Boll. Mus. reg. Sci. nat. Torino	Vol. 18 - N. 1	pp. 115-126	31-07-2001

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The species of the genus *Chrysotoxum* Meigen, 1822 (Diptera, Syrphidae) described by Giglio Tos

ABSTRACT

The Giglio Tos' collection of *Chrysotoxum* has been revised. *C. sackeni* is proposed as junior synonymy of *C. octomaculatum*. *C. lessonae* is maintained as good species and new characters to separate this species from *C. intermedium* are described in the paper.

KEY WORDS: Diptera Syrphidae, *Chrysotoxum*, Giglio Tos.

INTRODUCTION

The species of the genus *Chrysotoxum* Meigen, 1822 are Syrphidae miming wasps; their medium size and nice pattern of yellow and black designes greatly attract entomologists, both today and in the past. Many authors described a lot of species and the taxonomy of the genus is therefore very difficult for the great number of synonymies.

The genus shows a strong variability in several features such as abdomen and thorax designes, length of antennae, etc., but only a limited differentiation in the male genitalia. Except for few cases, e.g. *Chrysotoxum cautum* (Harris, 1776), *C. lydiae* Violovitsh, 1973, *C. cisalpinum* Rondani, 1845, *C. parmense* Rondani, 1845, most *Chrysotoxum* species show closely similar male genitalia.

I had the opportunity to study the collection in the Natural Museum of Turin and, in particular, the specimens which were the subject of the work published in 1890 by Giglio Tos. This author described 5 species and 6 varieties as new to science. Only two of the five species are still accepted as good taxa: *C. lessonae* and *C. sackeni* (Peck, 1988). The use of variety has been eliminated by the International Code of Zoological Nomenclature, only allowing the use of subspecies as category below the species level. However, I agree with many students who suggest to avoid the use of subspecies (e.g. La Greca, 1987; Minelli, 1992).

Some comments about the specimens examined are given. After the currently accepted name of the species, the names given by Giglio Tos as well as the number of males and females are reported. In the case of new taxa described by Giglio Tos the lectotype designation is given in order to fix its current taxonomic concept.

For the identification of the species I used prevalently the keys in Violovitsh (1974), Sack (1932) and Séguy (1961).

C. arcuatum (Linnaeus, 1758)

C. festivum (Auct. nec Linnaeus, 1758): 4 males, 5 females, synonymy by Thompson et al. (1982).

C. tomentosum Giglio Tos, 1890, as var. of *C. festivum:* 3 males, 2 females, **new synonymy**. I designated the male labelled as "*C. festivum* var. *tomentosa* Giglio Tos" and "20.60" as lectotype.

C. fuscum Giglio Tos, 1890: 2 males, misidentification of *C. arcuatum.*

C. vernale Loew, 1841: 1 male, misidentification of *C. arcuatum.*

Great confusion prevailed about the correct name of this species. Recently, Thompson et al. (1982) checked the Syrphidae types in the Linnean collection. They observed that the name "festivum" has to be referred to *Xanthogramma* and not *Chrysotoxum. C. festivum* of modern authors is actually *C. arcuatum* (Linnaeus, 1758), while *C. arcuatum* (Auct. nec Linnaeus, 1758) is to be referred to *C. fasciatum* (Müller, 1764). However there is still a debate about this change and some authors prefer to retain "festivum" for *Chrysotoxum* and *C. arcuatum* instead of *C. fasciatum.* (e.g. Verlinden, 1991; Dirickx, 1994). Giglio Tos (1890) followed Loew (1856) who, after changing his previous idea (Loew, 1841), referred "festivum" to *Chrysotoxum.*

