A review of the Stygnicranainae (Opiliones, Laniatores, Cranaidae)

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Summary

Stygnicranaus concolor, new species is described in the hitherto monotypic genus *Stygnicranaus* Roewer, 1913. The male genitalia of a member of the subfamily are described and illustrated for the first time. *Cranaostygnus* Caporiacco, 1951 and *Stygnicranella* Caporiacco, 1951 from Venezuela are based on juvenile Cranainae, possibly *Santinezia*. *Tryferos* Roewer, 1931 is the only other genus left in Stygnicranainae. A key is given for all species of the subfamily.

Introduction

The subfamily Stygnicranainae was erected by Roewer (1913) in the Gonyleptidae for animals in which coxa IV was hidden under the abdomen and the pedipalps were extremely elongate. At that time the subfamily comprised only one species, *Stygnicranaus abnormis* Roewer, 1913, supposedly from Colombia (but now thought to be from Venezuela — see Discussion). Later Roewer (1931) described a second monotypic genus and species, *Tryferos elegans*, from Ecuador.

Mello-Leitão (1932, 1939) included *Stygnobates* Mello-Leitão, 1927 and *Zortalia* Mello-Leitão, 1936, two monotypic genera from the Brazilian Atlantic Forest, in the Stygnicranainae. Soares & Soares (1946) described another monotypic genus, *Gertia*, from southern Brazil. Caporiacco (1951) described two monotypic genera from Venezuela, *Cranaostygnus* and *Stygnicranella*.

Soares & Soares (1985) treated the Brazilian species of Stygnicranainae, and removed *Gertia* and *Zortalia* to the Gonyleptidae Sodreaninae. Finally, Kury (1992) transferred *Stygnobates* to the Gonyleptidae Progonyleptoidellinae. The subfamily Stygnicranainae has recently been removed from the Gonyleptidae to the Cranaidae (Kury, 1994).

From the examination of material from the Museum of Comparative Zoology, Harvard University, Cambridge, Mass. (MCZ), I have found two specimens representative of a new species, which is described below.

Provenances were located with Gazetteers of Colombia and Ecuador (United States Board on Geographic Names, 1957, 1964). All measurements are in millimetres. Abbreviations of other institutions are British Museum (Natural History), London (BMNH), Museo de Biología, Universidad Central de Venezuela, Caracas (MBUCV), and Senckenberg Museum, Frankfurt am Main, older Roewer's Collection (SMF/RI).

Family Cranaidae Roewer, 1913

Cranaidae: Kury, 1994.

Subfamily Cranainae Roewer, 1913

Mitobatinae (part): Simon, 1879: 266.
Cranainae Roewer, 1913: 349; 1916: 145; 1923: 536; Mello-Leitão, 1932: 111; Soares & Soares, 1948: 583.
Stygnicranainae (part): Caporiacco, 1951: 24; Soares & Soares, 1985: 194.

Remarks: The type species of *Cranaostygnus* and *Stygnicranella* were described from juvenile specimens. Juveniles of Gonyleptoidea always have elongate pedipalps, making them superficially similar to the Stygnicranainae (see Discussion). There is evidence to think that *C. marcuzzi* and *S. pizai* are juveniles of *Santinezia* spp. (Cranaidae, Cranainae), suggested by the large dimensions of the juveniles (3.8 mm for *S. pizai* and 11 mm for *C. marcuzzi*), since the species of *Santinezia* are very common in northern Venezuela and reach a large size.

Genus *Cranaostygnus* Caporiacco, 1951, nomen dubium

Cranaostygnus Caporiacco, 1951: 26; Soares & Soares, 1985: 195 (type species *C. marcuzzi* Caporiacco, 1951).

Cranaostygnus marcuzzi Caporiacco, 1951

Cranaostygnus marcuzzi Caporiacco, 1951: 26, fig. 14.

Types: Female juvenile holotype and two female juvenile paratypes (MBUCV 499), Venezuela, Aragua, Rancho Grande, 7 September 1949 (Racenis). Two male juvenile paratypes (Inst. ?), same locality, 30 December 1949 (Monk). Not examined.

