

**SUBSPECIFIC DIVISION OF *SYMPETRUM SINAITICUM*
DUMONT, 1977, AND THE IDENTITY OF *S. VULGATUM*
DECOLORATUM (SELYS, 1884)
(ANISOPTERA: LIBELLULIDAE)**

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An analysis of the preserved four syntypes of *S. d. decoloratum* (Sel., 1884) from Tortum/Turkey revealed structural identity with *S. vulgatum* (L., 1758) in two specimens, whilst the other two presumably belong to a hitherto undescribed species. Fixing one *vulgatum*-like female as the lectotype, the name *decoloratum* denotes a *vulgatum* ssp. and is the senior synonym of *S. v. flavum* Bartenef, 1915. — The valid name of the taxon which was erroneously deemed to be *S. decoloratum*, is *S. sinaiticum* Dumont, 1977. Its nominate ssp. is confined to N Africa. *S. s. tarraconensis* ssp.n. is described from the Iberian Peninsula (holotype ♂, allotype ♀: Rio Canaleta nr Bot, Tarragona prov., Catalonia, Spain, 29-IX-1992). The Asiatic populations are split into *S. s. deserti* ssp.n. from Anatolia, Caucasus, Mesopotamia and the Iranian Plateau (holotype ♂, allotype ♀: Yasuj, Abshar, Boyr Ahmadi prov., Iran, 9-VII-1974), and *S. s. arenicolor* ssp.n. from Turkestan (holotype ♂, allotype ♀: Tschardschui, Turkmenistan, about 1925). All types are deposited in RMNH, Leiden.

INTRODUCTION

In the arid regions of the Near and Middle East, a group of *Sympetrum* taxa occurs characterized by its uniformly pale colouration. From E Anatolia, *S. d. decoloratum* (Selys, 1884), *S. meridionale* (Selys, 1841), *S. striolatum pallidum* Selys, 1887, and *S. vulgatum flavum* Bartenef, 1915, were reported to live in coexistence and can be separated by structural differentiation only (SCHMIDT, 1961).

One species of this group, *Sympetrum decoloratum*, covers a range extending from Spain, over N Africa and Near East to Turkestan and Pakistan. It can be regarded as "a little known dragonfly, which has probably not always been correctly differentiated from related congeners" (DUMONT, 1977a). These diffi-

culties are due to some incorrect and misleading descriptions, as will be demonstrated here. In 1992 a new population of *S. decoloratum* was found in Catalonia, NE Spain. Because the Catalan specimens are similar to the N African *S. d. sinaiticum* Dumont, 1977, but not identical, their subspecific identity was tested by comparison with all available types of *decoloratum*. It was recognized that the N African and the Asian populations cannot be considered conspecific. In consequence, the aim of this analysis was: (1) to define the true identity of *decoloratum*; – (2) to determine the valid name of that taxon, which was hitherto mistaken as *decoloratum*; and – (3) to describe the subspecific division in this taxon by means of structural differentiation.

SYMPETRUM VULGATUM DECOLORATUM (SELYS, 1884)

Figures 1-2, 7-8

- Diplax vulgata* (incl. *D. striolata*) race *decolorata* SELYS, 1884: 35.
Sympetrum vulgatum race *decoloratum* – SELYS, 1887a: 444; – 1887b: 10 (pars).
Sympetrum Vulgatum Var. d. *Dipl. V.*, race *decolorata* – KIRBY, 1890: 15.
Sympetrum vulgatum decoloratum – JAKOBSON & BIANCHI, 1904: 739.
Sympetrum decoloratum – RIS, 1911b: 629 (pars); – 1919: 1176 (pars); – MORTON, 1914: 58.
Sympetrum vulgatum flavum BARTENEFF, 1915: 317.

The taxon *decoloratum* was established as a subspecies of *Sympetrum vulgatum*. At that time, Selys had no clear conception of the taxonomic rank of *striolatum*, which he lumped with *vulgatum* (DE SELYS-LONGCHAMPS, 1884). Because he distinctly separated *striolatum* and *decoloratum*, it is beyond doubt that he interpreted the latter as closely related to *vulgatum*. Selys established the new taxon on a series (males and females) collected by M.T. Deyrolle in NE Turkey. The type locality is Tortum (= Nihah, published in the spelling "Tartoum"). When RIS (1911b) made his revision of Libellulinae, he still found four females from the original type series in the Selys Collection, and labelled each as type in 1906. A recent examination by the author clearly demonstrates that the preserved series is of heterogenous character (cf. Tab. I):

- Two females have projecting valvula vulvae, which are not distinguishable from nominotypical *vulgatum* (Figs 1-2, 7-8).
- The other two females are smaller and have an only moderately prominent vulvar scale without any resemblance to *vulgatum*. One of them is well preserved (Figs 3, 9), but the identity of the other is difficult to establish, due to its teneral condition and a deformation of the last abdominal segments, including the vulvar scale. There is no strict evidence that both specimens belong to the same taxon; the length of their appendices superiores is strikingly different.