In addition Giglio Tos (1890) described a new variety: *C. festivum* var. tomentosa. According to Giglio Tos (1890, p. 159) the main features to distinguish this variety are: shorter hairs on eye, thorax and scutellum; the subequal segments of antennae and the lower dimension. I studied the 3 males and 2 females labelled "C. festivum var. tomentosa". I found no difference regarding the length of the hairs and the dimension. In these species the antennal ratio is: 1 : 1 : 1 – 1.75. From data on a series of specimens belonging to *C. arcuatum* I found an antennal ratio of: 1 – 1,5 : 1 : 1.25 – 1.75. In my opinion there is no suggestion to separate *C. tomentosum* from *C. arcuatum.* I suggest *C. tomentosum* as synonym of *C. arcuatum.*

C. bicinctum (Linnaeus, 1758)

C. bicinctum (Linnaeus, 1758): 9 males, 17 females.

C. cautum (Harris, 1776)

C. arcuatum (Panzer, 1793): 2 females, synonymy by Bezzi & Stein (1907).

C. sylvarum Wiedemann in Meigen, 1822: 2 males, 5 females, synonymy by Bezzi & Stein (1907).

C. lubricum Giglio Tos, 1890: synonymy by Bezzi & Stein (1907).

Shortly after the publication of his paper, Giglio Tos realized that his *C. lubricum* was a synonym of *C. sylvarum* actually considered as *C. cautum*. Immediately Giglio Tos (1891) published a note with the correction about *C. lubricum*. Probably he also changed the labels from the specimens, and in fact I found no specimen labelled as *C. lubricum*.

I found 2 females labelled "*C. arcuatum*, Panzer", which instead was *C. cautum*. The description of *C. arcuatum* given by Giglio Tos (1890: 149-150) converge with that of *C. cautum*, in particular for the ratio of the antennal articles, the reduced black stripe of the face, the design of the abdomen.

C. cisalpinum Rondani, 1845

C. cisalpinum Rondani, 1845: 2 males, 1 female.

C. elegans Loew, 1841

C. elegans Loew, 1841: 1 male, 1 female.

C. bigoti Giglio Tos, 1890: 2 males, 4 females, synonymy by Becker (1921). I designated the male labelled "*C. bigoti* Giglio Tos" and "23.69" as lectotype.

C. chrysopolita Rondani, 1845: 1 female, misidentification of *C. elegans*.

C. fuscum Giglio Tos, 1890: 1 male, misidentification of *C. elegans*.

Giglio Tos (1890) recognized three species as separated taxa even if quite similar in their morphology: *C. elegans, C. chrysopolita* and the new species *C. bigoti*. The differences between these species regard:

- ratio in antennal segments,
- development of posterior yellow bands on abdominal tergites,
- design of abdominal sternites,
- colour of femora,
- colour of 6th and 7th sternites in male.

These differences are very small in *C. bigoti*. Accordingly to Giglio

Tos (1890) the ratio in antennal segments is as follows: 1:1:1.25 in *C. elegans*; 1.25:1:1.5 in *C. bigoti*: such a small difference can be easily find also in specimens of *C. elegans* s.s. The differences as to the abdomen design are very small as well. The colour of the fore and middle femora is usually variable, even if this is one of the main differences between *C. arcuatum* and *C. vernale*. In Giglio Tos' collection I found that in males of *C. bigoti* the 6th and 7th sternites are yellow as described by the author (Giglio Tos, 1890, p. 153), although in some males of *C. bigoti* the colour of the abdomen was not clear. In *C. elegans* the male genitalia are black. I consider this difference as not sufficient to separate *C. bigoti* as a good species. The genitalia of *C. bigoti* also show no difference with those of *C. elegans*. For these reasons I agree with the synonymy of *C. bigoti* with *C. elegans*, a synonymy widely accepted in the past (e.g. Sack, 1932; Peck, 1988).

Regarding *C. chrysopolita*, the description of the abdomen design (as illustrated in the table given by Giglio Tos (1890) as well as the original description of Rondani (1845)), involves that *C. chrysopolita* is conspecific with *C. octomaculatum*. As a matter of fact various authors consider *C. chrysopolita* as a junior synonym of *C. octomaculatum* (e.g. Loew, 1856; Bezzi & Stein, 1907; Sack, 1932; Peck, 1988). I found three specimens labelled by Giglio Tos as *C. chrysopolita*. Two males collected in St. Redegund were *C. octomaculatum*, while one female, with no locality indication, was instead *C. elegans*.