Genus *Stygnicranella* Caporiacco, 1951, nomen dubium

Stygnicranella Caporiacco, 1951: 24; Soares & Soares, 1985: 195 (type species *S. pizai* Caporiacco, 1951).

Stygnicranella pizai Caporiacco, 1951

Stygnicranella pizai Caporiacco, 1951: 24, fig. 13.

Types: Pullus holotype (MBUCV 471), Venezuela, DF, Caracas, El Junquito, 1949 (Marcuzzi). Not examined.

Subfamily Stygnicranainae Roewer, 1913

Stygnicranainae Roewer, 1913: 422; 1923: 570; Mello-Leitão, 1932: 128; Soares & Soares, 1985: 194.

Diagnosis: Cranaidae with eye mound armed with paired stout spines, scutal area II projecting into area I until touching scutal groove I, area III armed with paramedian high spines, pedipalpus slender and very elongate forming a subchela, ventral plate of penis oblique in relation to truncus axis, with distal margin slightly concave; stylus sigmoid, with apex swollen, without ventral or dorsal processes on glans penis.

Included genera: *Stygnicranaus* Roewer, 1913 and *Tryferos* Roewer, 1931.

Distribution: Colombia, Venezuela and Ecuador.

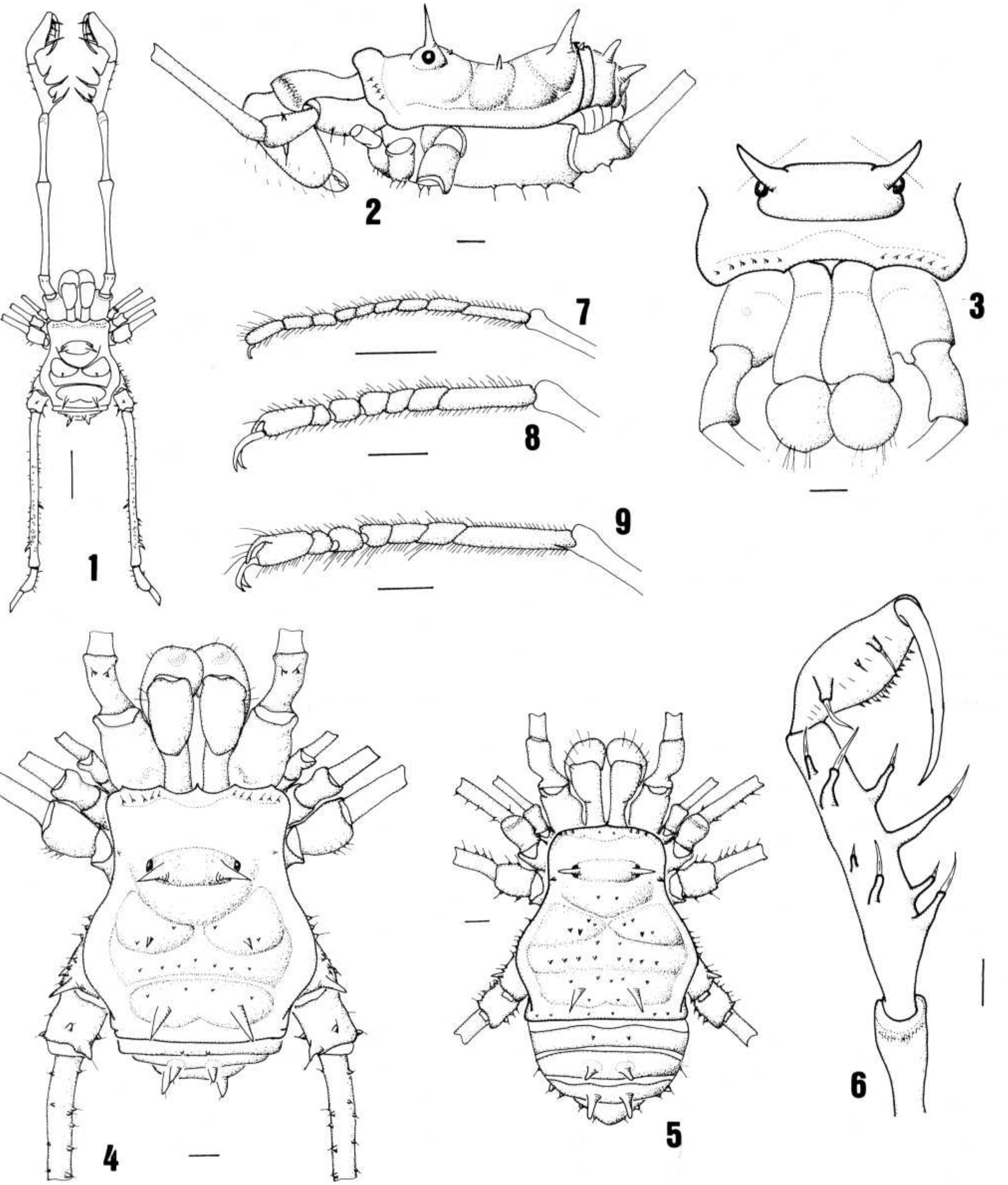
Genus *Stygnicranaus* Roewer, 1913

Stygnicranaus Roewer, 1913: 422; 1923: 570; Mello-Leitão, 1932: 128.

Type species: *S. abnormis* Roewer, 1913.

