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New species of *Afrosternophorus* Beier, 1967 (Pseudoscorpiones: Sternophoridae) from the eastern ghats and first record of *Afrosternophorus ceylonicus* Beier, 1973 from the western ghats in Kerala

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Abstract
A new species, *Afrosternophorus longus* sp. nov. from India is described and illustrated. New occurrence of *A. ceylonicus* (Beier, 1973) is recorded from Western Ghats. An updated key to the *Afrosternophorus* is included in this paper and the distribution of *A. longus* sp. nov. and new distribution of *A. ceylonicus* is mapped.

Keywords: first record, kerala, new species, taxonomy, western ghats

Introduction
The pseudoscorpion family Sternophoridae was first recognized by Chamberlin (1923) and it was later raised to family level by Chamberlin (1931). The genus *Afrosternophorus* was established by Beier (1967).
The *Afrosternophorus* genus Beier, 1967 currently has 14 nominal species distributed in North Africa, India, Nepal, Sri Lanka, South East Asia & Australia (Harvey 1985). *A. aethiopicus* Beier, 1967 is the only species from Africa. *A. anabetes* Harvey, 1985, *A. araucariae* Beier, 1971, *A. cavernae* Beier, 1982, *A. grayi* Beier, 1971, *A. hirsti* Chamberlin, 1932, *A. nanus* Harvey, 1985, *A. papuanus* Beier, 1975, *A. xalyx* Harvey, 1985 are described from Australasian realm. *A. chamberlini* Redikorzev, 1938, *A. ceylonicus* Beier, 1973, *A. cylindrimanus* Beier, 1951, *A. dawydoffi* Beier, 1951 and *A. fallax* Harvey, 1985 are the species currently recorded from Asia. The genus has only one representative in India: *A. ceylonicus* Beier, 1973. The members of the genus are characterised by having female genitalia with one median cribriform plate (Harvey, 1985).

Materials and Methods
All measurements are in millimetres (mm). Morphological terminology and mensuration follow Chamberlin (1931) and Judson (2007). Genetalic abbreviations follow Legg (1974, 1975). The specimens are deposited in a reference collection housed at the Division of Arachnology, Department of Zoology, Sacred Heart College, Thevara, Cochin, Kerala, India (ADSH). Abbreviations used: *bs*–basal, da–dorsal apodeme, *eb*–exterior basal, ejca–ejaculatory canal atrium, *esb*–exterior sub-basal, *gs*–galeal setae, la–lateral apodeme, *ls*–laminal setae.

Taxonomy
Family Sternophoridae Chamberlin, 1923
Genus *Afrosternophorus* Beier, 1967
Type Species: *Sternophorus (Afrosternophorus) aethiopicus* Beier, 1967, by original designation.

***Afrosternophorus longus* sp. nov.**
Figs. 1– 4, 6
Diagnosis: *Afrosternophorus longus* sp. nov can be distinguished from every other known species of the genus by its larger size (Chela with pedicel 1.776–1.929 (♂), 1.95–2.306 (♀) in length) and the form of the genitalia. Females are most similar with *A. dawydoffi* in having female galea with six rami, but can be distinguished by significantly large pedipalps. *A. longus* **sp. nov.** can be separated from *A. ceylonicus* in having six rami (three in *A. ceylonicus*).

