

***Phyxelida anatolica* Griswold, new to Cyprus
(Arachnida, Araneae: Amaurobiidae, Phyxelidinae)**

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Summary

Phyxelida anatolica Griswold has been discovered at two localities in Cyprus, Troodos Mts., at 1500 and 1900 m respectively, and its male is described. According to male characters the species stands close to *P. sindanoa* Griswold from Kenya and is an Ethiopian element in the Eastern Mediterranean fauna. Unlike in *Amaurobius*, the offspring of *P. anatolica* disperse without consuming their mother. Observations in captivity suggest that adult females are long-lived: they may even overwinter twice as adults and produce offspring in two successive years.

Introduction

The diversity of Amaurobiidae in Europe is not fully known. In the main glacial refugia of Europe more species of *Amaurobius* exist than previously recognised. This was recently shown for the southern macroslope of the Alps (Thaler, 1990; Pesarini, 1991) and for Greece (Thaler & Knoflach, 1993, 1995). Further species exist on islands in the Mediterranean: *A. deelemanae* Thaler & Knoflach on islands in the Aegean Sea, *A. cretaensis* Wunderlich on Crete (Wunderlich, 1995), and *A. latebrosus* Simon on Corsica (Simon, 1914). In the Eastern Mediterranean an Ethiopian influence is also present. We now report from Cyprus *Phyxelida anatolica* Griswold, which belongs to another subfamily and was recently described as a peripheral isolate from south-western Turkey. Phyxelidinae occur mainly from eastern Africa to the Cape of Good Hope and in Madagascar (Griswold, 1990).

Methods

Measurements (in mm) are given for a large and for a small specimen. Chaetotaxy: symbols according to Van Helsdingen (1968): v', v'' position pro-, retroventral, 1', 1'' pro-, retrolateral, d dorsal; subscript a denotes apical position; pairs of spines enclosed in round brackets, whorls of spines in square brackets.

***Phyxelida anatolica* Griswold, 1990 (Figs. 1-16, 18-23)**

Phyxelida anatolica Griswold, 1990: 167, figs. 90 c,d; Platnick, 1993: 578.

Material examined: CYPRUS, Troodos Mts.: 1500 m, under stones in pine forest, 1♀, 15 December 1985, leg. P.R. Deeleman; Mt. Olympus, c. 1900 m, on slope with sparse pines, under stones deeply embedded in needle litter, 11♀ and juv., 21 April 1995, leg. Thaler & Knoflach. Additional adults matured in captivity: 9♀ from 11 May to 10 July; 7♂ from 12 June to 27 July 1995. Furthermore, from cocoons laid in captivity in 1995, 3♂ matured on 9 February 1996, 25 April 1996,



Fig. 1: *Phyxelida anatolica* Griswold, male from Troodos Mts., Cyprus.

and 19 July 1996. Deposited in Muséum d'Histoire naturelle, Genève; Naturhistorisches Museum Wien; Thaler collection. *P. anatolica*: 1♀ holotype TQ 168, 2♀ paratypes TQ 129; K. Lindberg collection, Göteborg Natural History Museum. Type locality: The Great Cave of Magharadjik, near Soueidiyé (Samendagh), Anatakya (Antioch), Turkey (Lindberg, 1954; Griswold, 1990).

Identification: Somatic and epigynal characters agree well with *P. anatolica*, which was discovered in a cave on the nearby mainland (Griswold, 1990). As this species was described only from the female, palpal characters helpful for amaurobiid identification cannot be taken into consideration. The existence of a taxonomically separate island population therefore cannot be fully excluded.