Diagnosis: Eye mound moderately low, armed with a pair of high spines; scutal area III with a pair of high spines; pedipalps elongate and slender in both sexes; pedipalpal tibia and patella dorsally smooth; tarsus I with more than six segments.

Included species: The type species and *S. concolor*, sp.nov.



Figs. 1–9: *Stygnicranaus concolor*, sp.nov. Male holotype: **1** Habitus, dorsal view; **2** Body, lateral view; **3** Cephalothorax, chelicerae and pedipalps, frontal view; **4** Body, dorsal view; **6** Right pedipalpal tibia/tarsus, ventral view; **7** Tarsus I, lateral view; **8** Tarsus III, lateral view; **9** Tarsus IV, lateral view. Female paratype: **5** Body, dorsal view. Scale lines = 1.0 mm, except Fig. 1 = 5 mm.

Stygnicranaus abnormis Roewer, 1913

Stygnicranaus abnormis Roewer, 1913: 423, fig. 167; 1923: 570, fig. 716.

Type: Male holotype (SMF/RI), [Venezuela], Maracaibo. Not examined.

Stygnicranaus concolor, sp.n. (Figs. 1–11)

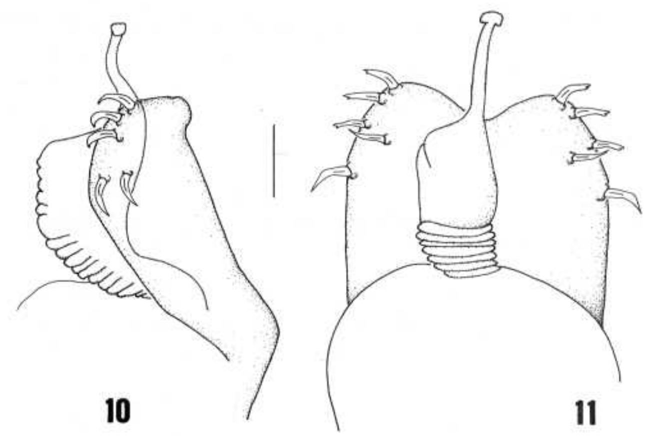
Type material: Male holotype and female paratype (MCZ), Colombia, Dpto Antioquia, Urrao, Parque das Orquideas (6°20'N,76°11'W), 1–7 July 1985, leg. Marco A. Serna.

Etymology: Species name refers to the absence of contrasting granules and of white spots on scute.

Diagnosis: *S. concolor* differs from *S. abnormis* by the absence of lighter granules and white spots on the scute, and by having tarsus I eight-segmented (seven in *S. abnormis*).

