

## REVISION OF THE THREE-STRIPED SPECIES OF *PHYLLOGOMPHUS* (ODONATA, GOMPHIDAE)

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The taxonomy of the *Phyllogomphus* species occurring from Cameroon eastwards, characterised by three-striped sides of the thorax, has been confused by misinterpretation of the identity of the most widespread species, *P. selysi*, and substantial variation in the species. Of sixteen named taxa, only four are considered valid species after clarifying the identity of *P. selysi*, matching females to the correct males, and accounting for variation, particularly of size, colour and the morphology of the vulvar scale: *P. annulus* is not a synonym of the true *P. selysi* but of Fraser's interpretation of the latter species; *P. dundomajoricus* and *P. dundominusculus* are junior synonyms of *P. annulus*; *P. montanus*, *P. hartwigi*, *P. perisi* and *P. margaritae* of *P. coloratus*; *P. orientalis*, *P. edentatus*, *P. latifasciae*, *P. symoensi*, *P. brunneus* and *P. corbetiae* of *P. selysi*. Keys to the species and distribution maps are provided, and the taxonomy of the genus is discussed.

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Key words. – Odonata; Dragonfly; Anisoptera; *Phyllogomphus*; Taxonomy; Synonym; Africa.

The genus *Phyllogomphus* Selys, 1854 inhabits tropical Africa, largely allopatric to *Ceratogomphus* Selys, 1854 of southern Africa and *Isomma* Selys, 1892 (including its probable synonym *Malgassogomphus* Cammaerts, 1987) of Madagascar. Together these genera form the distinctive Afrotropical subfamily Phyllogomphinae (Carle 1986). Despite the revision of *Phyllogomphus* by Fraser (1957), the genus is in urgent need of taxonomic attention (Dijkstra 2003, Vick 1999). Until now 22 names have been introduced, but they probably represent less than half that number of species (table 1). *Phyllogomphus* can be separated into two groups: a) species with five stripes on each side of the synthorax and b) species with the antehumeral and metepisternal stripes absent or strongly reduced, thus leaving only three thoracic stripes. The five-striped species occur from The Gambia to Nigeria. The three-striped species occur further east, ranging from Bioko and Cameroon to Kenya and South Africa. The present paper revises the latter group. Much of the confusion within this

group originated from Fraser's (1949, 1957) misinterpretation of *P. selysi*. The extensive material labelled as *P. selysi* in the Musée Royal de l'Afrique Centrale, Tervuren (MRAC) (27 males, 9 females) contains two species. Only a small proportion (3 males, 3 females, mostly type material) agrees with Schouteden's (1933) species. The majority belongs to a different species, which Fraser (1949, 1957) however described as *P. selysi*. Recently, the first author found *P. selysi* Schouteden and *P. selysi* sensu Fraser nec Schouteden occurring together in W Uganda (figs. 27, 29-30). The quest for the correct name of the second species provided the stimulus for this paper. Due to Fraser's mistake, an over-emphasis on variation and the description of taxa based on females only, sixteen names have been introduced in this group, a quarter with female holotypes. We believe that only four three-striped species exist, which are somewhat variable and widely overlapping in range, size and colour, but morphologically very distinctive.

Table 1. Overview of *Phyllogomphus* taxonomy. Names are listed in order of priority within groups and species. The first author to identify the correct opposite sex for each taxon is indicated.

Species	Synonyms	Type	Identity of other sex
<b>Three-striped species</b>			
<i>coloratus</i> Kimmins, 1931	<i>montanus</i> Fraser, 1957	♂	Klots 1944
	<i>hartwigi</i> Buchholz, 1958	♀	Vick 1999
	<i>perisi</i> (Compte Sart, 1963)	♂	this paper
	<i>margaritae</i> Compte Sart, 1967	♂	this paper
		♀	this paper
<i>selysi</i> Schouteden, 1933		♂	Schouteden 1933
	<i>orientalis</i> Fraser, 1957	♂	Fraser 1957
	<i>edentatus</i> St. Quentin, 1958	♂	Pinhey 1962
	<i>latifasciae</i> Pinhey, 1961	♂	this paper
	<i>symoensi</i> Liefinck, 1969	♀	this paper
	<i>brunneus</i> Pinhey, 1976	♂	Pinhey 1976
	<i>corbetae</i> Vick, 1999	♂	Vick 1999
	<i>leopoldi</i> Fraser, in litt.	♂	this paper
			Fraser 1957
			Fraser 1949
<i>annulus</i> Klots, 1944	<i>selysi sensu</i> Fraser, 1949	-	Fraser 1949
	<i>dundomajoricus</i> Fraser, 1957	♂	this paper
	<i>dundominusculus</i> Fraser, 1957	♂	this paper
<i>schoutedeni</i> Fraser, 1957		♂	unknown
		♂	
<b>Five-striped species</b>			
<i>aethiops</i> Selys, 1854		♂	Legrand 1993
<i>helenae</i> Lacroix, 1921		♀	= <i>bartolozzii</i> ?
<i>occidentalis</i> Fraser, 1957		♀	Lindley 1972
<i>moundi</i> Fraser, 1960		♂	Fraser 1960
<i>pseudoccidentalis</i> Lindley, 1972		♂	Lindley 1972
<i>bartolozzii</i> Marconi, Terzani & Carletti, 2001		♂	= <i>helenae</i> ?

MATERIAL AND METHODS

Acronyms for collections

AMNH	American Museum of Natural History (New York, USA)
BMNH	Natural History Museum, formerly British Museum (Natural History) (London, UK)
CGVL	Collection Graham Vick (Little London, UK)
CVCH	Collection Viola Clausnitzer (Halle, Germany)
ISNB	Institut Royal des Sciences Naturelles de Belgique (Brussels, Belgium)
MDLA	Museu do Dundo (Chitato, Angola)
MNHN	Muséum National d'Histoire Naturelle (Paris, France)
MNMS	Museo Nacional de Ciencias Naturales (Madrid, Spain)
MRAC	Musee Royal de l'Afrique Centrale (Tervuren, Belgium)
NHRS	Naturhistoriska Riksmuseet (Stockholm, Sweden)
NMBZ	Natural History Museum of Zimbabwe (Bulawayo, Zimbabwe)
NMKE	National Museums of Kenya (Nairobi, Kenya)

NMW	Naturhistorisches Museum Wien (Wien, Austria)
RMNH	Nationaal Natuurhistorisch Museum Naturalis, formerly Rijksmuseum van Natuurlijke Historie (Leiden, The Netherlands)
ZFMK	Zoologisches Forschungsinstitut und Museum 'Alexander König' (Bonn, Germany)
ZMAN	Zoologisch Museum, University of Amsterdam (Amsterdam, Netherlands)

Methods

The species are compared in table 2. Species distributions were mapped using type localities, examined material and additional sources, as stated in the figure captions (figs. 1-3). The terminology of synthoracic markings in Gomphidae is highly confusing; we follow that of Cammaerts (2004). In this terminology the pale stripe on the mesepisternum nearer the mid-dorsal carina is called the postdorsal stripe ('inner antehumeral stripe'), that nearer the humeral suture is the antehumeral stripe ('outer antehumeral'). Abbreviations. – Fw: forewing(s), Hw: hindwing(s), S1: first abdominal segment, S2-3: second and third abdominal segments etc.