Female: Carapace, legs and sternum pale yellow-brown, unmarked, chelicerae dark brown, opisthosoma greyish. Measurements approximately within range indicated by Griswold (1990). Total length 8.0 (4.2); carapace length 3.4 (1.6), width 2.4 (1.3); femur I length 4.2 (1.9), 1.23 (1.19) times carapace length. Palpal femur, prolateral basal setae as in Fig. 22. Calamistrum origin at 0.40 from metatarsus base. Metatarsi I-IV with single subdistal dorsal trichobothrium. PL spinneret with conspicuous curved seta (Fig. 21). Epigynum (Figs. 10, 11); membranous, only posterior rim darkened, orifices marking anterior corners of median plate. Vulva strongly sclerotised, with short oblique introductory ducts, to which globular receptacula are broadly attached. Some primary pores at anterior end of introductory ducts, receptacula with a poreplate (Lohmander, 1944; Bennett, 1992; Suhm & Alberti, 1994). Females taken in the field were fertilised and had the orifices plugged by a secretion. Chaetotaxy (highly variable): Fe I/II 1' 1'', III 1', IV d. Ti I-III (1' 1'') (v' v'') (1' 1'')(v_a'v_a''), IV 1' (1' 1'') (v_a'v_a''); in small specimens only subdistal pair of lateral spines present. Mt I-III (v' v'') (1' 1'') (v' v'') [1_a' v_a'v_a' 1_a'], IV (v' v'') (v' 1') [1_a' v_a'v_a' 1_a'].

Male (Fig. 1): Colour as in female. Measurements very variable. Total length 5.5 (3.0); carapace length 2.6 (1.4), width 2.1 (1.05); femur I length 4.0 (1.8), 1.3-1.5 times carapace length; patella+tibia I length 5.0 (2.3);