Selys' original description covers more or less each of the female types from Tortum (notice the big range of measurements given). However, there are good reasons for the decision to apply the name *decoloratum* to the *vulgatum*-like females:

Table I

Characters of the four females in the Selysian type series of *Sympetrum vulgatum decoloratum* from Tortum

Features	Specimen			
	1	2	3	4
abdomen (mm)	23.9	22.8	22.0	19.0
hindwing (mm)	26.3	25.6	25.9	22.3
Ax fore wing	7-7	7-7	7-7	7-7
Px fore wing	6-6	6-6	6-6	5-6
Ax hind wing	5-5	5-5	5-5	5-5
Px hind wing	7-6	6-6	7-8	5-6
anal loop	16-18	16-17	16-17	14-15
tibial black	(+)	+	(+)	-
thoracal black	+	+	+	-
vertex base black	+	+	-	-
projecting vulv.	+	+	-	-
<i>Remark</i>	<i>lectotype</i>	<i>paralectotype</i>	<i>taxon uncertain</i>	<i>sp.n. "Tortum-2"</i>

- Selys emphasized the projection of the valvula vulvae "l'écaille vulvaire est saillante en onglet redressé" [The word 'onglet' most probably indicates the projecting vestigial second and fifth digits in cattle]. The *vulgatum*-like morphology of the two females is best fitted by the description.
- One of the *vulgatum*-unlike females is slightly smaller than the minimum value given by Selys.
- The smallest female also lacks the blackish stripe along the inner faces of the tibiae.

Summarizing these facts, the taxon *decoloratum* can be defined as a pale subspecies of *S. vulgatum*, agreeing with Selys' intention. Consequently, one of the *vulgatum*-like females has been designated as the lectotype.

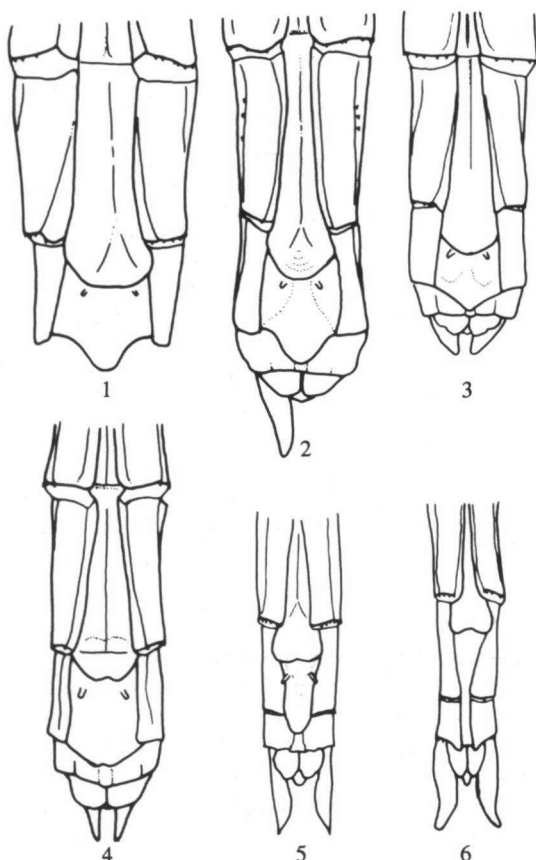
The females unlike *vulgatum* are supposed to belong to a hitherto undescribed species, which is provisionally named *Sympetrum* spec. "Tortum-2". At least the undamaged female is deemed to be identical with a series recently collected by R. Seidenbusch in S Turkey. All specimens are very small (abdomen < 20 mm) and represent a classical pale *Sympetrum* taxon. The females are only comparable with "Tortum-2" in structure. The males have a short inferior appendage similar to *vulgatum*, but strikingly short and stubby accessory genitalia. With regard to a description by Seidenbusch this taxon is not specified in more detail in the present paper.

DE SELYS-LONGCHAMPS (1887a) applied the name *decoloratum* to further *vulgatum* ssp. material from Chinese Central Asia, and provided a clear distinction from the sympatric and also pale coloured *S. striolatum pallidum* Selys, 1887. However, with the work on Asia Minor (DE SELYS-LONGCHAMPS, 1887b) arose some confusion, because not all localities given for *decoloratum* were represented by this taxon. RIS (1911b) rejected the records from northern Persia and Antiochia in Syria (= Antakya/Turkey), because they applied to *S. meridionale*

Selys (cf. MORTON, 1907; SCHMIDT, 1954). This was obviously correct, but an important fact remained undetected: one male mentioned for Malatya/E Turkey did not belong to *decoloratum*, but to a new pale species. This error became the source of further taxonomic and nomenclatural confusions.

