figures 44–49.—*Scharffia*. 44, 45, ***Scharffia chinja*** new species, holotype, left male palpus; 44, Ventral; 45, Retrolateral; 46, ***Scharffia chinja*** new species, female, from Uzungwa, epigynum, ventral; 47, ***Scharffia nyasa*** new species, female, epigynum, ventral; 48, 49, ***Scharffia nyasa*** new species, left male palpus; 48, Ventral; 49, Retrolateral.



Figures 50–53.—***Scharffia nyasa*** new species, right male palpus. 50, Retrolateral; 51, Prolateral; 52, Ventral; 53, Parembolic process. (Scale bars for Figs. 50–52 = 50 μm, Fig. 53 = 10 μm.)

ticulate over wide median area, tegulum hidden beneath; C simple, narrow; PP absent.

Female: Unknown.

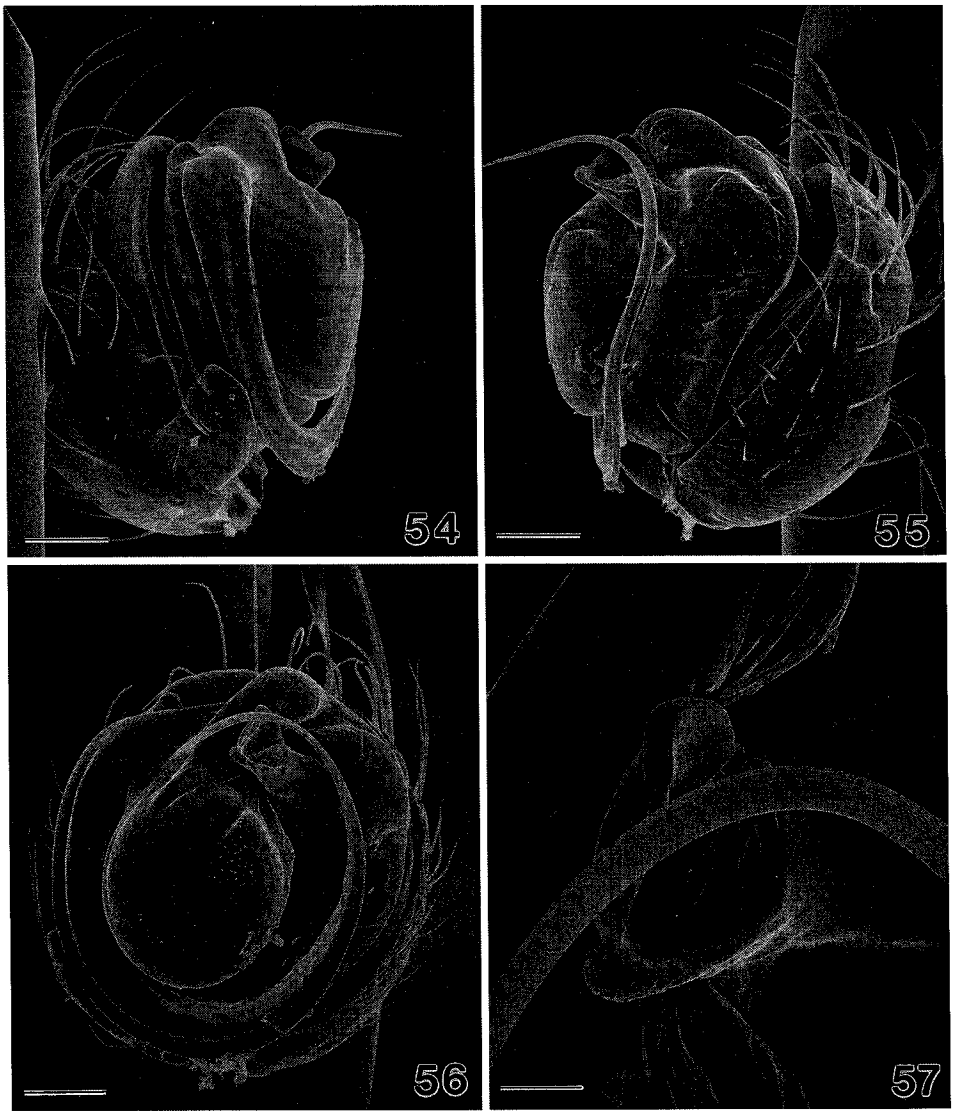
Natural history.—The specimen was collected on a hilltop in shade beneath tall umbrella acacias with an understory of grass and stones, either from tree bark or beneath objects on the ground. This dry site was more than 50 km from moist forest (E. Ross, pers. comm.).

Distribution.—Known only from the type locality (Fig. 58).

Material examined.—Only the type specimen.