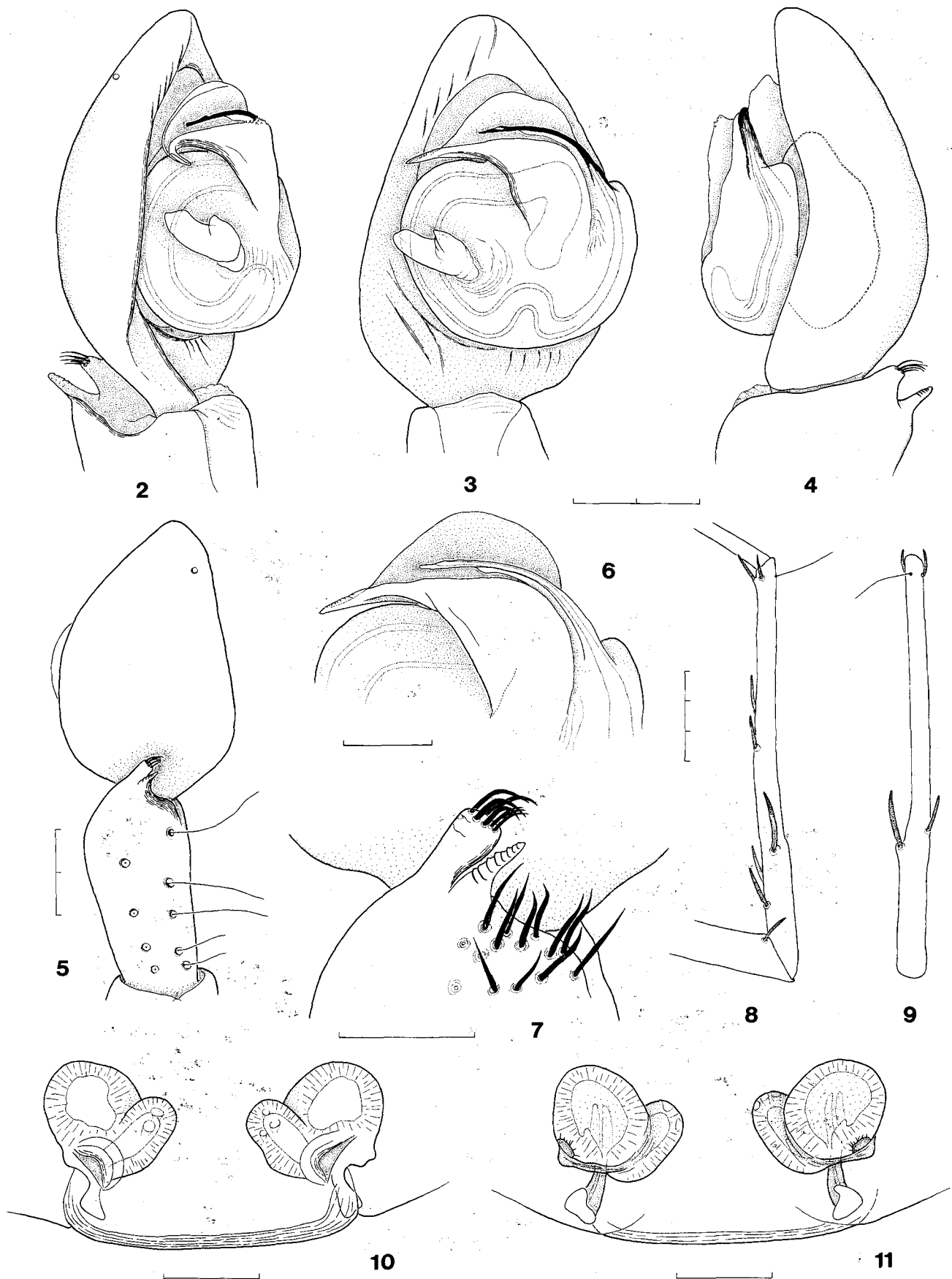
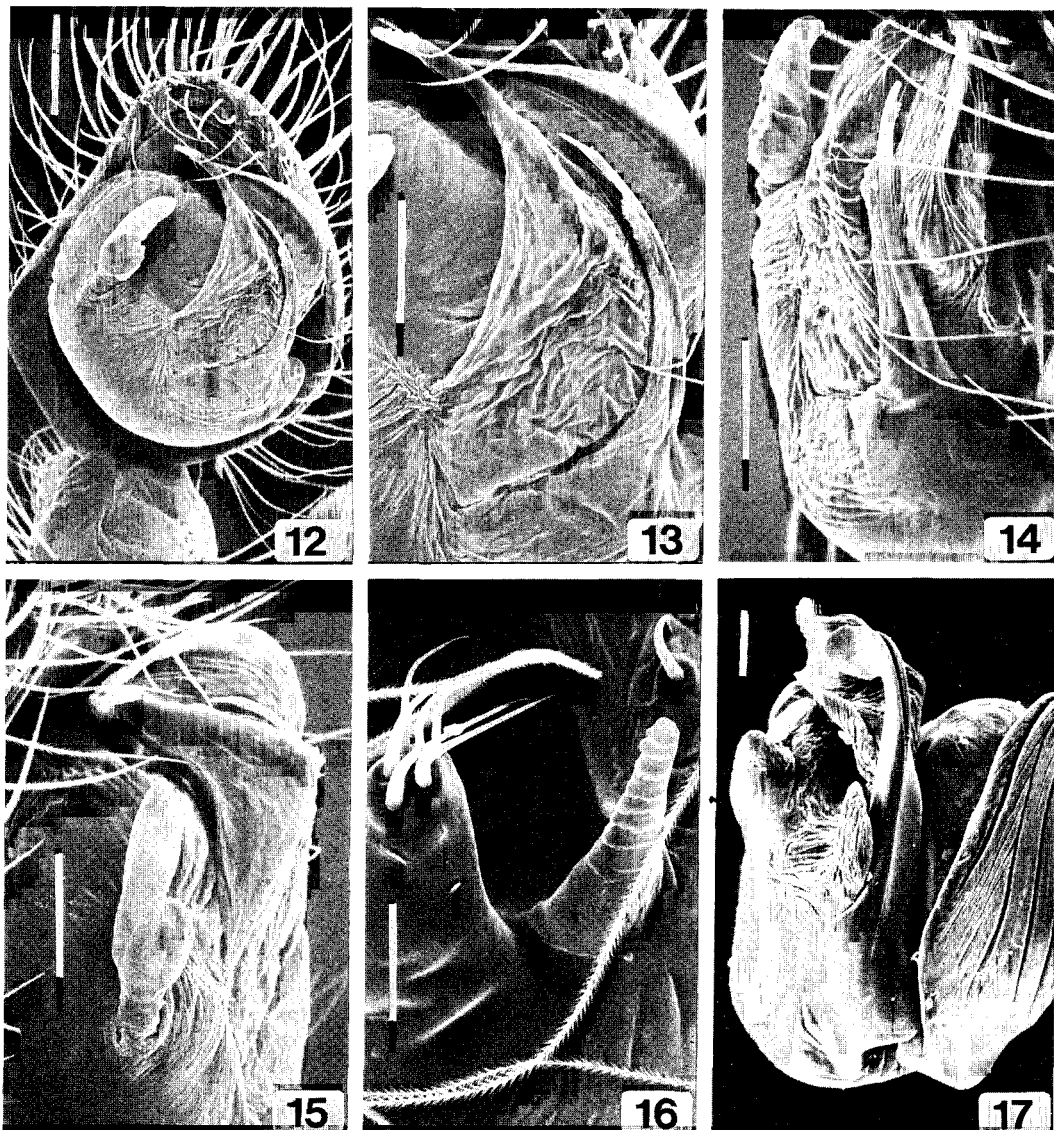


