

Spiders of the family Salticidae from the upper slopes of Everest and Makalu

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Introduction

The first report by Major R. W. G. Hingston (1925) of small, black, immature salticid spiders living amongst rocky debris at 22,000 ft on the slopes of Mount Everest, caused some controversy as to whether these spiders were vagrants or permanent residents. The discovery by Swan (1961) of adult salticids, together with small flies and springtails at numerous high altitudes in the Himalayas clearly shows that these spiders live permanently in this inhospitable environment. In the same paper Swan was able to demonstrate that this unique community was founded on wind blown vegetation and that spiders being the only predators formed the last link in this simple food chain by feeding on the insects, which in their turn were found to live on fungi and rotting vegetation.

Although immature specimens have been figured (Hingston, 1925; Bristowe, 1939) adults have never been described. The late Mr D. J. Clark of the British Museum (Natural History) studied the material described below. He recognised two new species and placed them in the genus *Euophrys*. His records contain a finished figure of a palp and pencil diagrams of the carapace and leg of one species. Furthermore he had agreed with Dr W. S. Bristowe's suggestion that the specific name *omnisuperstes* (standing above all) was appropriate for one of the new species.

Material and Methods

The material used for the studies in this paper originate from four sources, viz:

1. Dr T. G. Longstaff, Mount Everest Expedition, May 1922.
2. Major R. W. G. Hingston, Mount Everest Exploration Expedition, May 1924.
3. Dr N. Humphreys, Mount Everest Expedition, May 1936.
4. Dr L. W. Swan, American Himalayan Expedition to Makalu, May 1954.

Dr Swan's material has now been returned to the California Academy of Sciences, the remainder is preserved in the British Museum (Natural History).

The measurements were made in the manner described by Prószyński (1968). For the leg chaetotaxy, the system adopted is that used by van Helsdingen (1968).

Genus *EUOPHRYS* C. L. Koch, 1834.

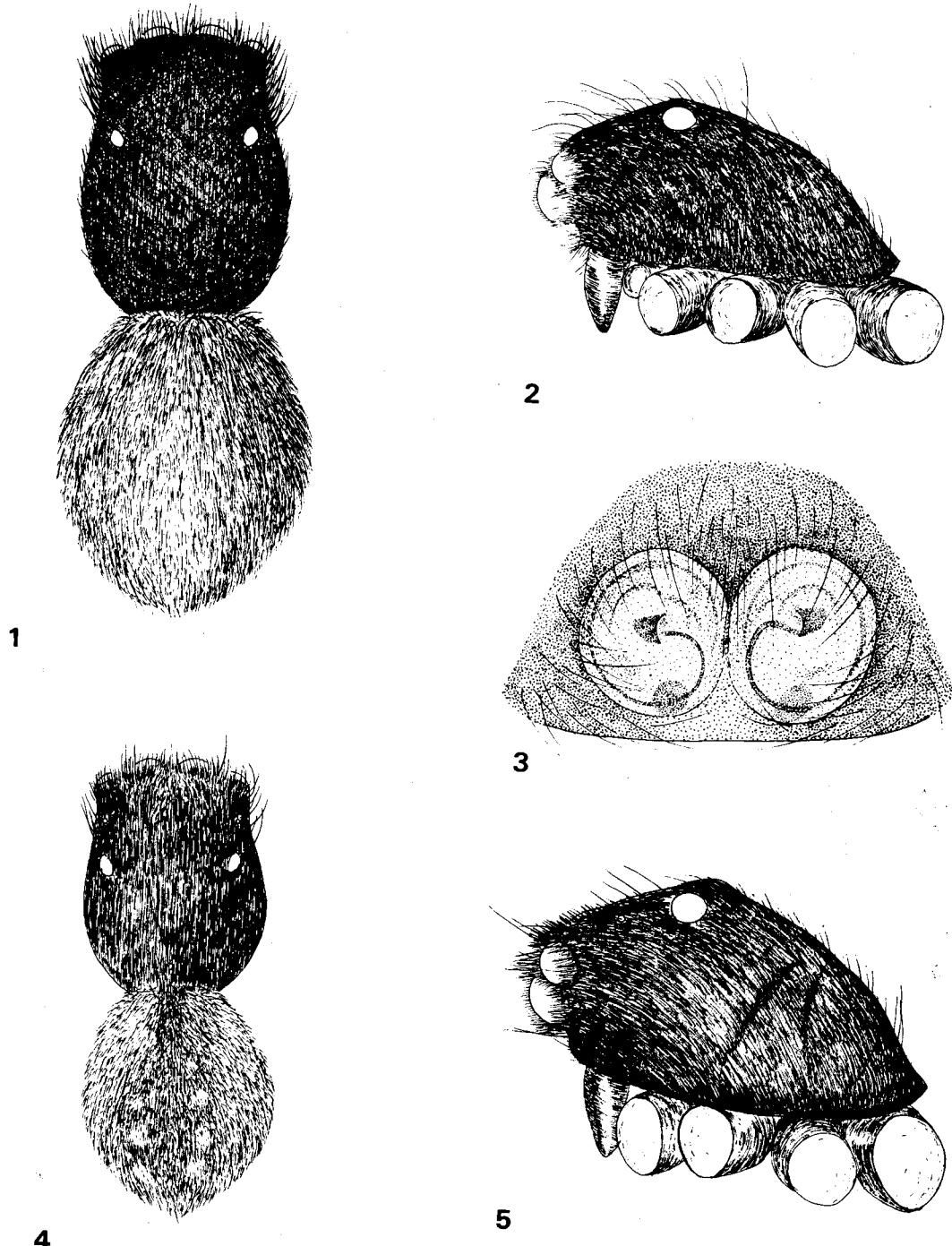
The widespread genus *Euophrys* contains about 130 species of small, mostly sombre coloured spiders. There is no doubt as to the generic placement of the Everest salticids as the general structure, particularly that of the genitalia, is similar to that of *Euophrys frontalis* (Walckenaer), the type of the genus.