The original situation can be well reconstructed, because the Selys Collection, which was the main basis for Ris' revision, is completely preserved in the Brussels Museum. The collection contained 14 specimens under the rubric of "*S. decoloratum*", which was originally labelled as "*Diplax Deyrollei*", but later on changed into "*vulgata* var. *decolorata*". The 14 specimens represent six different taxa:

- (1) *S. vulgatum decoloratum* (Selys) – lectotype ♀ and 1 paralectotype ♀ from Tortum/NE Turkey (see above); 1 ♀ from Amasya/N Turkey, leg. Staudinger; 1 ♀ from Erzurum/E Turkey; 1 ♂ from Tiflis/Georgia; 1 ♂ from Oasis Niya/W China; 1 ♀ from River Naschokhoun, Tsaidam/China, leg. Lacordaire.
- (2) *Sympetrum* sp.n. "Tortum-2" – 2 ♀ from Tortum (see above).
- (3) *S. vulgatum ibericum* Ocharan – 1 ♂, ♀ from Catalonia/NE Spain, leg. Cuni y Martorel (OCHARAN, 1985; JÖDICKE, 1993).
- (4) *S. striolatum pallidum* Selys – 1 ♂ from Oasis Niya/W China, originally labelled as "*Sym-*



Figs 1-6. Tip of female abdomen, ventral view: (1) *Sympetrum vulgatum decoloratum*, lectotype, anal appendages missing; – (2) *S. v. decoloratum*, paralectotype, left appendage missing; – (3) *Sympetrum* sp.n. "Tortum-2"; – (4) *S. sinaiticum tarraconensis* ssp.n., allotype; – (5) *S. s. deserti* ssp.n., allotype, slightly compressed; – (6) *S. s. arenicolor* ssp.n., allotype, sternites of S9-10 missing, compressed.

petrum striolatum Ch. Race ? *pallidum* Selys" by Selys. Ris misidentified this specimen and labelled it in 1906 as "*S. decoloratum*", which was later revised with an additional label "*striolatum!* nec *decoloratum!!* IX.1913".

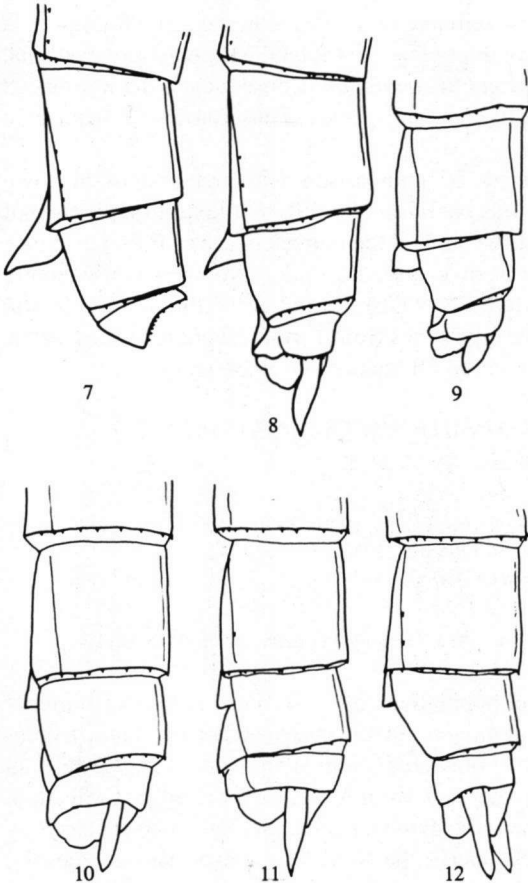
S. striolatum pallidum was established by DE SELYS-LONGCHAMPS (1887a) on the basis of two couples from Niya, collected by Przewalski. RIS (1911b) overlooked this taxon in his *Sympetrum* monograph, but added it

later in his supplementary paper (1919) on the basis of a pair from the Selys Collection, which he considered as types. A reexamination showed that the female belongs to *S. meridionale* (cf. next specimen), so the male represents the only true *pallidum* specimen preserved in the Selys Collection. It is now designated as lectotype.

(5) *S. meridionale* (Selys) – 1 ♀ from Oasis Niya/W China, misidentified by Selys and Ris as *S. striolatum pallidum*.

(6) *Sympetrum* sp.n. "Malatya" – 1 ♂ from Malatya/E-Turkey; labelled by Selys and Ris as "*decoloratum*".

When RIS (1911b) published his concept of *S. decoloratum*, he had meanwhile studied further material from Quetta/Pakistan (MORTON, 1907) and Tripolitania/Libya (RIS, 1911a), which was conspecific with the male from Malatya. In spite of that he did not recognize the separating characters of the heteroge-



Figs 7-12. Tip of female abdomen, lateral view: (7) *Sympetrum vulgatum decoloratum*, lectotype, anal appendages missing; – (8) *S. v. decoloratum*, paralectotype; – (9) *Sympetrum* sp.n. "Tortum-2"; – (10) *S. sinaiticum tarraconensis* ssp.n., allotype; – (11) *S. s. deserti* ssp.n., allotype; – (12) *S. s. arenicolor* ssp.n., allotype, sternites of S9-10 missing, compressed.

nous material. He figured a "true" female *vulgatum* subspecies (1911b: fig. 364; it remains unclear, why he did not choose a typical specimen for the illustration) and the "wrong" male from Malatya (1911b: fig. 363). Both taxa were also intermingled under the name *decoloratum* in a later work (RIS, 1919).