## TAXONOMIC PART

*Phyllogomphus* Selys

*Phyllogomphus* Selys, 1854: 43 (bulletin), 24 (reprint). Type species: *Phyllogomphus aethiops* Selys, 1854 (by monotypy).

*Guineagomphus* Compte Sart, 1963: 60. Type species: *Guineagomphus perisi* Compte Sart, 1963 (by monotypy). (synonymised by Carle 1986: 310).

## Diagnosis

Males are easily identified by their large size (Hw 33–47 mm), massive posterior hamules (figs. 12–15), big foliations on S8 (figs. 27–29), the elongated S10 adorned with a denticulate dorsal crest (figs. 16–19), and the characteristic lyrate shape of the cerci (figs. 20–23). Females may have the features of S8 and S10 less distinct, but are notable for the development of the vulvar scale, which is often drawn out into a long tip and usually covers most of S9 as well as sometimes a substantial part of S10 (figs. 24–26).

## Taxonomy

The two recognised groups (table 1) are used strictly for convenience; there is great morphological diversity within each and they are possibly not monophyletic. *P. occidentalis*, for instance, is very close to *P. selysi* in features of hamules, vulvar scale, S10 and appendages, differing mainly by its smaller size, much more extensive pale markings (including the additional thoracic stripes) and the hardly swollen inner ventral process of the cerci. The two groups are not known to occur together, although small exuviae from Barombi Mbo near Kumba (4°39'05"N 9°24'34"E) in SW Cameroon (in cgvl) could not be matched with the three-striped species occurring in that province (*P. selysi* and *P. coloratus*) and may belong to an undiscovered five-striped species. Like the three-striped group, the five-striped group requires revision: Legrand (2003) diagnosed and illustrated *P. aethiops* and *P. moundi*. Marconi *et al.* (2001) described the five-striped *P. bartolozzii* from a single damaged male from Sierra Leone, but only compared it with three-striped species. It could be conspecific with *P. belenae*, described from a single female from the same country by Lacroix (1921), and both share similarities with *P. moundi*.

## Identification

Identification keys for both sexes are provided below. Males of the three-striped species can be distinguished by the shape of the anterior and posterior hamules, S10 and appendages, as well as some details of markings, especially those of the abdomen. Females are separated by the shape and length of S10 and the vulvar scale, but that of *P. schoutedeni* is unknown.

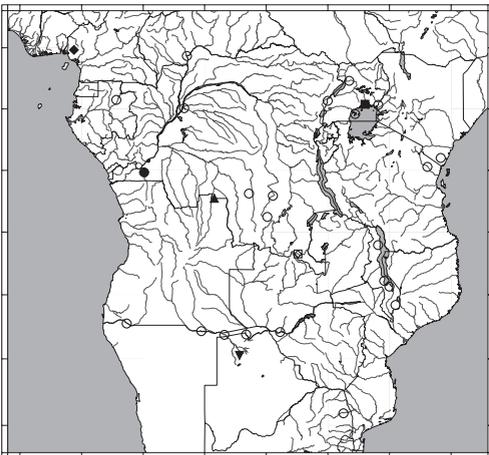
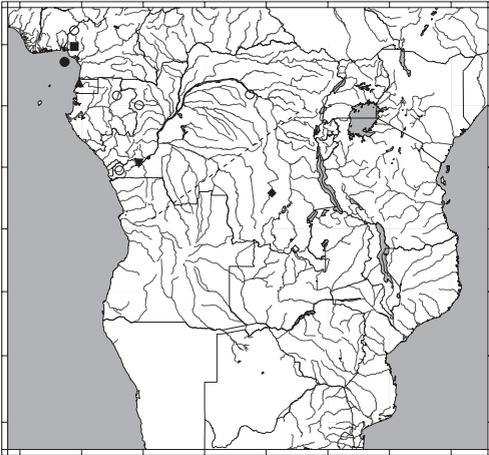
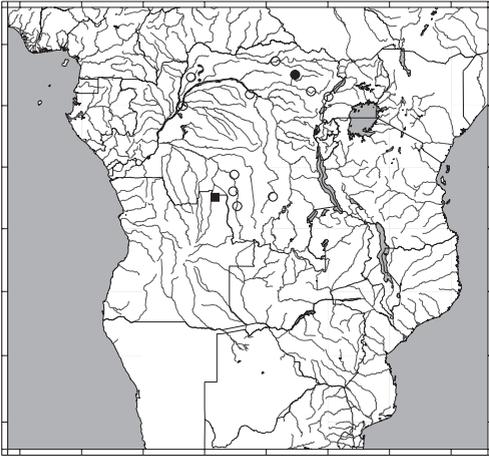
Sexes can be matched by abdominal markings and the relative length of S10, but only partly by locality because most species appear to be widely sympatric. The size and shape of the S8 foliations do not seem of great taxonomic importance in either sex. The shape of the female occiput, taxonomically significant in many gomphid genera, seems unimportant in *Phyllogomphus*.

## Variation

Within each species, there is variation in size and extent of pale markings (most notably on face and thorax), as well as in the shape of the male's anterior and posterior hamules, cerci, denticulation of S10, and the length and shape of the vulvar scale. As phenotypic expression alone accounts for many differences described between taxa, these must often be treated as synonymous. A general discussion of these problems is given below, their consequent synonymy under each species individually. A dimorphism common to all investigated *Phyllogomphus* females is seen in the S8 foliations: these are either completely absent or fully developed as in males (Vick 1999).

Size and coloration varies most in *P. selysi*, which also has the greatest distribution range and number of synonyms. Relatively small (male Hw 37–44 v. 41–45 mm) and pale forms occur further east and south, and these have generally been identified as *P. latifasciae* or *P. brunneus*. The pale markings in such specimens are larger, those on face and thorax being yellow (rather than green), and S9–10 are brighter rufous. Therefore the markings of these specimens appear more contrasting. The colour of the pterostigma (brown to black) and occiput (yellow to black), whether the postdorsal stripes are fused with the collar, as well as the presence and extent of black markings on the labrum and clypeus and of antehumeral and metepisternal spots on the thorax, are particularly variable. It seems to represent individual rather than geographic variation, as specimens from single populations differ, within and across sexes. The presence of two (rather than three) rows of cells at the base of the Fw discoidal field has been mentioned in the literature, but this feature seems to be restricted to small males.

Differences in the shape of the anterior and posterior hamules partly result from their flexibility. The anterior hamules are rather movable three-dimensional structures whose position determines the visibility of their base (e.g. rather exposed in fig. 11) and the width and acuteness of the branches: the relative length of the branches seems to be the most reliable feature for taxonomic purposes. The shape of the vulvar scale is also more plastic than previously realised and logically variation is greatest in the species with the longest scale: two of four taxa described from a female holotype are synonyms of



Figs. 1-3. Distribution of *Phyllogomphus* species. – 1, *P. annulus* (filled circle: type locality; filled square: type locality of *P. dundomajoricus* and *P. dundominusculus*; open circles: other records, including a sight record at Lokutu, Congo-Kinshasa, by K.-D.B. Dijkstra); 2, *P. schoutedeni* (filled diamond: type locality; open diamond: other record) and *P. coloratus* (filled circle: type locality; filled square: type *P. bartwigi* (type locality ‘Cameroons’ of *P. montanus* must also be approximately here); filled standing triangle: type *P. perisi*; filled inverted triangle: type *P. margaritae*; open circles: other records); 3, *P. selysi* (filled circle: type locality; filled square: type *P. orientalis* (type locality ‘Uganda’ of *P. edentatus* must also be approximately here); filled standing triangle: type *P. latifasciae*; filled inverted triangle: type *P. brunneus*; boxed diamond: type *P. symoensi*; filled diamond: type *P. corbetae*; open circles: other records, including additional records from F. Suhling (pers. comm.) for Namibia, Di Domenico et al. (1994) and Pinhey (1966b, 1979, 1984).