C. fasciatum (Müller, 1764)

C. hortense Meigen, 1822: 3 males, 4 females, new synonymy.

C. nigropilosum Giglio Tos, 1890 as var. of *C. hortense*, Meigen: 1 male, 2 females, new synonymy. I designated the male labelled as "*C. hortense* Meigen var. *nigropilosa* mihi" as lectotype.

C. hortense is commonly accepted as a junior synonym of *C. arcuatum*, recently synonymized with *C. fasciatum* by Thompson et al., (1982).

As to "C. fasciatum var. nigropilosa" I found one male and two females in Giglio Tos' collection. These specimens differ from *C. fasciatum* s.s. only for the colour of hairs, mainly black on the mesonotum and the sides of thorax, while in *C. fasciatum* they are mostly yellow. In my opinion such a difference is not sufficient to support the creation of two taxa, so I consider *C. nigropilosum* as synonym of *C. fasciatum*.

C. fasciolatum (De Geer, 1776)

C. fasciolatum (De Geer, 1776): 20 males, 10 females.

C. intermedium Meigen, 1822

C. italicum Rondani, 1845: 4 males, 7 females, synonymy by Loew (1856).

C. gymnophthalmum Giglio Tos, 1890, as var. of *C. italicum*, Rondani: 1 male, 1 female, synonymy by Sack (1932). I designated the female labelled as "C. italicum Rond. var *gymnophthalma* Giglio Tos" and "17" as lectotype.

C. affinis Giglio Tos, 1890, as var. of *C. lessonae*, Giglio Tos: 5 males, 7 females, **new synonym**. I designated the male labelled as "*C. lessonae* var. *affinis* Giglio Tos" and "18" as lectotype.

C. hyalipennis Giglio Tos, 1890, as var. of *C. lessonae*, Giglio Tos: 1 male, 1 female, **new synonym**. I designated the female labelled as "*C. lessonae* var. *hyalipennis* Giglio Tos" and "10.63" as lectotype.

The synonymy of *C. italicum* under *C. intermedium* has been reported for the first time by Loew (1856) and it is widespread accepted today (e.g. Peck, 1988).

Giglio Tos (1890) described *C. lessonae* together with two varieties: *C. lessonae* var. affinis and var. hyalipennis. According to Giglio Tos, the main differences between *C. lessonae* and *C. intermedium* are the size (greater in *C. lessonae*) and the shape of abdomen (wider in *C. lessonae*). I studied types labelled as *C. lessonae* in Giglio Tos' collection. Regarding the shape of abdomen I found no difference between *C. intermedium* and *C. lessonae*. The size of *C. lessonae* is longer than *C. intermedium* one: the dimension is 12 - 16 mm for *C. lessonae*, instead of 9 - 12 mm for *C. intermedium*. I compared the types of *C. lessonae* with specimens of *C. intermedium*. In my opinion the two species are different and the following features, in addition to the dimensions, are consistent to separate them:

- hairs on mesonotum and scutellum of female (Fig. 1-4): distinctly shorter in *C. intermedium*, longer in *C. lessonae*;
- in *C. lessonae* the arista is longer than flagellomere; in *C. intermedium* the arista is as long as or shorter than flagellomere (Fig. 5-6).