BARTENEFF (1915, 1919) was the first who made a clear distinction between the pale taxa. Following the misleading illustration of the male by Ris, he applied the name *decoloratum* to the wrong taxon. Due to his incorrect citation of Selys' description "l'écaïlle vulvaire est saillante en onglet redressé arrondi comme la striolata" instead of "... non arrondi comme la striolata", Barteneff believed that the types from Tortum would belong to *striolata*. Consequently, he introduced the name *flavum* for the pale *vulgatum* subspecies. Thus Barteneff's name is a junior synonym of *decoloratum*.

Also MORTON (1919) noticed, by comparison with material of his own collection, that Ris' description was based on two different taxa. In ignorance of the true identity of Selysian types he applied the nomenclature of Barteneff. Since that time the name *flavum* has been in use. Its senior synonym consequently denoted the wrong taxon. DUMONT (1977b) did not solve this nomenclatural tangle, although he considered the type series from Tortum a *vulgatum* subspecies. In spite of this discovery he preserved the names sensu Barteneff.

SYMPETRUM S. SINAITICUM DUMONT, 1977

Figures 13, 24, 28, 32

Sympetrum decoloratum - . RIS, 1911a: 614; - 1911b: 629 (pars); - 1919: 1176 (pars); - LE ROI, 1915: 614; - FRASER, 1936: 381 (pars).

Sympetrum decoloratum sinaiticum DUMONT, 1977a: 83; - 1978: 102; - 1991: 211.

Material. - Holotype ♂ from Tozeur, H.J. Dumont leg., deposited in IRSN Brussels.

DISCUSSION. - The N African populations of *S. decoloratum* sensu Barteneff were established as subspecies *sinaiticum*. As it is shown above, the name *decoloratum* denotes another taxon. Thus only *sinaiticum* is an available name for that species, which is represented by the male from Malatya in the Selys Collection. As far as this species is concerned, the name *decoloratum* has to be replaced by the valid name *sinaiticum*. Consequently, the N African subspecies becomes the nominotypical subspecies.

The range of *S. s. sinaiticum* extends from the Algerian Sahara, through S Tunisia, Libya, and Egypt, to Sinai. It is characterized by its colour and geographical distribution pattern (DUMONT, 1977a) and said to be bigger than the Asiatic substitutes (DUMONT, 1991). Additional descriptions were provided by RIS (1911a), LE ROI (1915), and DUMONT (1978). The former two authors emphasized the shape of the outer branches of hamuli: they are distinctly tapering at

the tip. This is also the case in the holotype (Fig. 32), but the reliability of this character should be confirmed in future, when used to differentiate against the specimens from Asia Minor.

SYMPETRUM SINAITICUM TARRACONENSIS SSP. N.

Figures 4, 10, 14-15, 18-19, 25, 29, 33

Sympetrum decoloratum sinaiticum – DUMONT, 1977a: 85 (pars); – FERRERAS-ROMERO, 1989a: 44; – 1989b: 68; – DUMONT, 1991: 211 (pars).

Sympetrum decoloratum – BONET BETORET, 1992: 2.

Material. – **Holotype** ♂: Rio Canaleta nr Bot, Tarragona prov., S Catalonia, NE Spain, alt. 210 m, 29-IX-1992. – **Allotype** ♀: in tandem with holotype. Both deposited in RMNH Leiden. – **Paratypes**: 30 ♂, 5 ♀, Cambrils, mouth of Rio Siurana in Rio Ebro, reservoirs Embalse de Riudecanyes and Embalse de Siurana, all in Tarragona prov., IX/X-1992; deposited in IRSN Brussels (2,1), RMNH Leiden (10,2), coll. R. Seidenbusch (1,2), coll. A. Wendler (2,0), all others in Author's coll. – **Other material.** – 2 ♂, tributary of Rio Guadalhorce nr El Romeral W Malaga, Andalucia, S Spain, 19-X-1991, A. Martens leg., now coll. A. Wendler [colour slides of adult males by A. Martens]; – 2 ♂, lake Anna, S Valencia prov., 1992, C. Bonet leg., now coll. R. Seidenbusch.

Etymology. – An adjective from the Latin "tarraco" (Tarragona).