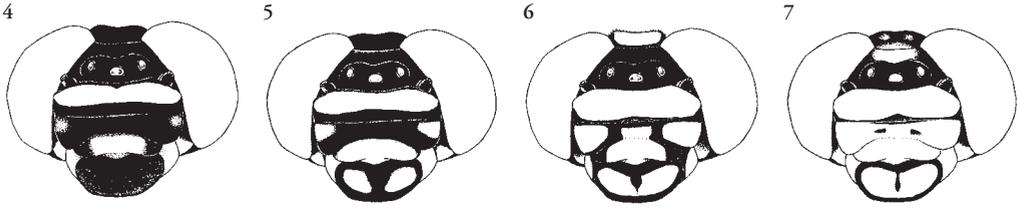
*P. coloratus*. At emergence the structure is white, soft and wrinkled, even when other parts (e.g. tergites) are already hardening. The degree of basal wrinkling and apical flexure that is fixed in the hardened scale determines its reach. Particularly when it is fine and bifid, the tip is vulnerable to distortion or breakage (e.g. in one of five *P. annulus* and the only *P. coloratus* in MRAC) and is often asymmetrical (e.g. the two ends may be crossed). Captured individuals of *Phyllogomphus* often curve their abdomens forwards and may gnaw on its tip. This has been seen to result in the mutilation of appendages, and may also affect the shape of the vulvar scale.

**Ecology**

Although the habitat of *P. schoutedeni* is unknown, all three-striped *Phyllogomphus* species appear to inhabit sandy streams and small rivers in forest (fig. 30). *P. coloratus* has also been found emerging from the Congo (fig. 31), a large river with forested banks, while larvae, exuviae and teneral of *P. selysi* have even been found at large rivers in open land (e.g. Okavango, Zambezi) and large lakes (Victoria, Malawi). Apparently the species occupy a wide range of non-stagnant waters (current, wave motion) with suitable burrowing substrates for the larvae (fig. 32).

**Key to three-striped *Phyllogomphus* males**

1. Posterior hamule slender, its posterior border almost straight (figs. 13, 15). Cerci about 2x as long as epiproct (figs. 17, 19). Apices of cerci slender and pointed (dorsal view, figs. 21, 23). S4-6 with pair of yellow basal spots, separated by black on dorsal carina (figs. 28-29) ..... 2
- Posterior hamule stout, its posterior border semi-circular (figs. 12, 14). Cerci at most 1.5x as long



Figs. 4-7. *Phyllogomphus* head in rostral view. – 4, *P. annulus*; 5, *P. coloratus*; 6, *P. schoutedeni*; 7, *P. selysi*.

- as epiproct (figs. 16, 18). Apices of cerci broad and truncate (figs. 20, 22). S4-6 usually all black (fig. 27) or with yellow basal rings ..... 3
2. S10 flat, profile of dorsal ridge almost straight (fig. 19). Cerci with rounded ventral swelling (lateral view, fig. 19). Inner branch of anterior hamule longer than outer (fig. 11). Postdorsal stripe usually fused to collar. Postclypeus and antefrons at most with dark traces (fig. 7) ..... *selysi*
- S10 humped, basal part of dorsal ridge abruptly arched (fig. 17). Cerci with pointed ventral tooth (fig. 17). Inner branch of anterior hamule shorter than outer (fig. 9). Postdorsal stripe usually severed from collar. Postclypeus and antefrons broadly black (fig. 5) ..... *coloratus*
3. S10 yellow, contrasting with blacker S8-9; denticles of hump directed posteriad; lateral excavations of apical border bare (fig. 18). S4-6 black with yellow basal rings. Cerci pale with black tips, about 1.5x as long as epiproct, with smoothly curved outer border (dorsal view, fig. 22). Face including occiput largely yellow, with contrasting black markings, border of occiput denticulate (fig. 6). Hw 35-38 mm ..... *schoutedeni*
- S10 red-brown, not contrasting with S8-9; denticles of hump directed anteriad; lateral excavations of apical border fringed with hair (fig. 16). S4-6 all black, or at most with pair of small yellow basal spots (fig. 27). Cerci brown, paler on tips, scarcely longer than epiproct, with rectangularly kinked outer border (fig. 20). Face including occiput all dark, with isolated green markings, border of occiput not denticulate (fig. 4). Hw 40-47 mm ..... *annulus*

#### Key to three-striped *Phyllogomphus* females

Note: The female of *P. schoutedeni* is unknown.

1. S10 about as long as S9 (best seen in dorsal or lateral view). Vulvar scale at most with small tip like a pen-nib that scarcely extends onto S10 (fig. 26). Postdorsal stripe usually fused to collar. Postclypeus and antefrons at most with dark traces (fig. 7) ..... *selysi*

- S10 1.5x as long as S9, or longer. Vulvar scale with long, narrow tip (which may have broken off) that extends over at least one quarter of S10 (figs. 24-25). Postdorsal stripe usually severed from collar. Postclypeus and antefrons broadly black (fig. 4-5) ..... 2
2. Vulvar scale abruptly narrowed to slender tip that extends over less than half of S10 (fig. 24). S4-6 all black or with very small yellow basal spots, much less prominent than basal yellow on S3 ..... *annulus*
- Vulvar scale gradually narrowed, usually extends over more than half of S10 (fig. 25). S4-6 with pairs of yellow basal spots, like on S3 ... *coloratus*

#### *Phyllogomphus annulus* Klots (figs. 1, 4, 8, 12, 16, 20, 24, 27)

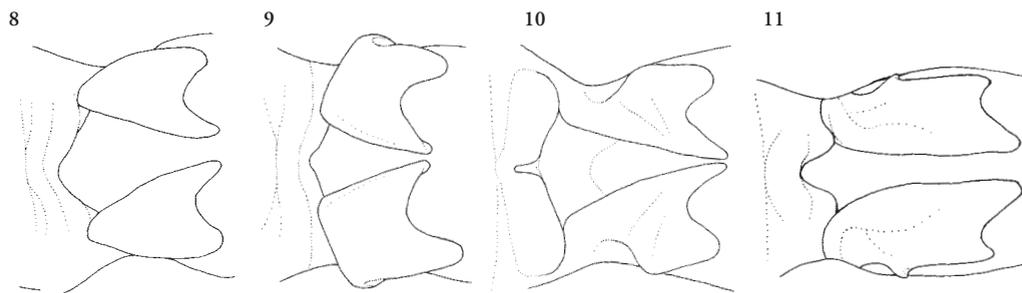
*Phyllogomphus annulus* Klots, 1944: 4. Holotype ♀: CONGO-KINSHASA: Medji (AMNH) [not examined].

*Phyllogomphus selysi* nec Schouteden, 1933 – Fraser 1949: 127.