DISCUSSION

Synapomorphies for *Scharffia* are the elongate sternum (length greater than 1.15× width: Figs. 21, 36) and elongate abdominal petiole. The sternal form is unique within the Cyatholipidae and Synotaxidae. Within these families an annulate anterior abdominal petiole (Figs. 11, 26) is uniquely shared with *Alaranea* Griswold 1997 from Madagascar, and is a synapomorphy uniting these genera:



Figures 54–57.—***Scharffia rossi*** new species, holotype, right male palpus. 54, Retrolateral; 55, Prolateral; 56, Ventral; 57, Conductor. (Scale bars for Figs. 54–56 = 50 μm, Fig. 57 = 12.5 μm.)

that of *Scharffia* is longer than that of *Alaranea*, which in turn has a unique dorsal horn (Griswold 1997, figs. 4, 68, 94). Synapomorphies within *Scharffia* are the carapace prolonged posteriorly into a neck uniting *holmi* new species (Fig. 32) and *rossi* new species (Fig. 1) and an abdominal petiole longer than 0.24 carapace (Figs. 11, 18) uniting these species with *chinja* new species.

Are *Scharffia* components of the Afromontane biota (White 1978; Griswold 1991)? Whereas they occur in montane forests of the Eastern Arc mountains and Albertine Rift, they are also recorded from lowland forests and savanna woodland (Fig. 58). Unlike the montane east African Linyphiidae studied by Scharff (1992, 1993), which typically had endemic species on each mountain within the Eastern Arc, *Scharffia chinja* new species is widespread. Whether *Scharffia* are very old (perhaps older than the mountains) and slow to differentiate, or readily dispersed, cannot be easily resolved. Occurrence of *Scharffia* in lowland forest (*chinja*) and open, dry country (*rossi*) suggests that for *Scharffia*, the Eastern Arc mountains may not be effectively isolated

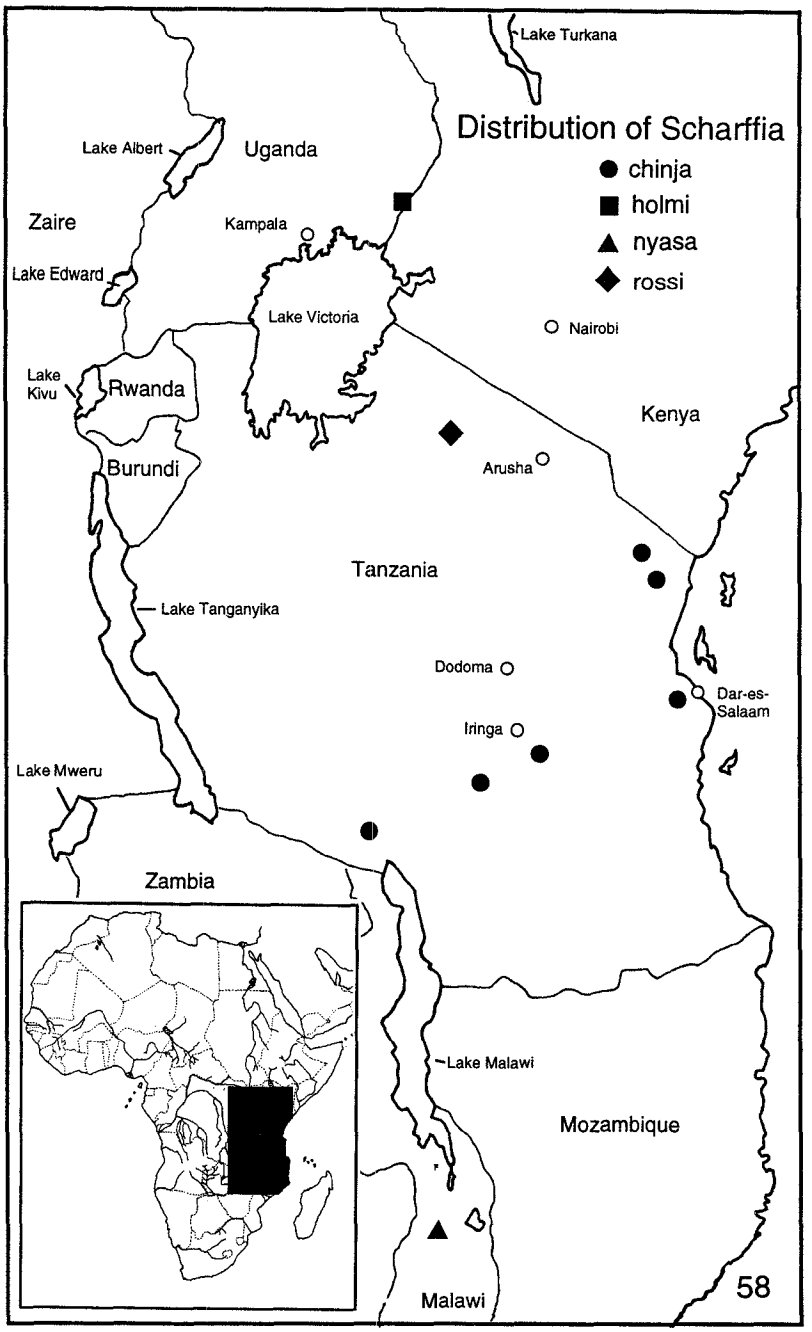


Figure 58.—Distribution of *Scharffia*.