Type material: Holotype: Male (ADSH PS0118),
India: Tamil Nadu: Yercaud: Kanavaipudur, 11°54’44” N 78°11’1” E, 490 m alt., M V Aneesh leg., under bark of *Tamarindus indica*, by hand, 29 March 2018.
Paratypes: 17 ♀♀ (ADSH PS0119) and 12 ♂♂ (ADSH PS0120), same data as holotype, except 01 May 2018 (3 ♀♀ (ADSH PS0121) and 3 ♂♂ (ADSH PS0122) and 28 May 2019 (7 ♀♀ (ADSH PS0123) and 4 ♂♂ (ADSH PS0124)).
Other materials examined: Tamil Nadu: 12 ♀♀ (ADSH PS0125) and 7 ♂♂ (ADSH PS0126) Alakarkovil Hills: Dindigul, 10°8’56” N 78°12’42” E, 310 m alt., M V Aneesh leg., under bark of *Tamarindus indica*, by hand, 31 July 2019.
Etymology: The specific epithet is a Latin adjective and refers to the longest pedipalp of the known species (*longus* = long).
Chelicera (Figs. 2D, 3F): Fixed finger with three (♂), five (♀) marginal serrations. Palm with exterior lyrifissure. *ls* absent. *bs* short and blunt. Rallum with four flagellum; anterior with five serrations. Serrula exterior with 13 (♂), 12–14 (♀) blades. Galea simple in males; with five terminals and one subdistal rami in females (Fig. 3F). *gs* at the tip, smaller than galea. *Carapace* (Fig. 2F): 1.43–1.48 (♂), 1.21–1.24 (♀) x longer than broad. Anterior part reddish–brown and posterior part yellowish–brown in colour. ca. 43 setae. 2 setae at the anterior. lateral depression between leg II and III. *Pedipalp* (Fig. 2A, B, 3C): Reddish colour; venom apparatus present in both the fingers. trochanter, femur and patella are granulated dorsally and ventrally; trochanter 1.84–2.17 (♂), 1.95–2.20 (♀), femur 4.11–4.6 (♂), 4.16–4.28 (♀), patella 3.06–3.07 (♂), 3.07–3.18 (♀), chela with pedicel 4.85–5.04 (♂), 4.56–5.15 (♀), chela without pedicel 4.58–4.59 (♂), 4.34–4.99 (♀) x longer

than broad. Fixed finger with 26–28 (♂), 27–28 (♀) and movable finger with 28–31 (♂), 27–31 (♀) teeth. Trichobothria as for *aethiopicus* group, in usual position (Fig. 2A, B). *Opisthosoma* (Figs. 1A–D): Tergites and sternites smooth, IV to XI with 2 granulated patches (♂ and ♀). Tergal chaetotaxy: ♂, 7–8:8:7:6:6–8:8:8:8:8:7–8:10 (including 4 tactile setae),?:2, ♀, 8–9:10:7:8–10:8:8:8:8:8:7:10 (including 4 tactile setae):?:2. Sternal chaetotaxy: ♂, 7–9:6–8:8:8:8:8:6–8:8:10 (including 4 tactile setae):?:2, ♀, 8–11:6–7:4–8:6:7:6:6–7:6:10 (including 4 tactile setae):?:2. *Coxa*: Pseudosternum present. Coxal chaetotaxy: ♂, 6–7, 8–9, 8–9, 7–11, 9–11, ♀, 7–9, 9–11:6–9:8–9:9–12. *Legs* (Figs. 2C, 3A, B): Reddish, smooth, articulation between femur I and femur II is perpendicular. Tactile setae at the base of tarsus IV and at the middle of tibia IV. Leg I (Fig. 3A): trochanter 0.88–1.09 (♂), 0.82–1.21 (♀), femur I 1.0–1.02(♂), 0.88–0.90 (♀), femur II 1.90–1.92 (♂), 1.71–1.82 (♀), tibia 2.97–3.08 (♂), 2.55–2.63 (♀), tarsus 2.82–2.93 (♂), 2.71–2.81 (♀) x longer than broad. Leg IV (Fig. 2C, 3B): trochanter 1.33–1.41 (♂), 1.53 (♀), femur I 1.28–1.34 (♂), 2.06–2.15 (♀), femur II 1.57–1.64 (♂), 1.71–1.82 (♀), tibia 3.52–3.73 (♂), 3.02–3.16 (♀), tarsus 2.66–3.01 (♂), 2.62–2.95 (♀) x longer than broad;

Genitalia (Figs. 3D, E): male with long, acute dorsal apodemes (Fig. 3D). Female: as for genus (Fig. 3E).