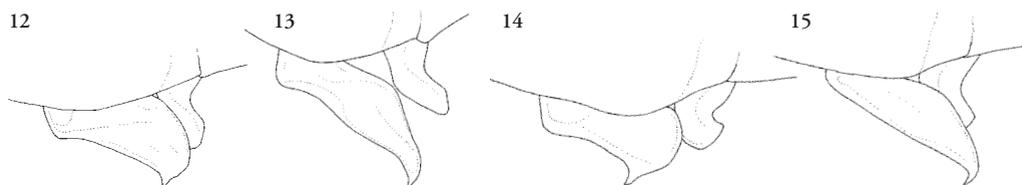
*Phyllogomphus dundomajoricus* Fraser, 1957: 24. Lectotype ♂ (designated by Kimmins 1966: 190): ANGOLA: 'LECTOTYPE', 'N. ANGOLA: Lunda Province. Dundo. Nov. 1948.', 'Brit. Mus. 1957-230.', 'Phyllogomphus dundominusculus ♂. TYPE 1957, det. F.C. Fraser', 'Phyllogomphus selysi Schouteden det. Miss C. Longfield.' (BMNH) [examined] **syn. n.**

*Phyllogomphus dundominusculus* Fraser, 1957: 28. Holotype ♂: ANGOLA: 'Type', 'N. ANGOLA: Lunda Province. Dundo. 11.XII.1947.', 'Brit. Mus. 1957-230.', 'Phyllogomphus dundomajoricus ♂. TYPE 1957, det. F.C. Fraser' (BMNH) [examined] **syn. n.**

Other material. – ANGOLA: 1♂, Lunda district, 1927, P.A. Nannings, with label 'Phyllogomphus nov. spec., cf. aethiops Sel. dl. Lieftrinck. '29' (ZMAN). – CONGO-KINSHASA: 1♂, Ituri Forest (4000 ft), 21.IV.1930, Lord Howard de Walden Expedition (BMNH); 1♂, River Luiza, 16.X.1933, G.F. Overlaet (MRAC); 1♂, Bambesa, 5.V.1934, leg. unknown (NMBZ); 1♂, Kapanga, xii.1934, G.F. Overlaet (MRAC); 3♂, Eala, 1934-35, J. Ghesquière (MRAC); 1♂, Eala (no further details) (BMNH); 19♂, 4♀, Bambesa, 1934-39, J.M. Vrijdagh, H.J. Brédo & P. Henfard (MRAC); 1♀, Luigunda, 5.IV.1935, A. Bal (MRAC); 1♂, Bambesa, 28.V.1937, J. Vrijdagh (BMNH); 1♂, Luluabourg (= Kananga), ii.1946, Ch. Seydel (NMBZ); 1♂, Kabongo, x.1953, Ch. Seydel



Figs. 8-11. *Phyllogomphus* male anterior hamules in ventro-frontal view. – 8, *P. annulus*; 9, *P. coloratus*; 10, *P. schoutedeni*; 11, *P. selysi*.



Figs. 12-15. *Phyllogomphus* male posterior hamules in lateral view. – 12, *P. annulus*; 13, *P. coloratus*; 14, *P. schoutedeni*; 15, *P. selysi*.

(MRAC); 1 ♀, same data, v.1954 (BMNH); 3 ♂, Teturi, ii.1958, E. Pinhey (NMBZ). – UGANDA: 5 ♂, Bundibugyo District, Semliki National Park, Ntandi, Nkisi River, shallow sandy river flanked by bushes in open rainforest (0°48.9'N 30°08.6'E), 700 m, 29.v-7.vi.2003, K.-D.B. Dijkstra (RMNH); 1 ♀, Bundibugyo District, Semliki National Park, Kirumia River (0°49.015'N 30°05.779'E), 746 m, 1.xi.2004, C. Clausnitzer (CVCH).

**Diagnosis**

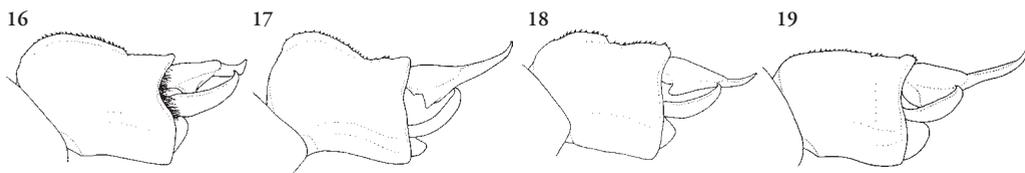
The darkest among the three-striped species: the pale spots on the labrum and S4-6 are small or (more often) absent (figs. 4, 27). The male's humped S10 possesses two unique features: most denticles on the dorsal ridge are directed antieriad and the latero-apical borders each bear a fringe of dark hairs (fig. 16). Details of the male's stout hamules and cerci are also distinctive (figs. 12, 20). Females are recognised by their markings and the length and shape of S10 and the vulvar scale, the latter being intermediate between *P. coloratus* and *P. annulus* (fig. 24).

**Remarks**

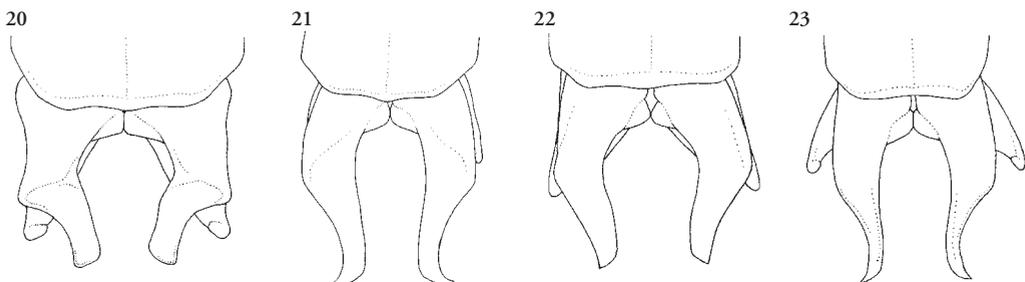
Fraser (1949) gave good illustrations of the male's posterior hamule, appendages (dorsal and lateral) and S10 and the female's S8-10 under the incorrect name *P. selysi*. These accurately show the hair fringes and direction of the denticles on S10, as well as the relative length of the female S10. Fraser (1957) maintained this interpretation of *P. selysi*, and also described two

species from Dundo in extreme NE Angola. The lectotype *P. dundomajoricus* and holotype *P. dundominusculus* share the diagnostic characters of Fraser's '*P. selysi*'. The only apparent difference between the two, as their names suggest, is their size: Hw 45 and 43 mm respectively. This insubstantial difference falls within the 40-47 mm range of males from Congo-Kinshasa and W Uganda (n = 29). The apices of the cerci are somewhat more acute in *P. dundominusculus* than in *P. dundomajoricus*, but this character varies. The Dundo males are slightly paler than Ugandan ones, with lateral green blotches on the labrum and postclypeus, wider thoracic stripes and tiny green antehumeral and metepisternal spots. Specimens from Congo-Kinshasa show both variations. The described characters of S10 and appendages are unique within *Phyllogomphus*, while described differences are minor, and we consider all foregoing males as one species.