Fig. 2-11: *Phyxelida anatolica* Griswold, male (2-9), female (10-11). **2** Right palp, ectal view; **3** Ditto, ventral view; **4** Ditto, mesal view; **5** Right palpal tibia and cymbium, dorsal view; **6** Conductor and embolus; **7** Distal end of palpal tibia, dorsal view; **8** Left metatarsus I with clasp spines, retro-lateral view; **9** Ditto, dorsal view; **10** Epigyne/vulva, ventral view; **11** Ditto, dorsal view. Scale lines=0.1 mm (6, 7, 10, 11), 0.2 mm (2-5), 0.3 mm (8, 9).

metatarsus I 3.4 (1.4); tarsus I 1.3 (0.8). Chaetotaxy: highly variable, as in females. In smallest male (prosoma length 1.4) only the following spines present: Fe I 1'; Mt I 1' (clasping spine), Mt III/IV [v_a ' v_a "]. Chelicerae, basal setae of palpal femur, metatarsal trichobothria and conspicuous seta on PL spinneret as in female, socket of trichobothrium without lateral lobes (Fig. 20). Epigastric glands and spigots present (Figs. 18, 19). Metatarsus I with clasping spine, slightly enlarged (Figs. 8, 9). Palp: tibia cylindrical, 3 times longer than wide (Fig. 5), dorsal-distal apophyses very similar to *P. carcharata* Griswold: one acute, spine-like, the other blunt and setose (Figs. 7, 16). Bulb (Figs. 2-4, 12): median apophysis clavate, conductor pointed, its apex straight, embolus elongate, spine-like, accompanied by a slender membranous process and with an angular protuberance at its base (Figs. 6, 13-15).

Brood care, life cycle: Seven adult females collected on 21 April 1995 deposited in captivity 2-5 egg cocoons in May and June 1995. Four of these females overwintered and each produced another 2-5 fertile cocoons in the

same period in 1996; the first on 26 April, the last on 7 July. As one of the females was still alive in April 1997, the life span of adult females may last 2-3 years! Juveniles of both sexes collected in the field in April reached maturity after 2-3 moults from 11 May to 27 July 1995. Three males reared from cocoons produced in May/June 1995 became mature on 2 February 1996, 25 April 1996 and 19 July 1996 respectively. These data suggest the following cycle: the spiders reach maturity from May to July, when copulation takes place. Males are short-lived and die shortly after copulation, but females are long-lived and overwinter. They produce their first cocoons in the following season and may even overwinter for at least one more year. Duration of post-embryonic development about one year. Egg sacs are whitish, with particles incorporated into the covering as described by Griswold (1990), see also Fig. 23. Two cocoons each contained *c.* 20 eggs. The behaviour of spiderlings has not been thoroughly observed, but they did not aggregate in a brood chamber and attempted to disperse shortly after hatching.