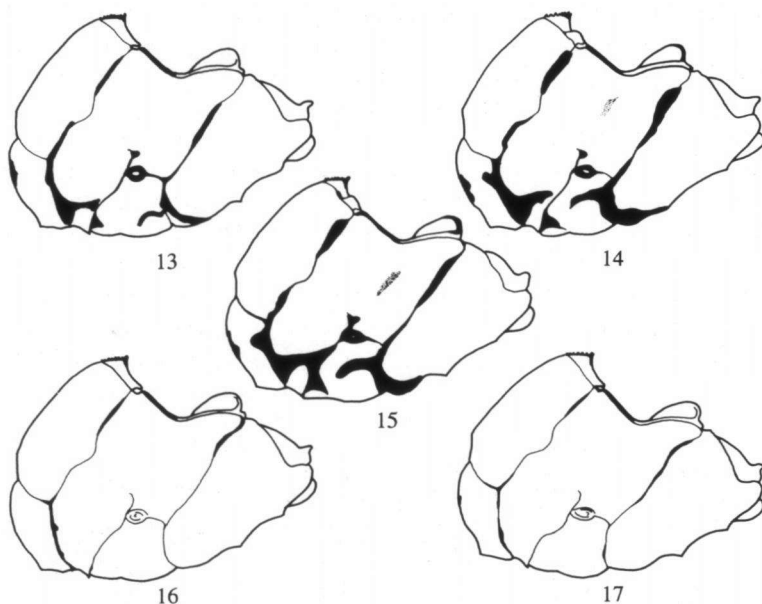
MALE. – **Head.** – In life eyes purple brown in upper part, bluish grey in lower part (blue trace not as intensive as in *S. fonscolombii*), vertex, frons, and clypeus salmon pink, labrum and labium pale cream coloured, some black on top of frons, continuing down eye margin very narrowly.

Thorax. – Olive brown with purple tinge in old specimens, mesepisternum dark brown with short pale antehumeral stripes, black markings as Figure 14.

Wings. – Hyaline with reddish venation in costal field, membranule whitish, pt orange-red, very little basal amber. Venation rather wide-meshed, cells between IR₃ and Rspl never divided. Fore wings with 7 (n=62) or 8 (n=1) antenodals (Ax), 5 (n=4), 6 (n=48) or 7 (n=8) postnodals (Px; 2 are damaged); hind wings with 5 Ax, 6 (n=32), 7 (n=29), or 8 (n=1) Px, anal loop with 15 (n=5), 16 (n=11), 17 (n=28), 18 (n=15), or 19 (n=3) cells.

Legs. – Femora and tibiae yellow with black stripe on internal face, often (nearly 50%) brown or blackish also on external face, tarsi black with external brown patch on S2.

Abdomen. – S3+4 slightly compressed in dorsal view. Dorsally and laterally red. In younger specimens one yellow bilateral spot towards caudal edge on S3-8 and lateral yellow on S1-3 (all red in old specimens). Black markings as in Figure 18, with some variation within the series; ventral black with whitish pruinescence. – Appendages: sup. reddish, inf. yellow, sometimes reddish, with black tip extending in almost all specimens to middle between ventral angle and apex of sup. (Fig. 25). – Accessory genitalia: medium to dark brown, structure as in Figures 29, 33.



Figs 13-17. Black markings on synthorax, lateral view: (13) *Sympetrum s. sinaiticum*, holotype ♂; – (14) *S. s. tarraconensis* ssp.n., holotype ♂; – (15) *S. s. tarraconensis* ssp.n., allotype ♀; – (16) *S. s. deserti* ssp.n., holotype ♂; – (17) *S. s. arenicolor* ssp.n., holotype ♂.

Measurements (mm). – Abdomen 21.5-25.5, mean 23.8, standard deviation 0.9, n=31; hind wing 25.5-29.0, mean 27.1, standard deviation 1.0, n=31.

FEMALE. – As the male, except following positions: **H e a d:** eyes alive brown and slightly purple tinged in upper part, greyish in lower part, face pale creme. – **T h o r a x:** black markings as in Figure 15. – **Wings:** venation yellow in a small costal field, pt ochreous yellow. Fore wings with 7 Ax, 6 (n=10) or 7 (n=2) Px; hind wings with 5 Ax, 6 (n=6) or 7 (n=6) Px, anal loop with 16 (n=2), 17 (n=3), 18 (n=7) cells. – **A b d o m e n:** in old specimens extension of orange red on dorsal parts of S2-8, completely on S9-10, some lateral red underlining yellow parts on S2-3, ventral red on S7-10 (all red light brown in younger specimens). Lateral yellow S1-8. Black markings as in Figure 19, ventral black (S3-6) with whitish pruinescence. – **Appendages:** sup. reddish, short (Figs 4, 10). – **Vulvar scale:** tapering to slightly bilobed apex (ventral view, Fig. 4), not or only slightly projecting (lateral view, Fig. 10).