Male holotype: Cephalothorax 6.10 wide, 4.98 long, abdominal scute 7.72 wide, 3.96 long. Eye mound 2.79 wide. Stigmatic area 5.08 wide, 5.18 long. Distance between stigmata 2.24. Pedipalpal coxa 2.44 long. *Body*: Large harvestman, with very long legs (Table 1). Dorsal scute (Fig. 4) subrectangular, strongly bowed in abdominal portion, narrowest at posterior margin. Sides of prosomatic scute divergent anteriorly. Anterior margin of carapace with transverse row of setiferous tubercles on each side. Eye mound armed with two stout divergent spines (Fig. 3). Prosoma smooth. Mesotergum divided into three areas without trace of area IV. Area I divided into two halves by projection of area II, armed with two small spines. Area II only with a granule row. Area III armed with two strong paramedian spines. Lateral and posterior margins of scute smooth. Free tergite I with two paramedian granules; free tergites II and III with a pair of spines each. *Mouth parts* (Table 1): Basal cheliceral segment reaching middle length of pedipalpal trochanter (Fig. 2). Cheliceral hand swollen, with a few hairs. Pedipalpal coxa very large, trochanter small with two dorsal tubercles; femur and patella very elongate and slender, unarmed (Fig. 1); tibia long, armed ectally and mesally each with 4(IiIi) long spines with high sockets (Fig. 6); tarsus rounded in mid cross-section, armed mesally with a row of denticles and ectally with 3 (IiI) spines (Fig. 6). *Legs* (Figs. 7–9, Table 1): Most segments unarmed, except trochanters III-IV with setiferous tubercles. Femur IV long, straight, with two rows of setiferous tubercles, and apical lateral tooth. Tarsal claws III-IV smooth, with tarsal process, without scopulae. Tarsal segments: 8-9/?/7/7. Ratio calcaneus/astragalus of metatarsi I-IV: 3.1/0.98/0.69/0.32. *Colour*: Body and appendages cinnamon-brown with black reticulations. Reticulations denser on posterior border of scute, venter and free tergites. Paired spines of tergites II-III yellow. *Genitalia* (Figs. 10–11): Ventral plate rectangular, oblique in relation to plan of truncus, armed with 3 distal bifurcate and 2 basal pointed setae. Distal border concave. Glans without dorsal or ventral processes, with inflatable sac formed by many seriate folds. Stylus long, sigmoid, apex swollen.

Female (Fig. 5, Table 2): Cephalothorax 5.38 wide, 4.25 long, abdominal scute 8.32 wide, 4.75 long. Eye mound 2.95 wide. Stigmatic area 4.88 wide, 4.67 long. Distance between stigmata 2.84. Pedipalpal coxa 1.93 long. Similar to male in body colour and general proportions. Spines of free tergites stouter. Femur IV unarmed. Tarsal segments: 8-?/13-?/7-7/?-7. Ratio calcaneus/astragalus of metatarsi I-IV: 3.0/0.85/0.73/0.35.



Figs. 10–11: *Stygnicranaus concolor*, sp.nov., male holotype. **10** Penis, distal part, lateral view; **11** Ditto, ventral view. Scale line=0.1 mm.

	Tr	Fe	Pa	Ti	Mt	Ta
Pedipalp	2.31	9.04	6.20	6.10	—	7.72
Leg I	1.24	7.62	2.03	5.16	9.83	3.70
Leg II	1.52	16.14	2.83	11.99	15.83	—
Leg III	1.93	12.00	3.05	7.42	13.99	5.69
Leg IV	2.13	16.49	3.34	10.50	18.71	6.60

Table 1: Appendage measurements of male holotype of *Stygnicranaus concolor* sp.nov.

	Tr	Fe	Pa	Ti	Mt	Ta
Pedipalp	1.96	9.16	6.16	5.17	—	7.90
Leg I	1.03	6.16	1.93	5.00	6.83	3.50
Leg II	1.48	13.66	2.34	10.83	14.16	7.00
Leg III	1.90	11.33	2.84	7.16	12.16	4.67
Leg IV	1.85	14.99	3.05	9.50	16.66	5.83

Table 2: Appendage measurements of female paratype of *Stygnicranaus concolor* sp.nov.