Caporiacco (1935) described five new species of *Euophrys* from various altitudes (3,700 – 12,400 ft) in the Himalayas. Of these *E. vittata*, *E. salomonis* and *E. larvata* were described from immature specimens and their taxonomic position is uncertain. The remaining species *E. concolor* and *E. longata* appear to be distinct from either of the Everest salticids. (The author has not had the opportunity to check whether *Euophrys concolor* Caporiacco, 1935 is congeneric with *Attus concolor* Banks, 1895 (see Bonnet, 1956)).

Euophrys omnisuperstes n. sp. (Figs 1 – 5 and 6 – 8)

Holotype male: Nepal/Tibet, Barun Valley; 19,500 ft, Dr L. W. Swan, American Himalayan Expedition to Makalu, 27 May 1954. CAS Type no. 12366.

Carapace: dark brown, blackish with a metallic sheen on the head; clothed with pale brown and whitish hairs, with long brown hairs on sides of cephalic part. *Eyes*: anteriors fringed with white and long brown hairs, recurved in dorsal and frontal views, closely set and more or less equally spaced. *Clypeus*: of medium height, with long pale brown hairs. *Chelicerae*: of medium size, vertical and parallel; brownish tinged with black with inner margins yellow-brown; thinly covered with fine brown hairs; fang groove with 2 teeth on outer margin and 1 tooth on inner. *Maxillae*: truncated, an apophysis on rim of outer distal margin; pale brown tinged with black with inner distal margin whitish. *Labium*: subtriangular; pale brown tipped with whitish. *Sternum*: scutiform, slightly broad; brownish tinged with black with numerous pale brown dots or pits; fringed with



Figs 1-3: *Euophrys omnisuperstes* n. sp. 1 Female dorsal view; 2 Female carapace, lateral view; 3 Female epigyne.