Males: holotype followed by 11 paratypes: body length 3.967 (3.326–3.607). Carapace 1.506/1.016 (1.427–1.478/0.995–1.0). Chelicera: palm 0.245/0.175 (0.221–0.235/0.148–0.162), movable finger length 0.216 (0.178–0.190). Pedipalps: trochanter 0.816/0.376 (0.661–0.733/0.358–0.361), femur 1.344/0.301 (1.161–1.232/0.282–0.307), patella 1.112/0.367 (1.041–1.086/0.340–0.353), chela (with pedicel) 1.929/0.403 (1.776–1.898/0.366–0.376), chela (without pedicel) 1.850/0.403 (1.678–1.8/0.366–0.376), hand (with pedicel) 1.205/0.358 (1.098–1.161/0.325–0.343), hand (without pedicel) 1.109/ (0.969–1.019/0.325–0.343), movable finger length 0.830 (0.775–0.823). Leg I: trochanter 0.181/0.166 (0.139–0.154/0.157), femur I 0.215/0.209 (0.202–0.213/0.201–0.203), femur II 0.403/0.209 (0.383/0.201–0.204), tibia 0.414/0.135 (0.392–0.404/0.127–0.136), tarsus 0.263/0.093 (0.267–0.269/0.091–0.092). Leg IV: trochanter 0.304/0.215 (0.239–0.250/0.179–0.192), femur I 0.393/0.293 (0.367–0.382/0.285–0.297), femur II 0.551/0.334 (0.490–0.507/0.312–0.314), tibia 0.703/0.188 (0.623–0.628/0.176–0.178), tarsus 0.356/0.118 (0.322–0.335/0.121–0.124). *Females*: paratype followed by 17 paratypes: body length 5.843 (4.617–5.536). Carapace (1.474–1.635/1.185–1.350). Chelicera: palm 0.261/.193 (0.234–0.257/0.175–0.188), movable finger length 0.236 (0.199–0.216). Pedipalps: trochanter 0.817/0.425 (0.768–0.964/0.389–0.438), femur 1.462/0.341 (1.328–1.517/0.319–0.359), patella 1.105/0.461 (1.118–1.324/0.370–0.416), chela (with pedicel) 2.306/0.447 (1.950–2.303/0.427–0.444), chela (without pedicel) 2.198/0.447 (1.856–2.217/0.427–0.444), hand (with pedicel) 1.303 (1.415/0.423), hand (without pedicel) 1.214 (1.296/0.423), movable finger 0.939 (0.957). Leg I: trochanter 0.231/0.190 (0.214–0.221/0.189–0.193), femur I 0.210/0.221 (0.199– 0.251/0.212–0.237), femur II 0.471/0.237 (0.410–0.465/0.221–0.241), tibia 0.475/0.157 (0.417–0.499/0.141–0.156), tarsus 0.277/0.111 (0.302–0.328/0.098–0.106). Leg IV: trochanter 0.254/0.220 (0.235–0.319/0.194–0.214), femur I 0.448/0.328 (0.383–0.423/0.317–0.350), femur II 0.641/0.377 (0.571–0.638/0.350–0.384), tibia 0.777/0.215 (0.711–0.779/0.190–0.213), tarsus 0.326/0.113 (0.371–0.404/0.121–0.147).

Updated key to species of *Afrosternophorus*

1. Moveable chelal finger with three trichobothria, *b*, *sb* and *t*...*aethiopicus* group...2 Moveable chelal finger with two trichobothria, *b* and *t*....*araucariae* group...12
2. Male genitalia with reduced dorsal apodemes...3 Male genitalia with long, tapering dorsal apodemes...5
3. Male genitalia with brush-like anterior apodeme; dorsal apodemes parallel sided; Australia...*hirsti* (Chamberlin) Male genitalia without brush-like anterior apodeme; dorsal apodemes, if visible, not parallel sided...4
4. Chelal fingers long and strongly curved; male genitalia with short, but prominent, dorsal apodemes, slightly curved; female galea with two distal and one subdistal to subbasal rami; India, Srilanka...*ceylonicus* (Beier) Chelal fingers not especially long or strongly curved; male genitalia with much reduced dorsal apodemes, not visible; female galea unknown; Ethiopia...*aethiopicus* (Beier)
5. Male genitalia with anterior apodeme distally broad; female galea with three distal, one subdistal and two (sometimes one) subbasal rami...6 Male genitalia with anterior apodeme not distally broad; female galea not as above...7
6. Chela (with pedicel) 0.83 to 0.895 (male), 0.835 to 1.03 mm (female) in length; Australia...*anabetes* (Harvey) Chela (with pedicel) 0.61 to 0.69 (male), 0.73 to 0.74 mm (female) in length; Papua New Guinea...*papuanus* (Beier)
7. Lateral rod of male genitalia with long mid-piece; female galea with atleast two distal to subdistal rami...8 Lateral rod of male genitalia with, or without short, mid-piece; female galea never with three subdistal rami...9
8. Chela (with pedicel) 0.74–0.81 mm in length; female galea with two distal, one subdistal and three subbasal rami; Vietnam, Laos?...*chamberlini* (Redikorzev) Chela (with pedicel) 1.77–1.929 mm in length; female galea with five distal and one subdistal rami...*longus* **sp. nov.**
9. Chela (with pedicel) less than 0.74 mm in length; female galea with three distal to subdistal rami...10 Chela (with pedicel) greater than 0.90 mm in length; female galea with at least four distal to subdistal rami...11
10. Chela (with pedicel) 0.645 to 0.70 (male), 0,68 to 0.74 mm (female) in length; female galea with two distal, one subbasal and one subdistal rami; Papua New Guinea...*grayi* (Beier) Chela (with pedicel) 0.55 to 0.59 (male), 0.56 to 0.61 mm (female) in length; female galea with three distal and one subbasal rami; Australia...*nanus* (Harvey)
11. Chela (with pedicel) 1.07 to 1.35 (male, 1.11 to 1.38 mm (female) in length; female galea with six (sometimes five) distal to subdistal rami; Kampuchea, Vietnam...*dawydoffi* (Beier) Chela (with pedicel) 0.935 to 0.95 (male), 1.02 mm (female) in length; female galea with four distal and one subbasal rami; Laos...*cylindrimanus* (Beier)
12. Male genitalia with reduced dorsal apodemes; female galea with two distal and four subdistal to subbasal rami; Australia...*xalyx* (Harvey) Male genitalia with