Figs. 12-17: Male palp, details. 12-16 *Phyxelida anatolica* Griswold; 17 *Amaurobius ruffoi* Thaler. 12 Ventral view; 13 Conductor and embolus, ventral view; 14 Ditto, ectal view; 15 Ditto, mesal view; 16 Distal end of tibia, dorsal view; 17 Palpal organ, removed from cymbium, mesal view. Scale lines=0.1 mm (12, 17), 0.05 mm (13-15), 0.02 mm (16).

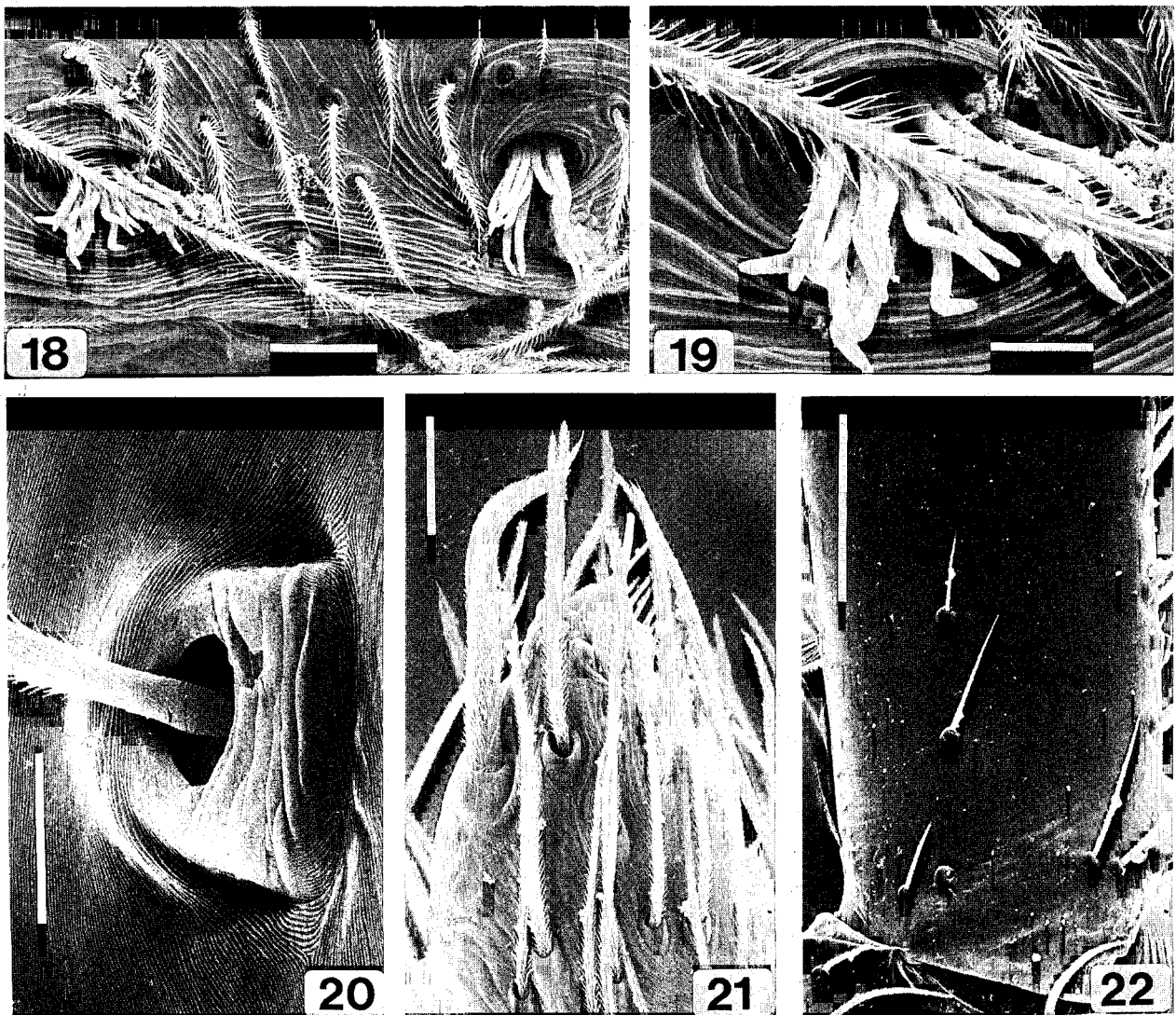
Distribution, habitat: *P. anatolica* was discovered in a semi-cavern in SW Turkey near the Syrian border (Lindberg, 1954; Griswold, 1990) and misidentified by Roewer (1959) as *Amaurobius fenestralis* (Stroem). As the species shows no special adaptations to cave life, the existence of surface populations cannot be excluded. We found such a population of *P. anatolica* in the summit region of Mt. Olympus at 1900 m, where the winter snow cover provides moisture throughout the year. Some patches of snow were still present in April.