Figs 4-5: *Euophrys everestensis* n. sp. 4 Male dorsal view; 5 Male carapace, lateral view.

long white hairs at the edges. *Coxae*: brownish black. *Abdomen*: black with 2 pairs of ill-defined sigilla; clothed with short whitish and long pale brown hairs. *Legs*: moderately long, almost equally slender; brownish tinged with black with blackish streaks and mottling, tarsi I-II yellow-brown, clothed with pale brown hairs with moderately dense fringes on legs I-II; spines pale brown, numerous and slender. *Palp*: as figured, yellow-brown, femur tinged with black ventrally; clothed with white and pale brown hairs.

Dimensions (mm): total length 3.8; carapace length 1.8, breadth 1.4, height 0.76; abdomen length 1.9, breadth 1.5; eyes anterior row 1.12, middle row 1.04, posterior row 1.04, quadrangle length 0.78.

Ratios: AM: AL: PM: PL:: 8:5:1:4. AL - PM - PL :: 7 - 5; tibia + patella I > IV > II ≈ III.

Chaetotaxy of metatarsi and tibiae I: (l'v'v'')a (v'v'l')b; (v'v'')a l' (v'v'') (v'v'')b.

Allotype Female: Nepal/Tibet, Barun Valley; 17,500 ft, Dr L. W. Swan, American Expedition to Makalu, 25 May 1954. CAS Type no. 12366.

Generally very like the male. *Carapace*: dark brown with pale brown hairs and numerous long brown ones especially on the sides of the head and behind the anterior eyes. *Clypeus*: brownish edged with black; thinly white-haired with a marginal fringe of pale brown hairs. *Maxillae*: as in male but apophysis lacking. *Abdomen*: brownish black with 2 pairs of ill-defined sigilla; clothed with orange-brown hairs. *Legs*: as in male but fringes of legs I-II lacking. *Palp*: yellow-brown with brownish hair except for ventral surface of femora which are blackish. *Epigyne*: as figured, rather pale.

Dimensions (mm): total length 5.0; carapace length 2.2, breadth 1.8, height 1.0; abdomen length 2.8, breadth 2.2; eyes anterior row 1.42, middle row 1.32, posterior row 1.32; quadrangle length 0.92.

Ratios: AM: AL: PM: PL:: 10:6:2:5; AL - PM - PL :: 7 - 5; tibia + patella IV > I ≈ III > II.

Chaetotaxy of metatarsi and tibiae I: (l'v'v'')a (l'v'v'')b; (v'v'')a l' (v'v'') (v'v'')b.

Paratypes: ♂: Tibet, Upper Rongbuk, Everest base camp, 16,500 ft; Dr T. G. Longstaff, May 1922. B.M.(N.H.) Reg. no. 1930.1.9.1-50 (part).

♂: Tibet, Rongbuk Valley, 15,000 ft, Maj. R. W. G. Hingston, Mount Everest Expedition, May 1924. B.M.(N.H.) Reg. no. 1934.2.28.321.

♂: Tibet, Tenkije, 14,500 ft; Dr N. Humphreys,

Mount Everest Expedition 27 May 1936. B.M. (N.H.) Reg. no. 1950.3.16.98.