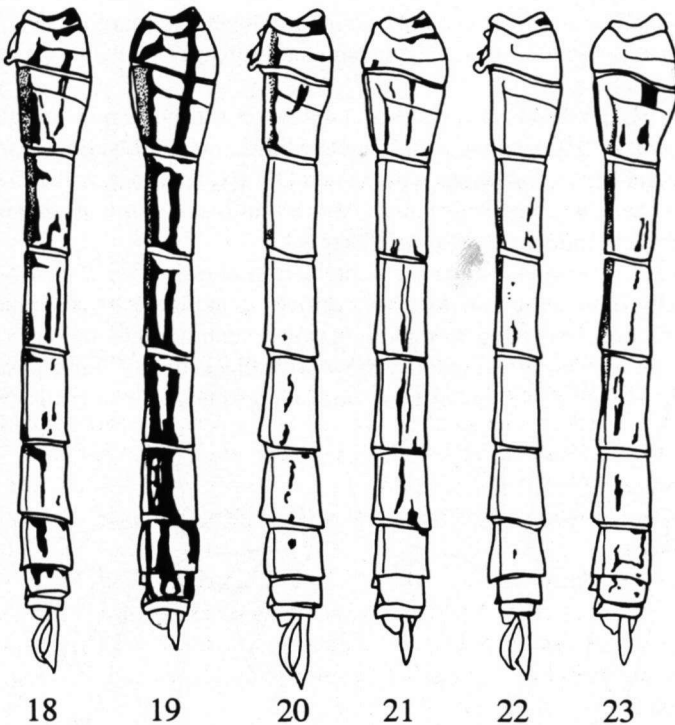
Measurements (mm). – Abdomen 22.0-25.0, mean 23.4, standard deviation 1.1 (n=5), another female with stubby abdomen of 17.0 length, probably due to an emergence fault; hind wing 26.0-28.0, mean 26.7, standard deviation 0.8 (n=6).

DISCUSSION. – The overall impression of the Spanish individuals is unlike a pale *Sympetrum*. The black markings in both sexes are more conspicuous than

in the "darkest" *sinaiticum* from the Ahaggar Mountains (DUMONT, 1978). The red colour of the abdomen in males is not as intensive as in *S. fonscolombii*, but more than in *S. striolatum*. Even in females, when completely mature, the abdomen shows a vivid orange-red colour in dorsal parts.

In structural respect the females do not obviously differ from the N African specimens, but the accessory genitalia in males have a distinct character. The inner branches of the hamules are less erect, and their tips are particularly bent towards the body. Thus they are invisible between the outer branches in lateral view. This trait is very homogeneous in the material studied. In only three out of 35 males (incl. the material from S Spain) a slight projection was to be seen.

Summarizing these characters, *tarraconensis* can clearly be differentiated against the nominotypical subspecies, and seems to be confined to the Mediterranean Spain.



Figs 18-23. Black markings on abdomen, lateral view: (18) *Sympetrum sinaiticum tarraconensis* ssp.n., holotype ♂; - (19) *S. s. tarraconensis* ssp. n., allotype ♀; - (20) *S. s. deserti* ssp.n., holotype ♂; - (21) *S. s. deserti* ssp.n., allotype ♀; - (22) *S. s. arenicolor* ssp.n., holotype ♂; - (23) *S. s. arenicolor* ssp.n., allotype ♀.

SYMPETRUM SINAITICUM DESERTI Ssp. N.

Figures 5, 11, 16, 20-21, 26, 30, 34

Sympetrum decolorata — MORTON, 1907: 303.*Sympetrum decoloratum* — RIS, 1911b: 629 (pars); — 1919: 1176 (pars); — BARTE-NEF, 1919: 401 (pars); — MORTON, 1919: 190.*Sympetrum decoloratum decoloratum* — DUMONT, 1977a: 83; — 1977b: 162.

Material. — **Holotype** ♂, **allotype** ♀: Yasuj, Abshar, Boyr Ahmadi prov., Iran, alt. 2750 m, 9-VII-1974, W.L. Blom, leg., coll. RMNH Leiden [det. as *Sympetrum decoloratum* by M.A. Liefstinck and J. van Tol]. — **Paratype** ♂: Malatya, E Turkey, coll. Selys [det. as *Diplax vulgata decolorata* by Selys and *Sympetrum decoloratum* by Ris]. — **Other material:** 1 ♀, Transcasp, Bala-Tschem/N Iran, in NHMV Vienna.

Etymology. — A noun in genitive from the Latin "desertum".

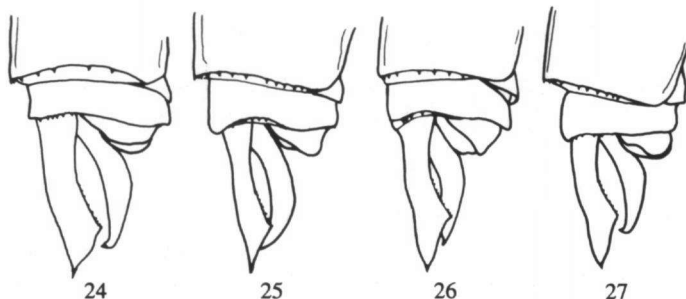
MALE (holotype). — **Head.** — Face yellowish white, partly with rose tinge, marginal black on top of frons, not continuing down eye margin.