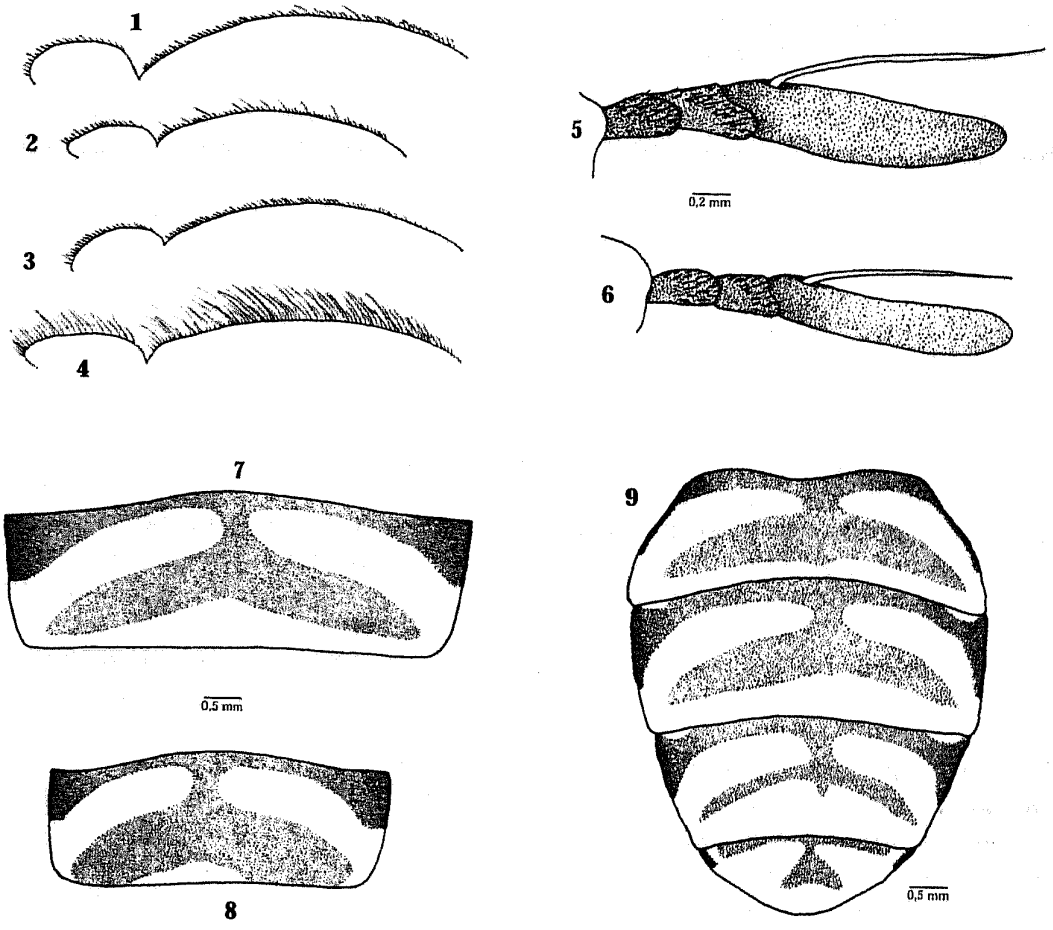
Other differences can usually help to identify the two species. Tab. 1 summarizes all the differences observed.

Regarding *C. lessonae* var. affinis the only difference with respect to *C. intermedium* is the size, usually higher (11 - 13 mm) than *C. intermedium* (9 - 12 mm). Giglio Tos (1890) himself considered *C. lessonae* var. affinis as an intermediate form between *C. lessonae* and *C. intermedium*. On the basis of the above mentioned features I consider *C. affinis* (as var. of *C. lessonae*) a junior synonym of *C. intermedium*.

For the features of female hairs on mesonoto and the ratio antenna/flagellomere *C. lessonae* var. hyalipennis is similar to *C.*

intermedium. Giglio Tos (1890: 144-145) recorded two differences between *C. lessonae* var. *hyalipennis* and *C. lessonae* s.s.: the design of abdomen and the yellowish anterior margin of wing. I found no differences. I consider these features as vary variable and not sufficient to separate the two taxa. *C. hyalipennis* (as var. of *C. lessonae*) is proposed as synonym of *C. intermedium*.

I found only a pair of specimens labelled as "*C. italicum* var. *gymnophthalma*": in my opinion there is no real difference between these two specimens and *C. intermedium*.