The allotype female of *P. dundomajoricus* is in bad condition, but by its markings and vulvar scale it matches our diagnosis of *P. selysi*. It appears not to be conspecific with the *P. dundomajoricus* lectotype and thus with the species discussed here. We believe females illustrated by Fraser (1949; 1957) and associated with his '*P. selysi*' males in MRAC to be the true female of the discussed species. Fraser's females have a long vulvar scale, which reaches down about a third of S10 (fig. 24). That segment is about 1.5x as



Figs. 16-19. *Phyllogomphus* male S10 and appendages in lateral view. – 16, *P. annulus*; 17, *P. coloratus*; 18, *P. schoutedeni*; 19, *P. selysi*.



Figs. 20-23. *Phyllogomphus* male appendages in dorsal view. – 20, *P. annulus*; 21, *P. coloratus*; 22, *P. schoutedeni*; 23, *P. selysi*.

long as S9. The terminal third of the scale is abruptly narrowed, forming a slender gouge or half-tube with a bifid, acute apex. This diagnostic vulvar scale is illustrated by Klots (1944) for *P. annulus* and her description also mentions the characteristic largely dark face and S4-6. The type locality of *P. annulus* must be Medje (SW of Isiro, formerly Paulis), which was on the route of the Lang & Chapin expedition that collected it. This is well inside the range of the dark species discussed here, which is almost confined to the Congo Basin (fig. 1). Fraser (1957) considered *P. annulus* a synonym of *P. selysi*, which under his incorrect interpretation of the latter appears to be justified. With the identity of the male clarified and the correct female associated with it, the name *P. annulus* takes precedence.

#### *Phyllogomphus coloratus* Kimmins

(figs. 2, 5, 9, 13, 17, 21, 25, 28, 31)

*Phyllogomphus aethiops* nec Selys, 1854 – Selys (1878: 439).

*Phyllogomphus coloratus* Kimmins, 1931: 217. Holotype ♂: EQUATORIAL GUINEA (BIOKO): 'Holotype', 'Type ♂ *Phyllogomphus coloratus* Kimmins, det. D.E. Kimmins. 1930.', 'West Africa: Fernando Po. 650ft. End of Wet Season. Rev. W. Cooper', 'Brit. Mus. 1924-496' (BMNH) [examined].

*Phyllogomphus montanus* Fraser, 1957: 14. Lectotype ♀ (designated by Kimmins 1966: 204): CAMEROON: 'Lectotype', '*Phyllogomphus coloratus* Kim. CAMEROONS. 1957 ♀ det. F.C. Fraser', '*Phyllogomphus montanus* [TYPE] Fraser, ♀ 1957 det. F.C. Fraser', '*Phyllogomphus montanus* Fras. ♀ LECTOTYPE, D.E. Kimmins det. 1965',

'F.C. Fraser Bequest. Brit. Mus. 1963-234.' (BMNH) [examined] **syn. n.**

*Phyllogomphus hartwigi* Buchholz, 1958: 259. Holotype ♂: CAMEROON: 'Holotypus *Phyllogomphus hartwigi* Buchholz, det. Dr. K. Buchholz 1958', 'Koto-Barombi-See, Kamerun, 24.1.1958, leg. W. Hartwig' (ZFMK) [examined] **syn. n.**

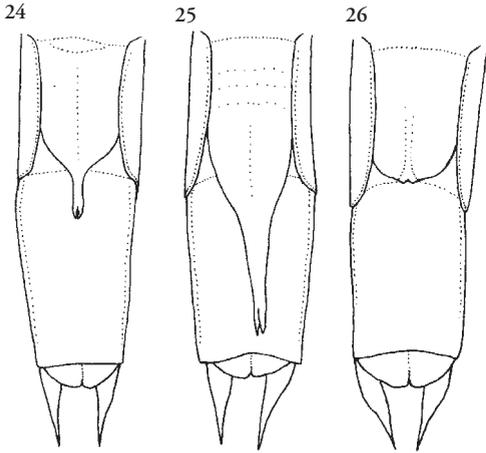
*Phyllogomphus coronatus* St. Quentin, 1958: 43. – Misspelling.

*Guineagomphus perisi* Compte Sart, 1963: 61. Holotype ♂: EQUATORIAL GUINEA (RIO MUNI): 'Bata. Guinea española. 17 julio 1966. F. Martorell leg.', 'Colección A. Compte', '♂, *Guineagomphus perisi* Compte. (Holotipo. Genotipo). A. Compte det. 1963.', '= *Phyllogomphus perisi* (Compte) J. Legrand dét. 1988' (MNMS) [examined] **syn. n.**

*Phyllogomphus margaritae* Compte Sart, 1967: 12. Holotype ♀: CONGO-BRAZZAVILLE: 'Musana. Fr. Congo.', '♀, *Phyllogomphus margaritae* Compte, Holotypus, A. Compte det. 1967' (MNMS) [examined] **syn. n.**

Further type material. – paratype ♀ *coloratus*: EQUATORIAL GUINEA (BIOKO): 'Paratype', 'West Africa: Fernando Po. Rev. W. Cooper', 'Brit. Mus. 1926-6', '♀ *Phyllogomphus coloratus* Kimmins, det. D.E. Kimmins. 1930.' (BMNH). – Paralectotype ♀ *montanus*: CAMEROON: with labels 'Allotype' [intended of *aethiops*], 'Isibu No.' [SW Cameroon], 'McLachlan Coll. B.M. 1938-674', '*Phyllogomphus aethiops*, Selys', '*Phyllogomphus aethiops*, Selys ♀ Isibu.', 'Paratype', '*Phyllogomphus montanus* Fras. ♀ D.E. Kimmins det. 1963 Paratype' (BMNH).

Other material. – CAMEROON (LITTORAL): 1♂, Lala, R. Ndibe (4°46'48"N 9°45'33"E), 400 m, 21.iv.1995,



Figs. 24-26. *Phyllogomphus* female S9-10 with vulvar scale in ventral view. – 24, *P. annulus*; 25, *P. coloratus*; 26, *P. selysi*.

O. Mesumbe (CGVL); 1 ♀, Lala, 27.vi.1995, O. Mesumbe (CGVL). – CAMEROON (sw): 1 ♀, Tombel, Ngusi, R. Tubere (4°51'16"N 9°38'57"E), 300 m, 10.xi.1995, O. Mesumbe (CGVL); 1 ♂, Tombel, Ebonji, Sandwater Falls, 200 m, 10.vii.1996, G.S. Vick (CGVL); 1 ♀, Takamanda, Mfakwe (6°06'N, 9°24'E), 14.xii.1997, 155 m, O. Mesumbe (CGVL); 1 ♀, Bakossi Mountains, Messaka, 9.iii.1998, O. Mesumbe (CGVL); 1 ♀, Ngombo, Mbeng and Mbambe Streams, 800 m, 30.xii.2002 (emerged 3.ii.2003, bred by Cameroon Dragonfly Project) (CGVL). – CONGO-BRAZZAVILLE: 2 ♂, Musana, date unknown, M. Lundgren (NHRS); 1 ♂, 1 ♀, Etoumbi Forest, ii-xii.1962, leg. unknown (NMBZ); 1 ♂, Mambili Forest, iv.1962, leg. unknown (NMBZ). – CONGO-KINSHASA: 1 ♀, Camp de Lukula, 1911, Dr. Daniel (MRAC); 1 ♂, 1 ♀, Territoire de Basoko, 25 km NW of Lokutu, Lingungu Stream, large shallow sandy clear stream (2-4 m) within forest (1°17.6'N 23°25.9'E), 375 m, 4.xi.2004, K.-D.B. Dijkstra (RMNH); 1 ♀ (in alcohol, collected with exuviae, see fig. 31), Territoire de Basoko, Lokutu, Congo River, huge river (> 1 km broad) with mostly forested banks (1°10'N 23°37'E), 370 m, 8.xi.2004, K.-D.B. Dijkstra (RMNH). – GABON: 19 ♂, 8 ♀; Makokou area, J. Legrand (MNHN).