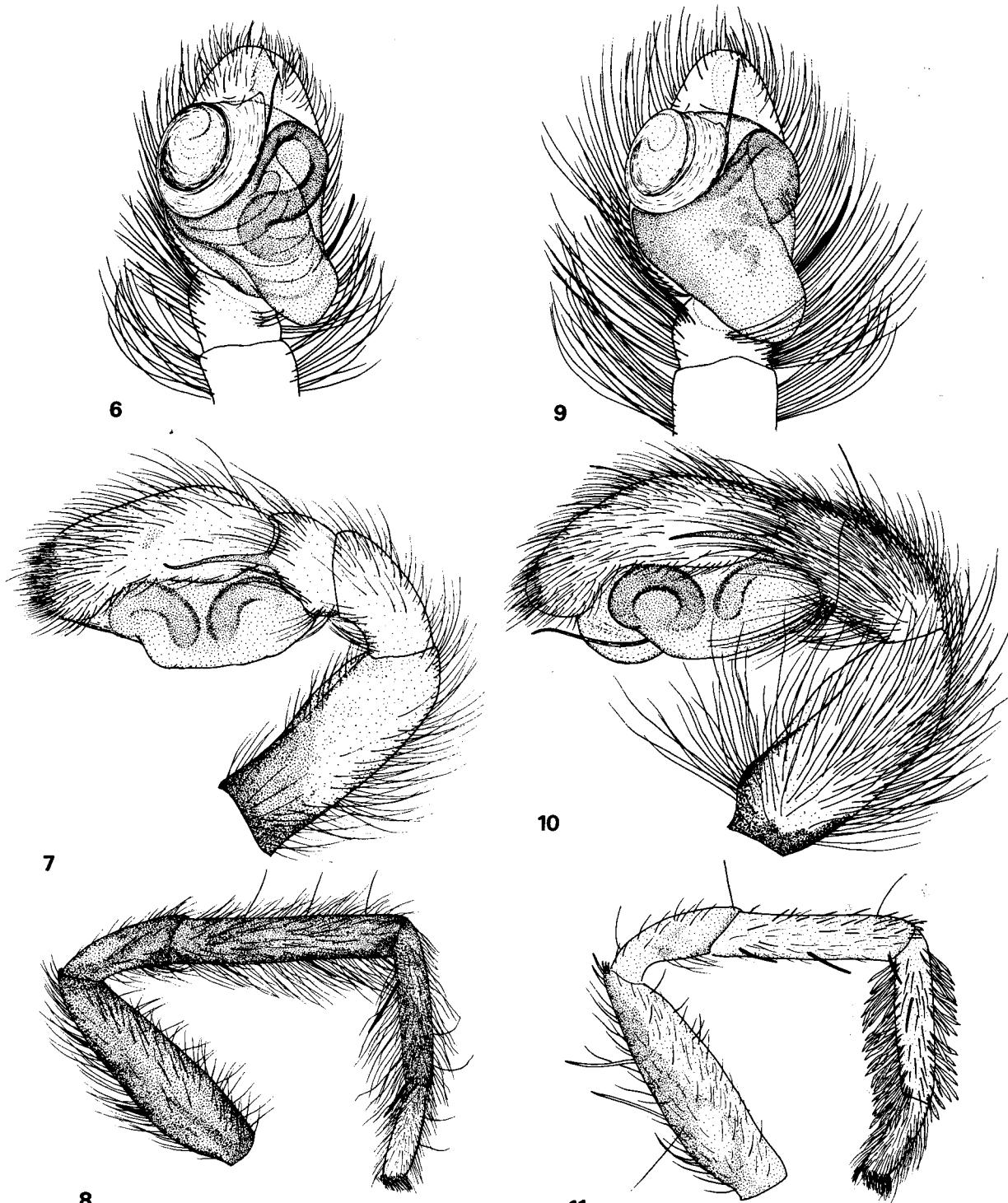
♂: Nepal/Tibet, Barun Valley, 19,500 ft; Dr L. W. Swan, American Expedition to Makalu 27 May 1954. ♂: Nepal/Tibet, Barun Valley, 17,500 ft; Dr L. W. Swan, American Expedition to Makalu, 25 May 1954.

The immature specimens collected by Major Hingston from 22,000 ft are mutilated and badly rubbed. They appear to be conspecific with *E. omnisuperstes* n. sp. but the clypeus is low and the apices of the anterior eyes form a straight line, a condition possibly brought about by a dented carapace. The identity of immature spiders is often uncertain and for this reason these specimens have not been listed as paratypes.

Euophrys everestensis n. sp. (Figs 4-5 and 9-11).

Holotype male: Tibet, Upper Rongbuk, 16,500 ft, Everest base camp; Maj. R. W. G. Hingston, Mount Everest Expedition, May 1924. B.M.(N.H.) Reg. no. 1934.2.28.311.