Discussion

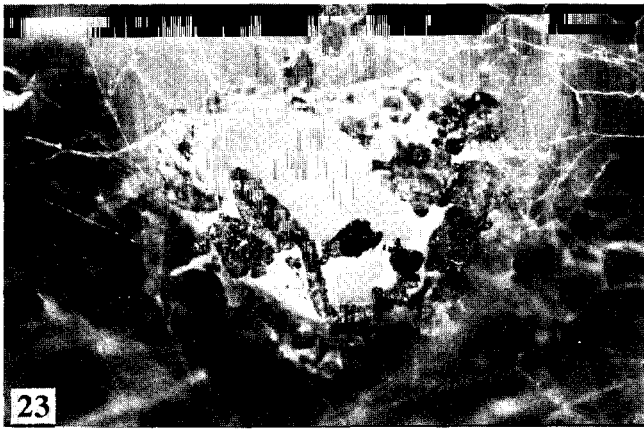
The clasping spine on male metatarsus I, the single subdistal metatarsal trichobothrium and the row of prolateral setae on the palpal femur clearly place this species among the Phyxelidinae. As can be inferred from the distad-directed clavate median apophysis, *P. anatolica* stands close to *P. sindanoa* Griswold from Kenya, although the tip of the conductor is rather short and a swelling is present at the embolar base as in *P. mirabilis* (L. Koch) from Ethiopia. In *P. anatolica* and *P. sindanoa* the male metatarsus I is relatively unmodi-

fied. In view of the new discovery of Phyxelidinae in the Mediterranean some comparative remarks with Amaurobiinae may be appropriate. In addition to characters already mentioned, *Amaurobius* males possess a rather stout embolus with a distinct prolateral groove (Fig. 17). At its base opens the bulbus gland, where the mating plug is produced (Suhm *et al.*, 1996). Such a turgid bulbus gland, which when filled is visible even with the naked eye, was not seen in *P. anatolica*, although inconspicuous mating plugs were present in females taken in the field. As far as we know, European *Amaurobius* produce only one cocoon after overwintering, as females are consumed by their offspring (Fig. 24, Tahiri *et al.*, 1989). Short-lived males with their peak of activity in August are probably present in *A. longipes* Thaler & Knoflach from Peloponnese, and in a species of mid-Europe, *Callobius claustrarius* (Hahn) (Stubbemann, 1980).

The presence of hygrophilic species both at an elevated mountain site and in lowland caves has also been reported from other regions. It was recently shown for the genus *Wabarra* (Amaurobioidea) in Australia (Todd Davies, 1996), and is known from the Alps as a



Figs. 18–22: *Phyxelida anatolica* Griswold, male (18–20), female (21, 22). **18, 19** Epigastric glands, spigots; **20** Base of trichobothrium, metatarsus leg IV; **21** PL spinneret; **22** Base of left palpal femur, prolateral view. Scale lines=0.1 mm (22), 0.02 mm (18, 21), 0.01 mm (19, 20).



Figs. 23–24: **23** *Phyxelida anatolica* Griswold, egg sac; **24** *Amaurobius fenestralis* (Stroem), female with young, in brood chamber.

“refugial-cavatic” type of distribution (Janetschek, 1956). Such a vertical separation was caused by range oscillations due to environmental changes in the pleistocene glaciations. *P. anatolica* is certainly an Ethiopian element (Por, 1975) in the fauna of the Eastern Mediterranean.

Acknowledgements

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