### Diagnosis

Recalls *P. selysi* by markings (fig. 28) and the slender posterior hamule and cerci (figs. 13, 21). It is generally darker and never as small as *P. selysi*, but the largest and darkest *P. selysi* occur in the area where both species occur. Males are best separated by the different anterior hamules (fig. 9), the humped S10 and acute ventral tooth of the cerci (fig. 17). Females have longer S10 and vulvar scale than other three-striped species (fig. 25).

### Remarks

Vick (1999) demonstrated that the male of *P. montanus* was the same as *P. hartwigi* (its holotype

perfectly matches Vick's description and illustrations), but did not mention the similar *P. coloratus* described from just across a narrow strait in Bioko. This was because of the relatively short vulvar scale of the *P. coloratus* female paratype (reaching to only half the length of S10) compared with the *P. montanus* lectotype (nearly to end S10). However, as the latter's labels demonstrate, Fraser initially considered them to be conspecific. The holotype of *P. perisi* is teneral, discoloured and lacks part of the frons and right cercus. This damage lead Compte Sart (1963) to describe *Guineagomphus*, which was said to differ from *Phyllogomphus* by lacking a frontal crest. Although the facial and thoracic markings are indiscernable and the specimen is somewhat distorted and small (Hw 41 mm), the hamules, S10 and appendages are clearly like those of *P. coloratus*. The type locality of *P. margaritae*, described from a female, falls within the range of *P. selysi* and potentially that of *P. annulus*, but the abdominal maculation and vulvar scale almost reaching the end of S10 agree with *P. coloratus*. NHRS possesses two males of that species from the same locality. A female in the McLachlan collection from Cameroon (in BMNH) discussed by Selys-Longchamps (1878), Longfield (1936) and Klots (1944), was made a paratype of *P. montanus* by Fraser (in litt.) and indeed belongs to *P. coloratus*.

Slight differences between specimens assigned to aforementioned taxa are present in the shape of the anterior and posterior hamules, the cerci and the vulvar scale. The posterior hamule can be more or less slender and the angulation of its anterior border varies. Specimens from Cameroon have the most slender and angular hamule. The angle is rounded in the males from Rio Muni and Congo-Kinshasa and intermediate in Gabon. The shape of the tip and ventral teeth of the cerci may differ slightly among males, but the diagnostic strongly up-curved tip, acute large tooth and small (often overlooked) basal tooth are always maintained. Most variation is seen in the length and shape of the vulvar scale. The absolute lengths of both the scale and S10 are flexible, and therefore the scale's relative length varies: S10 can be about 1.5 to 1.7 times as long as S9, the vulvar scale can reach only about half-way along S10, but also almost to its end. As shown in the general discussion, the scale's shape (and thus length) is rather plastic, and observed extremes fall into the variation of a single species.

### *Phyllogomphus schoutedeni* Fraser (figs. 2, 6, 10, 14, 18, 22)

*Phyllogomphus schoutedeni* Fraser, 1957: 29. Holotype ♂: CONGO-KINSHASA: 'HOLOTYPE', 'COLL. MUS. CONGO, Lualaba: Kabongo, X.1953, Ch. Seydel', 'Phyllogomphus schoutedeni ♂ TYPE. 1957 det. F.C. Fraser' (MRAC) [examined].



Figs. 27-29. *Phyllogomphus* males in the hand. – 27, *P. annulus* in Semliki National Park, Uganda; 28, *P. coloratus* near Lokutu, Congo-Kinshasa; 29, *P. selysi* in Semliki National Park, Uganda. Photographs by K.-D.B. Dijkstra.

Further type material. – 3♂ paratypes: 'PARATYPUS', 'COLL. MUS. CONGO, Lualaba: Kabongo, X.1953, Ch. Seydel', 'Phyllogomphus schoutedeni n.sp. ♂ 1957 det. F.C. Fraser' (MRAC); ♂ paratype: 'Paratype', 'COLL. MUS. CONGO Elisabethville III-1953, Ch. Seydel', 'Phyllogomphus schoutedeni n.sp. ♂ 1957, det. F.C. Fraser', 'F.C. Fraser Bequest. Brit. Mus. 1963-234' (BMNH).

Other material. – CONGO-KINSHASA: 1♂, Kabongo, x.1953, Ch. Seydel (NMBZ).

### Diagnosis

Smaller and paler than other species. The stout appendages and posterior hamule, as well as the humped S10, recall *P. annulus* but differ in details (figs. 14, 18, 22). The denticulate border of the male occiput is unique (fig. 6).

### Remarks

The species is only known from the type series, of which both Fraser (1957) and Pinhey (1976) stated that it was from Elisabethville (= Lubumbashi), but the majority is from another site in Katanga; Kabongo (fig. 2). Pinhey (1966a) reported females as *P. schoutedeni* from 'Victoria Falls, near the confluence of the Maramba River with the Zambezi River, January, 1965' but Pinhey (1976) later made these paratypes of *P. brunneus* (see *P. selysi*). The female is unknown; a small female (Hw 38.5 mm, 37-45 in *P. selysi*) in MRAC from Kilwezi in Parc National de l'Upemba (August 1948, G.F. de Witte) is too teneral, discoloured and damaged (vulvar scale lost) to associate with the male; S10 is marginally longer than S9. The site lies halfway between Kabongo and Lubumbashi. A female from Kabongo in NMBZ identified as *P. schoutedeni* by E. Pinhey (Hw 40 mm) pertains to *P. selysi*.

### *Phyllogomphus selysi* Schouteden (figs. 3, 7, 11, 15, 19, 23, 26, 29)

*Phyllogomphus selysi* Schouteden, 1933: 340. Holotype ♂: CONGO-KINSHASA: 'HOLOTYPUS', 'MUSÉE DU CONGO, Bas-Congo: Lemfu, 1929, R.P. Van Eyen', 'Phyllog. mis[?] pos aethiops [possibly Schouteden's handwriting]', 'R. DET. 5299 v' (MRAC) [examined]

*Phyllogomphus aethiops* nec Selys, 1854 – Corbet (1956: 219).

*Phyllogomphus orientalis* Fraser, 1957: 16. Lectotype ♂ (designated by Kimmins 1966: 207): UGANDA: 'LECTOTYPE', 'Phyllogomphus aethiops ♂ Bugalla Is. L. Victoria, Uganda, I.IX.28. G. Hale Carpenter', '♂ Phyllogomphus orientalis Fraser. det. F.C. Fraser', '♂ Phyllogomphus orientalis Fras, LECTOTYPE D.E. Kimmins det. 1965', 'F.C. Fraser Bequest. Brit. Mus. 1963-234' (BMNH) [examined] **syn. n.**

*Phyllogomphus edentatus* St. Quentin, 1958: 42. Holotype: UGANDA (NMW) [not examined] **syn. n.**

*Phyllogomphus latifasciata* Pinhey, 1961b: 83. Holotype: ANGOLA: Dundo (MDLA) [not examined] **syn. n.**

*Phyllogomphus latifasciatus* Compte Sart, 1963: 61. – Misspelling.