long dorsal apodemes; female galea not as above...13

13. Chela (with pedicel) 0.805 to 0.82 mm (male) in length, 4.47 to 4.56 times longer than broad; Papua New Guinea...*araucanae* (Beier) Chela (with pedicel) less than 0.70 mm in length, less than 4.00 times longer than broad...14
14. Lateral rod of male with short mid-piece; Papua New Guinea...*cavernae* (Beier) Lateral rod of male genitalia with long mid-piece; Vietnam...*fallax* (Harvey)

***Afrosternophorus ceylonicus* Beier, 1973**
Fig. 5

New record
Karnataka: 1 ♀ (ADSH PS0129) Shivamoga, 13º59'45" N 75º27'55" E], 690 m alt., 31 January 2020, M V Aneesh leg., under bark of *Tamarindus indica*, by hand, 31 January 2020.

Kerala: 12 ♀♀ (ADSH PS0127) and 7 ♂♂ (ADSH PS0128) Attappadi, 11°9'26" N 76°37'24" E, 310 m alt., M V Aneesh leg., under bark of *Tamarindus indica*, by hand, 4 March 2020.

Fig 1: *Afrosternophorus longus* **sp. nov.** A, B male holotype; C, D female paratype. Scale bars: A–D 2 mm.

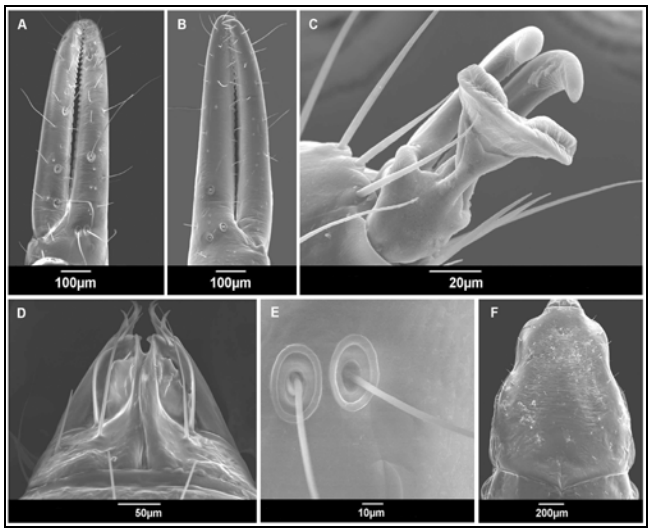

Fig 2: *Afrosternophorus longus* **sp. nov.** Female: A Left chela, lateral; B Left chela, dorsal; C Arolium, Leg IV; D Chelicerae; E areole of trichobothria *eb* and *esb*; F Carapace.