Genus *Tryferos* Roewer, 1931

Tryferos Roewer, 1931: 147; Soares & Soares, 1985: 194.

Type species: *T. elegans* Roewer, 1931.

Diagnosis: Eye mound low, saddle-shaped, armed with a few low tubercles; scutal area III with a row of four sharp spines, the median pair stouter; pedipalps sexually dimorphic, elongate and slender in male; pedipalpal tibia and patella dorsally covered with coarse granules; tarsus I with 6 segments.

Included species: Only the type species.

Tryferos elegans Roewer, 1931

Tryferos elegans Roewer, 1931: 147, fig. 20; Soares & Soares, 1985: 194.

Type material: 1 male and 2 female syntypes ("Typus") (BMNH 7000), Ecuador, Guayaquil (2°10′S,79°50′W); 1 male and 1 female syntypes ("Cotypus") (SMF 1458/1), Ecuador, Isla de Puná (2°50′S,80°08′W). Not examined.

Key to the species of Stygnicranainae (see also Table 3)

1. Eye mound saddle-shaped with low tubercles; pedipalpal tibia and tarsus dorsally covered with coarse granulation; area III with four sharp spines .... *T. elegans*
   Eye mound convex with two high spines; pedipalpal tibia and tarsus smooth; area III only with two paramedian spines 2
2. Tarsus I seven-segmented; dorsum dark yellow with contrasting lighter granules and white spots .... *S. abnormis*
   Tarsus I eight-segmented; dorsum dark brown without lighter granules or white spots ..... *S. concolor*

Discussion

The very elongate coxa, femur and patella of the pedipalp, forming a functional subchela with the stout tibia and tarsus, is an advanced character which has developed convergently in at least four lineages of laniatorids. This kind of pedipalp occurs in the Epedanidae, Stygnidae, Biantidae and Gonyleptidae (Sodreaninae and Progonyleptoidellinae). A roughly similar condition occurs in juveniles of Gonyleptoidea, but in this case the spines are relatively longer, the coxa, femur and patella are not so elongate, and the tarsus has a semicircular cross-section.

Some authors, probably not acquainted with laniatorid morphology, mistook juveniles for representatives of different taxa. This is the case with the Palpinidae, a family erected by Pickard-Cambridge (1905) for juvenile cosmetids (Roewer, 1923), and surely it is also the case with both genera of "Stygnicranainae" that were created by Caporiacco.

Members of the Stygnicranainae are closely related to the Cranainae, judging from external features and the genital morphology, and possibly should be included in the latter subfamily in order to turn it into a monophyletic group. Although there is no cladistic analysis at this level, it appears that the Cranainae (which lack any detected synapomorphy uniting exclusively its species) form a paraphyletic group if one excludes the specialised offshoot constituted by the Stygnicranainae. The close relationship between both nominal subfamilies is suggested by the probably synapomorphic oblique position of the ventral plate, eye mound structure and area II invading area I until touching the scutal groove.

The type locality of *Stygnicranaus abnormis* is almost certainly not Maracaibo, Colombia. There are four populated places by that name in Colombia, but none of them is large enough to be on maps. Maracaibo, Venezuela is the likely collection locality. Roewer (1913, 1923) was inconsistent in recording the country for Maracaibo and for other localities in Venezuela, but in the introduction of his paper on Gonyleptidae (Roewer, 1913: 257) he stated that his collections were from Maracaibo, Venezuela. In the description of *Sabanilla*, he listed the distribution of the single species as northern Colombia, but under the description of the type species he reported it as Sabanilla, Venezuela. Roewer (1943) cited "Maracaibo, Surinam" as the type locality of *Poecilocranaus gratiosus*, and I determined material of this species from Puerto Cabello, Carabobo, Venezuela (Zoologisk Museum, Copenhagen), so this is surely another example of mistaken locality report by Roewer.