*Phyllogomphus symoensi* Liefstinck, 1969: 11. Holotype ♀: CONGO-KINSHASA: 'Holotype', 'C. Africa, Katanga (Congo), Elisabethville, 28.xii.1960, J.J. Symoens, No. 8026', 'Phyllogomphus symoensi Liefert., det. M.A. Liefertinck 1968, HOLOTYPUS' (MRAC) [examined] **syn. n.**

*Phyllogomphus brunneus* Pinhey, 1976: 555. Holotype ♂: BOTSWANA: 'Phyllogomphus brunneus Pinhey ♂ eye olive yellow vent', 'Holotype ♂ Phyllogomphus brunneus spec.nov. Jan. 1976', '4 - Riv. Camp, 19°03'S, 23°10'E, Okavango BOTSWANA, '7-XII-1973 Nat. Mus Bulawayo Pinhey-Fal.Coll.Exp' (NMBZ) [examined] **syn. n.**

*Phyllogomphus montanus* nec Fraser, 1957 – Corbet 1977: 59.

*Phyllogomphus corbetiae* Vick, 1999: 232. Holotype ♂: CAMEROON: 'Cameroon (SW), Etam, first stream W of Mungo River, Tombel to Kumba Road (4°43'48"N 9°33'45"E), 4.4.1997, leg. O. Mesumbe' (CGVL) [examined] **syn. n.**

*Phyllogomphus leopoldi* Fraser [unavailable name]. 'Holotype' ♂: CONGO-KINSHASA: 'Congo belge, Au bord du 'Luxembourg' II-1933 Prince Leopold', 'Type', 'Phyllogomphus leopoldi Fraser ♂ F.C. Fraser det 1933', 'in coll.?', 'Boite no 26', 'R. Cammaerts, rev. '67, Phyllogomphus leopoldi Fras. = syn. nov. de Phyllogomphus selysi Schout.' (ISNB) [examined] **syn. n.**

Further type material. – Paratypes *selysi*: CONGO-KINSHASA: 1♀, 'ALLOTYPE', 'MUSÉE DU CONGO, Bas-Congo: Lemfu, 1929, R.P. Van Eyen', 'R. DET. 5299 w' (MRAC); 1♂ 'PARATYPUS ♂', 'MUSÉE DU CONGO Eala, 6-XI-1931, H.J. Brédo', 'R. DET. 5300 i' (MRAC); 1♂, 'PARATYPUS ♂', 'MUSÉE DU CONGO Lomami: Kambaye, X-1930, P. Quarré', 'R. DET. 5300 i' (MRAC); 1♀ 'PARATYPUS ♀', 'MUSÉE DU CONGO BELGE, Ladima, 20.VIII.1906, Waelbroeck', 'Phyllogomphus selysi Typ.', 'R. DET. 5300 h' (MRAC). – Paratypes *orientalis*: UGANDA: 1♀, 'Allotype', 'Phyllogomphus aethiops ♀ Bugalla Is. L. Victoria, Uganda, 1.IX.28. G. Hale Carpenter', '♀ Phyllogomphus orientalis Fraser. det. F.C. Fraser', 'F.C. Fraser Bequest. Brit. Mus. 1963-234' (BMNH); 1♀: Uganda, Jinja, (M/V Light Trap), 3.viii.1956, P.S. Corbet (BMNH). – Paratypes *brunneus*: ZIMBABWE: 2♀, Katembora, Zambezi, i.1956, E. Pinhey (NMBZ); ZAMBIA: 2♀, Maramba, Zambezi River, 1-3.ii.1965, E. Pinhey (NMBZ); BOTSWANA: 1♀, Kasane, Chobe River, 28.xii.1965, E. Pinhey (NMBZ); 1♂, 1♀, Okavango, 4-River Camp (19°03'S, 23°10'E), 6-7.xii.1973, E. Pinhey (NMBZ). – Paratypes *corbetiae*: CAMEROON (SW): 1♂ Kumba, Lake Kotto, Starker's Crossing, 11.iv.1970, S.A. Corbet (CGVL); 1♀, ('Allotype'): Limbe, Bimbia, Elephant River, 50 m, 4.vii.1996, G.S. Vick (CGVL); 1♂, 1♀, Barombi Mbo, 20.ix.1997, O. Mesumbe (CGVL). – Misidentified paratype ('allotype') *dundomajoricus*: ANGOLA: 1♀, 'Type', 'N. ANGOLA: Lunda Province. Dundo. II.1948.', 'Brit. Mus. 1957-230.', 'Phyllogomphus dundomajoricus ♀. ALLOTYPE 1957, det. F.C. Fraser', 'Phyllogomphus selysi Schouteden det. Miss C. Longfield.' (BMNH).

Other material. – BOTSWANA: 1♂, 2♀, Okavango Delta, Kurumxaraga, Cement Camp, 15.xii.1981, leg. unknown (NMBZ). – CAMEROON (LITTORAL): 1♀, Loum Forest Reserve (4°45'19"N 9°43'01"E), 21.viii.1998, O. Mesumbe (CGVL). – CENTRAL AFRICAN REPUBLIC: 1♂, Bangui, 19.ix.1968, R. Pujol (NMBZ). – CONGO-KINSHASA: 1♀ (identified as *schoutedeni*), Kabongo, xi.1952, Ch. Seydel (NMBZ); 1♀, Kamina, 1952, Thounissen (MRAC);

Table 2: Diagnostic features of species of the three-striped group of *Phyllogomphus*.

Character	Sex	<i>P. colonatus</i>	<i>P. sebyi</i>	<i>P. annulus</i>	<i>P. schoutedeni</i>
Distribution		Bioko to Congo Basin	Cameroon to Kenya and South Africa	Congo Basin	Katanga
Hw length	♂	41-46 mm	37-45 mm	40-47 mm	35-38 mm
Labrum	♂ ♀	dark with 2 pale dots	pale with dark border of variable width	all dark or with 2 pale dots	pale with dark border and centre
Clypeus	♂ ♀	dark with isolated pale markings	pale, may have limited dark markings	dark with isolated pale markings	yellow with limited contrasting black markings
Occiput colour	♂	all dark	all dark to all pale	all dark	pale with dark border
Postdorsal stripe and collar	♂ ♀	usually separate	usually fused	usually separate	separate
Anterior hamules	♂	inner branch shorter and narrower than outer	inner branch longer and wider than outer	inner branch longer and narrower than outer	inner branch longer and narrower than outer
Posterior hamules	♂	slender, posterior border straight	slender, posterior border straight	stout, posterior border semi-circular	stout, posterior border semi-circular
Markings S3	♂ ♀	with pale basal spots	with pale basal ring or spots	with pale basal ring	with pale basal ring
Markings S4-6	♂	with pale basal spots	with pale basal spots	usually all dark	with pale basal rings
Colour S10	♂ ♀	red-brown	red-brown	red-brown	largely yellow
Ridge S10	♂	strong hump	flat	strong hump	weak hump
Direction of denticles S10 ridge	♂	mostly posteriad, basally irregular	all posteriad	basally anteriad	all posteriad
Latero-apical border S10	♂	bare	bare	with hair-fringe	bare
Outer border cerci	♂	smoothly curved	smoothly curved	with rectangular kink	smoothly curved
Apex cerci	♂	slender, strongly curved out and up	slender, weakly curved out and up	very truncate, weakly curved up	fairly truncate, weakly curved up
Outer ventral process cerci	♂	acute tooth, directed anteriad	blunt tooth, directed slightly anteriad	blunt tooth, directed down	blunt tooth, directed anteriad
Inner ventral process cerci (lateral view)	♂	low swelling to small tooth	round swelling, obscures outer process	reduced	reduced
Colour cerci	♂	all brown	pale to brown with darker tips	brown, pale blotch on apical half	pale with black tips
Length cerci	♂	about 2x epipect	about 2x epipect	just over epipect	about 1.5x epipect
Length S10	♀	about 1.5x S9	about 1x S9	about 1.5x S9	unknown
Reach of vulvar scale	♀	at least halfway S10	to apex S9 or base S10	at most halfway S10	unknown