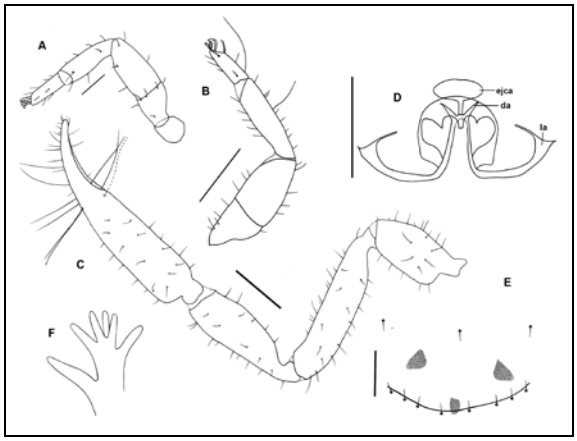

Fig 3: *Afrosternophorus longus* **sp. nov.** A–D Male: A Leg I, lateral; B Leg IV, lateral; C Left pedipalp, dorsal; D Anterior portion of male genitalia, ventral aspect; E Female genitalia; F Galea, female. Scale bars: A, D, E 0.2 mm. B, C 0.5 mm. F Not to scale.

Fig 4: Field photograph of *Afrosternophorus longus* **sp. nov.**

Fig 5: *Afrosternophorus ceylonicus* Beier, 1973 A, B male; C, D female. Scale bars: A–D 1 mm.

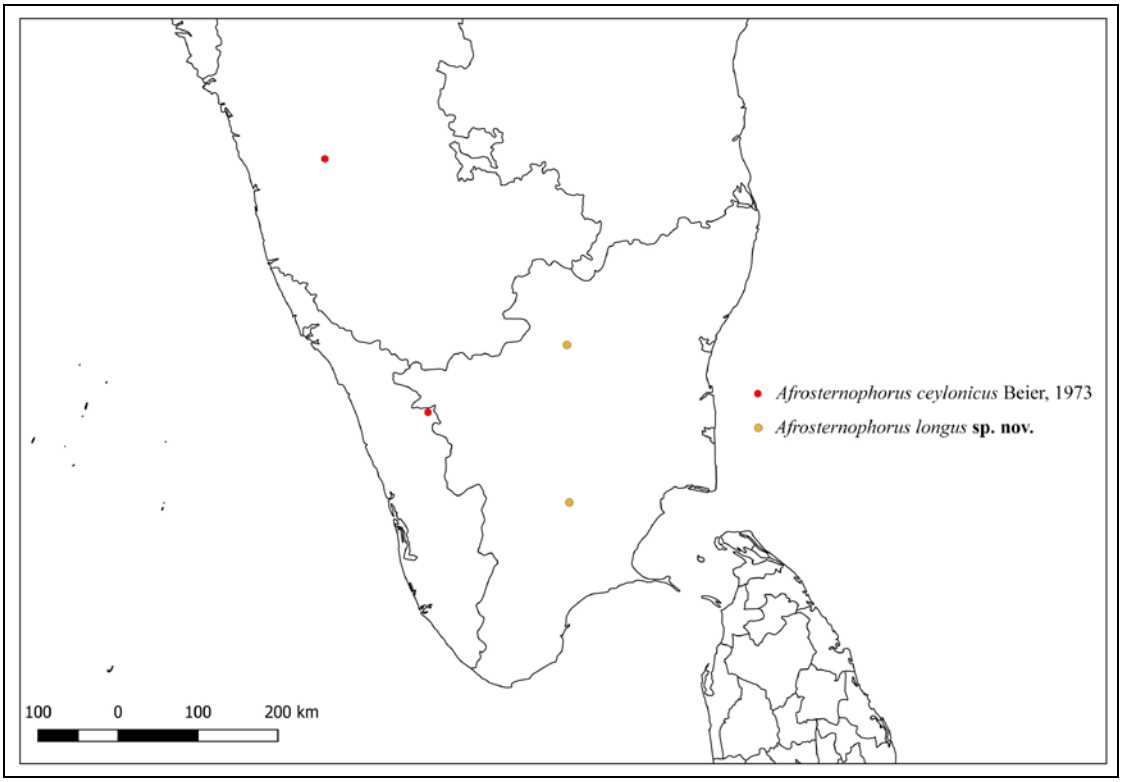

Fig 6: Map showing distribution of *Afrosternophorus longus* sp. nov. and new record of *Afrosternophorus ceylonicus* Beier, 1973

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