from one another. On the other hand, the distribution of the sister group of *Scharffia* (*Alaranea*, in Madagascar) is consistent with the Afromontane biogeographic pattern detailed for spiders (Griswold 1991) in which Madagascar and the montane forests of eastern Africa are sister areas. Several groups of spiders, including *Phyxelida* and the *Lamaika* group of the Amaurobiidae Phyxelidinae (Griswold 1990), and *Ulwembua* and *Alaranea* plus *Scharffia* of the Cyatholipidae (Griswold 1997), show this intercontinental disjunction,

suggesting that their distribution is not the result of accidental dispersal. Their distribution may date from times of former connection or at least greater proximity between Madagascar and eastern Africa, perhaps in the Mesozoic (Rabinowitz et al. 1983). Given the possible great age of this sister-group disjunction, *Scharffia* appears to be another component of an ancient Afromontane biota.

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LITERATURE CITED

Brignoli, P.M. 1983. A catalogue of the Araneae described between 1940–1981. Manchester: Manchester Univ. Press, 755 pp.

Cambridge, O.P. 1903. Descriptions of some new species and characters of three new genera of Araneoidea from South Africa. Annal. S. African Mus., 3:143–165.

Coddington, J.A. 1983. A temporary slide mount allowing precise manipulation of small structures. Verh. Naturwiss. Ver. Hamburg (NF), 26: 291–292.

Davies, V. Todd. 1978. A new family of spiders (Araneae: Teemenaaridae). Symp. Zool. Soc. London, 42:293–302.

Forster, R.R. 1988. Cyatholipidae. Pp. 7–34, *In* Spiders of New Zealand, vol. 6. Otago Mus. Bull.

Forster, R.R., N.I. Platnick & J.A. Coddington. 1990. A proposal and review of the spider family Synotaxidae (Araneae, Araneoidea), with notes on theridiid interrelationships. Bull. American Mus. Nat. Hist., 193:1–116.

Griswold, C.E. 1987. A review of the southern African spiders of the family Cyatholipidae Simon, 1894 (Araneae: Araneomorphae). Annal. Natal Mus., 28:499–542.

Griswold, C.E. 1990. A revision and phylogenetic analysis of the spider subfamily Phyxelidinae (Araneae, Amaurobiidae). Bull. American Mus. Nat. Hist., 196:1–206.

Griswold, C.E. 1991. Cladistic biogeography of Afromontane spiders. Australian Syst. Bot., 4: 73–89.

Griswold, C.E. 1997. The spider family Cyatholipidae in Madagascar (Araneae, Araneoidea). J. Arachnol., 25:53–83.

Griswold, C.E., J.A. Coddington, G. Hormiga & N. Scharff. In press. Phylogeny of the orb-web building spiders (Araneae, Orbiculariae: Deinopoidea, Araneoidea). Zool. J. Linn. Soc.

Platnick, N.I. 1979. [Review of] Arachnology. New York: Academic Press, 1978, Symp. Zool. Soc. London, 42 (P. Merrett, ed.). Academic Press, New York. Syst. Zool., 28:115–117.

Platnick, N.I. 1989. Advances in spider taxonomy: a supplement to Brignoli's A Catalogue of the Araneae described between 1940 and 1981. Manchester, Manchester Univ. Press, 673 pp.

Platnick, N.I. 1993. Advances in spider taxonomy, 1988–1991: with synonymies and transfers 1940–1980. New York Entomol. Soc., 846 pp.

Rabinowitz, P.D., M.F. Coffin & D. Falvey. 1983. The separation of Madagascar and Africa. Science, 220:67–69.

Roewer, C.F. 1942. Katalog der Araneae von 1758 bis 1940. Bremen: Natura, 1:1–1040.

Scharff, N. 1992. The linyphiid fauna of eastern Africa (Araneae, Linyphiidae) -distributional patterns, diversity, and endemism. Biol. J. Linn. Soc., 45:117–154.

Scharff, N. 1993. The linyphiid spider fauna (Araneae: Linyphiidae) of mountain forests in the Eastern Arc mountains. Pp. 115–132, *In* Biogeography and ecology of the rain forests of eastern Africa. (J.C. Lovett & S.K. Wasser, eds.) Cambridge Univ. Press.

Simon, E. 1894. Histoire Naturelle des Araignées. 2nd ed. Paris: Roret, 1:489–760.

White, F. 1978. The Afromontane region. Pp. 132–143, *In* Biogeography and Ecology of Southern Africa. (M.J.A. Werger, ed.) Junk, The Hague.

Wunderlich, J. 1978. Zur Kenntnis der Cyatholipinae Simon 1894 (Arachnida: Araneida: ?Tetragnathidae). Zool. Beitr. 24:33–41.

Wunderlich, J. 1993. Die ersten fossilen Becherspinnen (Fam. Cyatholipidae) in Baltischem und Bitterfelder Bernstein (Arachnida: Araneae). Mitt. Geol.-Paläont. Inst. Univ. Hamburg, 75: 231–241.

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