Structures	*S. concolor*	*S. abnormis*	*T. elegans*
Eye mound	VV	VV	saddle
Area I	vv	vv	vv
Area III	VV	VV	vVVv
Dimorphic Pp	absent	?	present
Pp Ti/Ta do	smooth	smooth	coarse grnls
Tarsal counts	8-9/?/7/7	7/15/8/9	6/11-14/7/7-8
Body length	11.5	7.0	5.0
Pp length	30.0	20.0	13.0
Legs I–IV	30/54/44/58	21/48/36/50	12/21/15/18
Calcaneus I	normal	normal	swollen
Basitarsus I	normal	normal	swollen
Colour body	dark brown	dark yellow	dark brown
Colour legs	dark brown	dark yellow	pale yellow
Tergites	dark brown	brown/black	dark brown
Granules	dark brown	white	white
Spots	absent	white	white
Metatarsi	ringed black	ringed brown	no contrast
VV area III	as body	as body	black contrast

Table 3: Synopsis of the diagnostic structures for separating the three species of the Stygnicranainae. Abbreviations: do=dorsally, Pp=pedipalp, v=short spine, V=stout spine.

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Three factors affecting the pitfall trap catch of linyphiid spiders (Araneae: Linyphiidae)

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Summary

The effects of three factors influencing the pitfall trap catch of linyphiid spiders was investigated using polypropylene pitfall traps with ethylene glycol as the trapping fluid. Dilution of ethylene glycol did not reduce its effectiveness as a pitfall trap fluid but the addition of detergent increased the trap catch by 50 to 1000%. Some evidence was found to suggest that the daily catch of grassland spiders in pitfall traps declined as the frequency of emptying the traps decreased. Traps with rougher surfaces caught fewer spiders. The wear and tear caused by normal usage was found to reduce the catch of spiders when these traps were re-used.

Introduction

Pitfall traps are universally used to collect invertebrates, including spiders, from the ground stratum of many habitats. However, problems with their usage as an ecological sampling method have been cited by a number of authors (e.g. Adis, 1979; Desender & Alderweireldt, 1990; Topping & Sunderland, 1992). Unlike other disciplines it has not been common to test the efficiency of many sampling methodologies used in ecology, and in particular the pitfall trap. However, studies on the potential sources of error are necessary. Both activity (Heydemann, 1957) and trapability (Luff, 1975; Halsall & Wratten, 1988; Topping, 1993) are known to affect catch, but other factors such as the physical construction of the trap and placement may be equally important. This paper concerns three experiments used to assess the effects of some possible causes of error when pitfall trapping spiders.

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Trap fluid type

Spiders are soft bodied animals capable of climbing in and out of pitfall traps, thus for efficient trapping of spiders it is necessary to add a trap fluid to act as a preservative and a retaining agent. Previously used trap fluids include methylated spirits, ethylene glycol, formalin and plenyl mercuric acetate (Fichter, 1941; Uetz & Unzicker, 1976; Heydemann, 1956; Macfadyen, 1963). Formalin and ethylene glycol have been shown to be attractive to carabid beetles (Luff, 1968; Skuhravý, 1970; Holopainen, 1990), but no such effects have been suggested for spiders. It is also common practice to add a small amount of detergent to the trap solution in the hope of increasing the catch by reducing the surface tension of the trap fluid, as suggested by Basedow (1976). However, the effect of this addition on the catch of spiders has not been quantified.

Length of time the trap is operating

Long trapping periods in the field can be used to reduce over- or under-recording which could occur if the trapping period coincides with a period of unusually high or low activity. Whilst traps cannot be in the field indefinitely, it would be a waste of effort to service them frequently if less frequent sampling would provide equally good results.

Trap surface texture

It has commonly been suggested that pitfall traps with rough surfaces would catch less, owing to the ability of the animals to crawl up the rough trap sides and escape. Kudrin (1971) demonstrated this effect, while others such as Luff (1975) showed that the material from which the trap was made affected the efficiency of the trap (glass>plastic>metal). In ecological sampling the use of glass traps is prohibited by practicality and safety, so recourse has to be made to the cheaper and safer plastic pot. However, as they are used plastic traps become dirty and scratched. Since it is unlikely that traps would