Figs. 1-9 - (1-4) Female mesonoto and scutellum in lateral view. – 1. *C. intermedium*. 2. *C. lessonae* var *affinis* of Giglio Tos 3. *C lessonae* var. *gymnophthalma* of Giglio Tos. 4. *C. lessonae s.s.;* (5-6) Antennae in lateral vie. – 5. *C. lessonae*. 6. *C. intermedium*; (7-8) Third tergite. 7. *C. lessonae* 8. *C. intermedium*; (9) Abdomen design in *C. sackeni* (holotype)

	C. intermedium	*C. lessonae*
Hairs on mesonotum and scutellum in females	Short (as in Fig. 1, 2, 3)	Long (as in Fig. 4)
Ratio arista / flagellomere	Equal or shorter (as in Fig. 5)	Longer (as in Fig. 6)
Size	9 – 12 mm	12 – 16 mm
Antennal ratio	1 : 1: 4 to 6	1 : 1 : 2,5 to 5
Hairs on apical-posterior part of femora	Usually all yellow	Usually with black hairs
Design of tergite III	Usually as in Fig. 8	Usually as in Fig. 7

Tab. 1 - Differences between *C. lessonae* and *C. intermedium*

C. lessonae Giglio Tos, 1890

C. lessonae Giglio Tos, 1890: 6 males, 1 female. I designated the male labelled as "*C. lessonae* Giglio Tos" and "4.86" as lectotype.

I consider *C. lessonae* as a good species, also suggesting features in addition to those listed by Giglio Tos (1890) as discussed in *C. intermedium.*

C. octomaculatum Curtis, 1837

C. octomaclatum Curtis, 1837: 3 males, 4 females.
C. sackeni Giglio Tos, 1890: 1 male, holotype, **new synonymy.**
C. chrysopolita Rondani, 1845. 2 males, synonymy by Loew (1856).

Giglio Tos (1890) described *C. sackeni* on the basis of one male only. The species has been widely accepted (Sack, 1932; Violovitsch, 1974; Peck, 1988; Belcari et al. 1995). No other specimen has been recorded from the Giglio Tos holotype (Dirickx, 1994).

Giglio Tos (1890: 152-153) listed the following features with respect to *C. octomaculatum:*

- design of abdomen;
- spot of scutellum: black in *C. octomaculatum*; translucent in *C. sackeni;*
- antennal ratio;
- design of abdominal sternites.

As to the design of abdomen, *C. sackeni* differs from *C. octomaculatum* merely for the yellow spots on the anterior part of tergites 3rd and 4th not reaching the abdominal fasciae; the interrupted anterior

black marking is visible on the 5th tergite (Fig. 7). Except for this weak character, the design of tergites in *C. sackeni* is quite similar to that of *C. octomaculatum*. The colour of the scutellar spot can be variable; in some specimens of *C. octomaculatum* a translucent spot as in *C. sackeni* is sometimes present. Following Giglio Tos (1890) the antennal ratio is 1.2 : 1 : 1.5 in *C. sackeni*; 1.3 : 1 : 1.3 in *C. octomaculatum*. The difference is very small. After comparing a series of specimens (both from Giglio Tos' collection and other sources) I found that the ratio in *C. octomaculatum* is: 1 – 1.25 : 1 : 1.25 – 1.75. So the antennal ratio of *C. sackeni* falls within the intraspecific variation of *C. octomaculatum*. Also, I found no difference between the sternal design of *C. sackeni* and *C. octomaculatum*. The male genitalia of *C. sackeni* also show no difference with those observed in other species of *Chrysotoxum*, incl. *C. octomaculatum*.

For all these reasons I propose here to consider *C. sackeni* as a junior synonym of *C. octomaculatum*.

C. vernale Loew 1841

C. vernale Loew, 1841: 2 males, 8 females.

C. fuscum Giglio Tos, 1890: 3 males, 5 females, synonymy by Sack (1932). I designated the male labelled as "*C. fuscum* Giglio Tos" and "21.10" as lectotype.