Carapace: dark brown, blackish with a metallic sheen on the head and a thin black border line around the margins; clothed with whitish hairs and numerous small setae in the anterior half of the quadrangle. *Eyes*: anteriors fringed with pale orange hairs above and white ones below, recurved in dorsal and frontal views, closely set but subequally spaced. *Clypeus*: of medium height, dark brown edged with black, covered with long white hairs. *Chelicerae*: of medium size, vertical and parallel; yellow-brown tinged with black with inner distal edge paler; fang groove with 2 teeth on outer margin and 1 tooth on inner. *Maxillae*: truncated, slightly broad with an apophysis on rim of outer distal margin; yellow-brown faintly mottled with black with inner distal margin whitish. *Labium*: subtriangular; blackish, tipped with yellow-brown. *Sternum*: scutiform, slightly broad; brown tinged with black, clothed with long white hairs especially around the margins. *Coxae*: yellow-brown. *Abdomen*: black with 2 pairs of ill-defined sigilla; clothed with whitish and orange-brown hairs; there is an obscure pattern of whitish spots (partly due to white hairs in the sigilla) on either side of a central brown-haired band. *Legs*: almost equally robust; orange-brown with faint blackish marks and bands particularly on the posterior legs; tarsi I are white-haired, metatarsi I which contrast strongly with the



Figs 6-8: *Euophrys omnisuperstes* n. sp. 6 Male palp, ventral view; 7 Male palp, retrolateral view; 8 Male, leg I.
Figs 9-11: *Euophrys everestensis* n. sp. 9 Male palp, ventral view; 10 Male palp, retrolateral view; 11 Male, leg I.

remaining segments are densely fringed with brownish lanceolate hairs and bristles; the remaining segments and legs are generally covered with whitish hairs. *Palp*: as figured; yellowish with ventral surface of femora black; fringed with white hairs.

Dimensions (mm): total length 3.8; carapace length 2.0, breadth 1.6, height 1.1; abdomen length 1.8, breadth 1.6; eyes anterior row 1.3, middle row 1.22, posterior row 1.24; quadrangle length 0.92.

Ratios: AM: AL: PM: PL:: 8.5:6:1:5; AL - PM - PL :: 8.5 - 6; tibia + patella IV \cong III > I > II.

Chaetotaxy of metatarsi and tibiae I: (l'v'v'l")a (l'v'v'l")b; (v'v")a l' (v'v")l' v"b.

Paratypes: 8 males with the same data and originally in the same vial as the holotype. Another male from Tibet, Upper Rongbuk, Everest base camp 16,500 ft; Dr T. G. Longstaff, May 1922. B.M. (N.H.) Reg. no. 1930. 1.9 1-50 (part). *Note*: 6 subadult females also originally with the holotype but not regarded here as paratypes are almost certainly conspecific with this species. They are generally very similar to the males but fringes are lacking on legs I and the leg bands are more distinct. The epigynal outlines as seen through the cuticle suggest that this structure is likely to be very similar to that of *E. omnisuperstes* n. sp.

Diagnosis: adults and juveniles of this species are immediately distinguished from *E. omnisuperstes* by the numerous setae in the anterior half of the quadrangle. Males are distinguished by the form of legs I (Figs 8 and 11).

Discussion

These small, dark, ground-living salticids are fairly typical of mountain spiders from temperate regions. Their structure does not suggest any obvious adaptations for life under such rigorous conditions, they are in fact similar to other salticids which live at low altitudes and in warmer climates. How they manage

to live permanently at heights above 16,000 ft can be partly explained by the remarkable fact that on sunny days temperatures may be higher than at lower altitudes. At 18,000 ft Swan (1961) recorded temperatures of 92°F on the rock surface and 60°F at a depth of six inches when the air temperature was 55°F. These temperatures, being higher than the equivalent readings at 16,000 ft, influence the hunting and courtship activities of these spiders. At night and on occasions when the sun is not shining they probably survive the freezing temperatures by remaining in silken cells spun beneath the rocky debris. This latter aspect of salticid behaviour may account for their success in exploiting this unique environment.

Acknowledgements

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