Thorax. — Yellowish, some antehumeral brown; black markings as Figure 16.

Wings. — Clear, blackish veins except reddish costa and somewhat paler veins in costal field, no basal amber, membranule whitish, pt. ochre-yellow. Fore wings with 7 Ax and 7 Px; hind wings with 5 Ax and 7 Px, anal loop with 16/17 cells.

Legs. — Yellow, tibiae and femora with a thin black stripe on internal face, tibial spines and internal face of tarsi black.

Abdomen. — S3+4 slightly compressed in dorsal view. Dorsally orange-red, laterally yellow. Dark marking very diffuse, as in Figure 20. — **Appendages:** orange; inf. long, extending to middle between ventral angle and apex of sup. (Fig. 26). — **Accessory genitalia:** yellow with black tips of ham. post., lobes very short, (Figs 30, 34), tips of ham. post. more rounded in ventral view (Fig. 34).



Figs 24-27. Male anal appendages, lateral view: (24) *Sympetrum s. sinaiticum*, holotype; — (25) *S. s. tarraconensis* ssp.n., holotype; — (26) *S. s. deserti* ssp.n., holotype; — (27) *S. s. arenicolor* ssp.n., holotype.

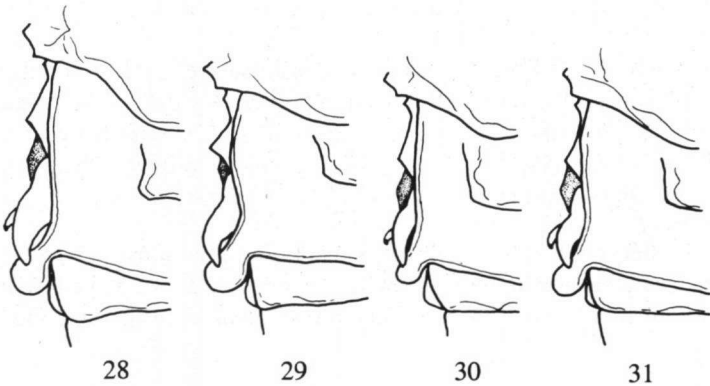
Measurements (mm). — Abdomen 22.0, hind wing 26.4.

FEMALE (allotype) — As the male, except: Head: face creamish white, without black on top of frons. Wings: paler veins in costal field, costa yellow, pt whitish yellow, fore wings with 7 antenodals and 6 postnodals; hind wings with 5 antenodals and 7 postnodals, anal loop with 16/17 cells. — Abdomen: sandy brown, dark markings as in Figure 21. — Appendages: sup. yellow, rather long (Figs 5, 11). — Vulvar scale: not projecting, slightly bilobed (Figs 5, 11).

Measurements (mm). — Abdomen 23.1, hind wing 26.3.

DISCUSSION. — This SW Asiatic taxon is known as *S. decoloratum* or its nominotypical subspecies. As it is demonstrated that this name denotes another taxon, *S. s. deserti* has to be erected as a new taxon.

It differs from the nominotypical subspecies in its pale colouration. Only the males show structural differences: the tips of the hamuli posteriores are more flattened and less tapering, and the genital lobes are very small. Additional descriptions, especially of the colour in live animals, are given by RIS (1911b: the Malatya ♂), MORTON (1919, 1920), and ASAHINA (1973).



Figs 28-31. Male accessory genitalia, lateral view: (28) *Sympetrum s. sinaiticum*, holotype; — (29) *S. s. tarraconensis* ssp.n., holotype; — (30) *S. s. deserti* ssp.n., holotype; — (31) *S. s. arenicolor* ssp.n., holotype.

This subspecies includes the material reported from E Anatolia, Caucasus, Mesopotamia, and the Iranian Plateau. The series from Quetta/Pakistan (MORTON, 1907; RIS, 1911b; FRASER, 1919, 1936) might also be included, but their identity should be confirmed in future. However, the description by FRASER (1919) does not fit the characters of a *sinaiticum* taxon (e.g. the different structure of the vulvar scale!).

SYMPETRUM SINAITICUM ARENICOLOR SSP. N.

Figures 6, 12, 17, 22-23, 27, 31, 35

Sympetrum decoloratum. — Bartenef, 1919: 401 (pars).

Material. — **Holotype** ♂, **allotype** ♀: Tschardschui (= Chardzhou/Turkmenistan), E. von Rennenkampf leg., in RMNH Leiden [det. as *Sympetrum decoloratum* by M.A. Lieftinck, 1925].

Etymology. — An adjective named from its sandy colouration.

MALE (holotype). — **Head.** — Vertex, frons, and postclypeus pale brownish, anteclypeus and labrum yellowish, no black on top of frons.

Thorax. — Self-coloured sandy brown with some yellow on basal parts; black markings as in Figure 17.