C. vernaloides Giglio Tos as var. of *C. fuscum*, 1890: 4 males, 5 females, synonymy by Sack (1932). I designated the male labelled as "*C. fuscum* var. *vernaloides* Giglio Tos" and "23.64" as lectotype.

C. lineare (Zetterstedt, 1819): 2 males, 2 females, misidentification of *C. vernale*.

Giglio Tos (1890, pag. 160-161) observed that his new species, *C. fuscum*, was similar to *C. vernale* differing from the latter for the following character states:

- antennal ratio;
- longer hairs;
- femora with greater black fascia at base;
- shading veins.

I found 11 specimens labelled *C. fuscum* in Giglio Tos' collection. The only difference which I observed between these specimens and *C. vernale* was the presence, in *C. fuscum*, of a shading area around the wing veins. The antennal ratio is variable: 1 – 1.25 : 1 : 1.75 – 2 in males and 1 – 1.5 : 1 : 2 – 2.5 in females. Studying a series of *C. vernale* (both from Giglio Tos' collection and other sources) I found an antennal ratio of: 1 – 1.75 : 1 : 1.5 – 2 in males and 1 – 1.5 : 1 : 2 – 2.5 in females. The length of the hairs is

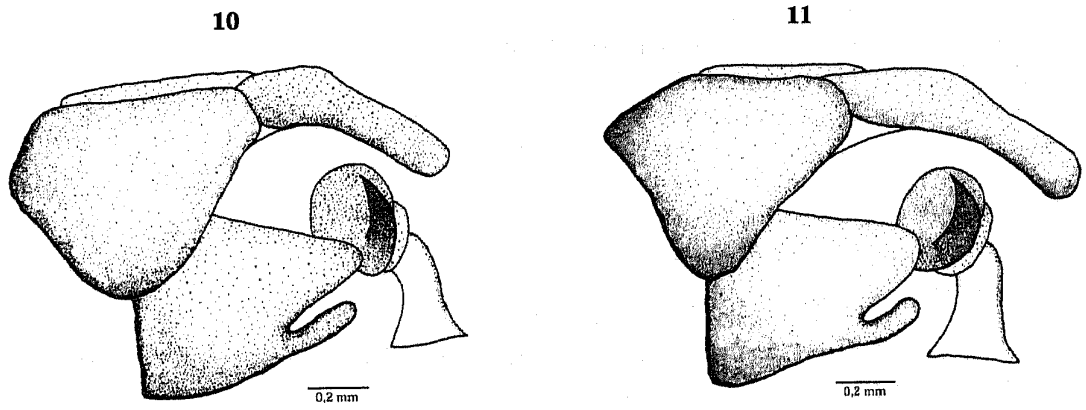
the same than in *C. vernale*. In *C. fuscum* the black fascia on the femora is strongly variable: from small dorsal spot to 1/4 of the length of femora.

The shading of the veins is also a variable feature: in some species all the veins are shaded, in other species only a few veins (R_{4+5} and R_{2+3}) are shaded. I consider this feature to be lacking in consistency in order to designate a new species. The synonymy of *C. fuscum* with *C. vernale* has been widely accepted (Sack, 1932; Peck, 1988).

Curiously, if the shading veins were not considered as a good character, most specimens of *C. fuscum* would result similar to *C. vernale*, except for three specimens which I consider *C. arcuatum* (2 specimens) and *C. elegans* (1 specimen).

Also *C. fuscum* var. vernaloides would appear similar to *C. vernale*; as a matter of fact Giglio Tos (1890) himself considered these specimens as intermediate forms between *C. fuscum* and *C. vernale*. I reported the male genitalia of *C. fuscum* and *C. fuscum* var. vernaloides in Fig. 10 and 11: the two genitalia seem closely related.

Giglio Tos (1890) recorded *C. lineare* from Piemonte (north-western Italy). I studied the specimens labelled *C. lineare* in Giglio Tos' collection (a total of 4 specimens). All specimens belong to *C. vernale*, instead of *C. lineare*. In Italy the presence of *C. lineare* is actually based only on the records by Giglio Tos (Dirckx, 1994). This species has been recorded from the central part of Europe (e.g. Bradescu, 1991 for Romania; Barkmeyer, 1994 for Germany; Séguy, 1961 and Speight, 1996 for France). I suggest now not to consider *C. lineare* as present in Italy, until records will be documentated.