Fig. 30. Nkisi River, Semliki National Park, Uganda: habitat of *Phyllogomphus annulus* and *P. selysi*. Photograph by K.-D.B. Dijkstra.

1 ♀, Kabulamenshi, vii.1958, J.J. Symoens (MRAC). – GABON: 1 ♀, Savane de Mwadi, 17.v.1963, G. Bernard (MNHN); 1 ♀, Ipassa Source, 10.iv.1973, G. Bernard (MNHN); 1 ♂, Ipassa, 13.iv.1973, G. Bernard (MNHN); 1 ♂, Makokou, Mpassa, 8.iv.1978, J. Legrand (MNHN). – KENYA: 2 ♀, Shimba Hills, Marere River, fast sandy river in coastal forest (4°12.08'S 39°24.85'E), 211 m, 5-13.v.2000, V. Clausnitzer (CVCH); 1 ♂, Shimba Hills, Marere Hills, 12.v.2000, V. Clausnitzer (CGVL). – MALAWI: 1 ♀, Monkey Bay, 4.i.1961, D.H. Scales (NMBZ); 1 ♀, Monkey Bay, 30.xii.1962, M. Fraser (NMBZ); 1 ♀, Nkata Bay, Chikale Beach, 27.xi.1970, Ph. Mhlanga (NMBZ); 1 ♀, Lake Malawi, Senga Bay, 15.ii.1980, J.M. Wilson (NMBZ); 1 ♂, Mount Mulanje, 915 m, 22.xi.1992, R.J. Murphy, labelled '*latifasciae* det. A. Barlow' (CGVL). – TANZANIA: 1 ♂, Kilimanjaro District, thorn-bush close to Pangani River (4°37.18'S 38°00.63'E), 561 m, 29.iv.2002, V. Clausnitzer (RMNH); 1 ♀, East Usambara Mts, Msingo River, fast rocky stream in forest, (5°03.56'S 38°42.19'E), 157 m, 3.v.2002, V. Clausnitzer (CVCH); 1 ♂, East Usambara Mts, Msingo River, 3.v.2002, V. Clausnitzer (RMNH). – UGANDA: 1 ♂, Torofo, E. Pinhey (NMKE); 1 ♀, near Murchison Falls, 1980, M. Green (CGVL); 1 ♂, Sese Islands, Bugala Island, 14.iii.1996, V. Clausnitzer (CGVL); 3 ♂, 2 ♀, Bundibugyo District, Semliki National Park, Ntandi,

Nkisi River, shallow sandy river flanked by bushes in open rainforest (0°48.9'N 30°08.6'E), 700 m, 29.v-7.vi.2003, K.-D.B. Dijkstra (RMNH); 1 ♀, Bundibugyo District, Semliki National Park, Kirumia Trail, rainforest stream (0°48-50'N 30°05.3-7'E), 700 m, 3.vi.2003, K.-D.B. Dijkstra (RMNH). – ZIMBABWE: 1 ♂, 1 ♀ (in copula), Katombora Rapids, Zambezi River, 5.xii.1981, leg. unknown (NMBZ).

### Diagnosis

A variable but relatively pale species, e.g. the labrum is often pale with a relatively narrow dark border, antefrons and clypeus can be unmarked (fig. 7). Unlike other species the pale postdorsal stripe is often fused with the collar (fig. 29). The male has slender posterior hamules (fig. 15) and cerci (fig. 23); it is the only three-stripped species with a relatively flat dorsum of S10 and a bulbous ventral swelling at the base of the cerci (fig. 19). The female differs from *P. annulus* and *P. coloratus* by the distinctly shorter S10 and vulvar scale: the former only as long as S9 and the latter without a drawn-out point and only reaching to near the S9-10 border (fig. 26).

### Remarks

Having misinterpreted *P. selysi*, Fraser (1957) described a rather teneral and damaged Ugandan specimen near the true *P. selysi* as *P. orientalis*. Probably unaware of this, St. Quentin (1958) described *P. edentatus*, also from Uganda. Subsequently four species near *P. selysi* were described from widely disparate regions: *P. latifasciae* from NE Angola, *P. symoensi* from S Katanga, *P. brunneus* from N Botswana and *P. corbetiae* from SW Cameroon (fig. 3). These taxa are alike in features of hamules, S10, appendages and vulvar scale. The accumulation of names not only followed Fraser's misinterpretation of *P. selysi*, but also the failure of authors to compare their species with all similar taxa. St. Quentin (1958) and Vick (1999) compared their species with *P. coloratus* (named *P. coronatus* and *P. montanus* respectively) and Liefinck (1969) his female type with *P. schoutedeni*, which is not even known in that sex. Pinhey (1961b) correctly believed his *P. latifasciae* to be nearest *P. orientalis*, but in the description of *P. brunneus* Pinhey (1976) failed to mention either species and only compared *P. brunneus* with *P. schoutedeni*. Indeed the plethora of names and variations has led to much confusion, as illustrated by Pinhey (1961a; 1961b) who reported a *P. latifasciae* male, a *P. orientalis* male and a *P. selysi* female from Dundo. Note that Fraser's allotype of *P. dundomajoricus* from that locality also pertains to *P. selysi* (see under *P. annulus*).

Although *selysi*-like specimens are morphologically almost identical throughout central and eastern Africa, they vary strongly in size and extent of pale markings (see general discussion), although their layout is alike. Some variation also exists in the vulvar



Fig. 31. Emerging female of *Phyllogomphus coloratus* near Lokutu, Congo-Kinshasa. Photograph by K.-D.B. Dijkstra.



Fig. 32. Exuviae of final larval instar of *Phyllogomphus annulus* or *P. sebyi* in Semliki National Park, Uganda. Photograph by K.-D.B. Dijkstra.

scale. Its tip may be rounded with a slight notch, or bear one or two small rounded points. The tip may fall just short of the S9-10 border but also slightly surpass it. As shown in the general discussion, various factors influence the shape and (relative!) length of the scale. Considering the continuous nature of all observed variation, the overlap therein between populations, the huge geographic distances between available specimens (fig. 3) and the great similarity in structural (sexual) characters of named taxa, it is best to consider all as a single species. This species has a broad range, both geographically and ecologically, which may explain its variability. Dijkstra (2005) described an identical scenario in *Phyllomacromia contumax* Selys, 1879 and it probably applies to other widespread tropical African odonates too.

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