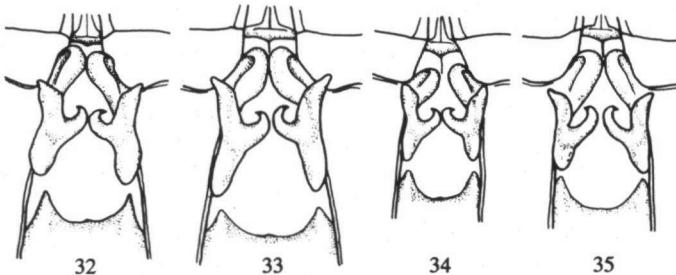
Wings. — With a slight milky tinge, reddish veins in costal field, no basal amber, membranule whitish, pt rose-orange. Fore wings with 7 Ax and 7 Px; hind wings with 5 Ax and 7/8 Px, anal loop with 17 cells.

Legs. — Yellow, tibiae and femur 1 with a thin black stripe on internal face, femora 2 and 3 with a trace of distal black; tibial spines and internal face of tarsi black.

Abdomen. — S3+4 slightly compressed in dorsal view; selfcoloured orange, only some lateral yellow on S2, 3+9. Dark marking very diffuse, see Figure 22. — **Appendages:** inf. rather short, merely extending to first third between ventral angle and apex of sup. (Fig. 27). — **Accessory genitalia:** yellow with black apices of ham. post., lobes and hamuli anteriores as in Figures 31, 35.

Measurements (mm). — Abdomen 23.6, hind wing 27.6.

FEMALE (allotype). — As the male, except: **Head:** frons and postclypeus whitish, anteclypeus and labrum yellowish cream. — **Thorax:** yellowish, diffuse brown antehumerals. — **Wings:** clear, brown veins in costal field, pt whitish



Figs 32-35. Male accessory genitalia, ventral view: (32) *Sympetrum s. sinaiticum*, holotype; — (33) *S. s. tarraconensis* ssp.n., holotype; — (34) *S. s. deserti* ssp.n., holotype; — (35) *S. s. arenicolor* ssp.n., holotype.

yellow, only a trace of basal amber. Fore wings with 7/8 Ax and 6 Px; hind wings with 5 Ax and 7 Px, anal loop with 16/17 cells. — Legs: all femora with thin blackish stripe on internal face. — A b d o m e n: sandy brown, dark markings as in Figure 23; sternites S9 and 10 missing. — Appendages: see Figures 6, 12. — Vulvar scale: not projecting, slightly bilobed (Figs 6, 12).

M e a s u r e m e n t s (mm). — Abdomen 23.3, hind wing 26.6.

DISCUSSION. — This taxon resembles *deserti* in its overall impression, which is dominated by a pale colouration. It is established as a distinct subspecies in consequence of the genital structure in males; the lobes are much bigger than in *deserti*, and the outer branches of the hamuli are slimmer and elongated. These characters are also shown by BARTENEV (1919: fig. 132). He illustrated a male from Buchara/Uzbekistan, which is not far away from the type locality. Due to the poor material available from this region, it can only be supposed that *arenicolor* marks the northwesternmost occurrence in Asia. Its range can provisionally be defined as the Turanian Plain (Amu-Darja region/W Turkestan). It would be interesting to examine the subspecific identity of the material from SW-Tadjikistan (KHARITONOV & BORISOV, 1991).

CONCLUSIONS

S. sinaiticum can be best characterized by structural traits. In males, the inferior appendage is long and clearly exceeds the ventral angle of the superior appendage. The hamules are slim, the posterior process is about twice bigger than the anterior one and overlaps the lobe with its more or less tapering tip in lateral view. The anterior branches are curved and pointed, and in lateral view, not or only moderately erected. In females, the vulvar scale is small and laterally not projecting. In ventral view, the apex of its posterior margin is tapering or slightly bilobed. Intensive colouration is confined to the European and some North African populations. In Asia, the species is represented by populations with dilute colour and markings. Generally, *S. sinaiticum* should be separated from related and coexisting *Sympetrum* taxa by structural traits only.

Females of *S. vulgatum decoloratum*, *S. v. ibericum*, and *S. striolatum pallidum* are easily distinguishable from *S. sinaiticum* by their prominent vulvar scales. In *S. meridionale*, the lateral shape of the vulvar scale is similar to that of *S. sinaiticum*. In contrast to the latter, the ventralmost rim of the plate does not mark the edge of the genital aperture, but has a reflexed elongation, which covers the hole.

Males of *S. striolatum pallidum* and *S. meridionale* differ from *S. sinaiticum* in their strong and erected inner branches of the hamules. The pale subspecies of *S. vulgatum* have a short inferior appendage, which just reaches the ventral angle of the superior ones. Their outer branches of the hamules are shorter and less pointed than in *S. sinaiticum*, and their inner branches are as big as the outer

ones.

The main characters of the pale taxon from S Turkey, which is preliminary treated as "Tortum-2" in the present paper, are mentioned above. It will be from interest to have a more detailed description, which is to be published by R. Seidenbusch.

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