Figs. 10-11 - Male genitalia. 10: *C. fuscum* (lectotype). 11: *C. fuscum* var. *vernaloides* (paralectotype).

C. verralli Collin, 1940

C. bigoti Giglio Tos, 1890: 1 male, 1 female, misidentification of *C. verralli.*

Two specimens labelled "C. bigoti" by Giglio Tos are instead *C. verralli.* In the original description of *C. bigoti*, Giglio Tos (1890) listed some features in order to distinguish the new species from *C. elegans*, but the description dos not mention the character state typical of *C. verralli:* "the straighter front margin to the yellow first (basal) interrupted band on abdomen, this band becoming progressively wider outwardly nearly to sidemargin" (Collin, 1940: 155). In Giglio Tos' collection I found both specimens of *C. elegans* and *C. verralli* labelled as "*C. bigoti*". For this reason I suggest here to consider *C. bigoti* as a junior synonym of *C. elegans* and not as a senior synonym of *C. verralli.*

Synopsis of the taxa treated in this paper:

C. arcuatum (Linnaeus, 1758)
= *C. festivum* (Auct. nec Linnaeus, 1758)
= *C. tomentosum* Giglio Tos, 1890 as var. of *C. festivum* (Linnaeus, 1758), **new synonymy**

C. bicinctum (Linnaeus, 1758)

C. cautum (Harris, 1776)
= *C. arcuatum* (Panzer, 1793)
= *C. sylvarum* Wiedemann in Meigen, 1822
= *C. lubricum* Giglio Tos, 1890

C. cisalpinum Rondani, 1845

C. elegans Loew, 1841
= *C. bigoti* Giglio Tos, 1890

C. fasciatum (Müller, 1764)
= *C. arcuatum* (Auct. nec Linnaeu, 1758)
= *C. hortense* Meigen, 1822
= *C. nigropilosum* Giglio Tos, 1890 as var. of *C. hortense* Meigen, 1822, **new synonymy**

C. fasciolatum (De Geer, 1776)

C. intermedium Meigen, 1822
= *C. italicum* Rondani, 1845
= *C. gymnocephalum* Giglio Tos, 1890 as var. of *C. italicum* Rondani, 1845
= *C. affinis* Giglio Tos, 1890 as var. of *C. lessonae* Giglio Tos, **new synonym**
= *C. hyalipennis* Giglio Tos, 1890 as var. of *C. lessonae* Giglio Tos, **new synonym**

C. lessonae Giglio Tos, 1890
C. lineare (Zetterstedt, 1819)
C. octomaculatum Curtis, 1837
= *C. sackeni* Giglio Tos, 1890, **new synonym**
= *C. chysopolita* Rondani, 1845
C. vernale Loew, 1841
= *C. fuscum* Giglio Tos, 1890
= *C. vernaloides* Giglio Tos, 1890 as var. of *C. fuscum* Giglio Tos, 1890
C. verralli Collin, 1940

ACKNOWLEDGEMENTS

I wish to thank the following authors for reading and improving the manuscript: C. Claussen, M. Daccordi and L. Munari. A particular thank to M. Daccordi who friendly allowed me to study the material in the Natural History Museum of Turin.

RIASSUNTO

Le specie del genere Chrysotoxum Meigen, *1822 (Diptera, Syrphydae) descritte da Giglio Tos.* Vengono rivisti gli esemplari oggetto dello studio di Giglio Tos sul genere *Chrysotoxum.* La specie *C. sackeni* è proposta come sinonimo di *C. octomaculatum* mentre *C. lessonae* è mantenuta come specie valida. Sono inoltre descritti dei caratteri aggiuntivi per distinguere *C. lessonae* da *C. intermedium.*

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