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Fieber's unpublished colour plates allow reassessing some of his *Cixius* species (Insecta: Hemiptera, Fulgoromorpha, Cixiidae)

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Abstract

Franz Xaver Fieber was a leading Hemiptera taxonomist in the 19th century. The recent discovery of his unpublished drawings that go along with the original handwritten manuscript allow a reassessment of species descriptions from this century. In addition, we present an alphabet of Fieber's handwriting. We give an overview on the Cixiidae species he had described and reassess the status of the species names *Cixius brachycranus* Scott, 1870*, Cixius intermedius* Scott, 1870, *Cixius pinicola* Fieber, 1876, *Tachycixius venustulus* (Germar, 1830) and *Tachycixius distinctus* (Signoret, 1865). *T. venustulus* and *T. distinctus* are regarded as valid species. The synonymy of *C. pinicola* with *T. venustulus* is invalidated and *C. pinicola* is placed in synonymy with *T. distinctus*.

Zusammenfassung

Franz Xaver Fieber war einer der führenden Hemiptera-Taxonomen des 19. Jahrhunderts. Die erst kürzlich wiederentdeckten Originalzeichnungen sowie das damit einhergehende, handschriftlich verfasste Originalmanuskript ermöglichen erstmals eine Neuinterpretation seiner Artbeschreibungen. Als Hilfsmittel für zukünftige Arbeiten präsentieren wir ein Alphabet von Fiebers Handschrift. Wir geben einen Überblick über die von ihm beschriebenen Glasflügelzikaden (Cixiidae) und beurteilen den Artstatus von *Cixius brachycranus* Scott, 1870*, Cixius intermedius* Scott, 1870, *Cixius pinicola* Fieber, 1876, *Tachycixius venustulus* (Germar, 1830) und *Tachycixius distinctus* (Signoret, 1865). *T. venustulus* und *T. distinctus* werden als valide Arten erachtet. Die Synonymie von *C. pinicola* mit *T. venustulus* wird als ungültig erklärt, und *C. pinicola* wird mit *T. distinctus* synonymisiert.

Key words: Fulgoromorpha, Cixiidae, Franz Xaver Fieber, synonymy, nomenclature, taxonomy

Introduction

Many old species descriptions are insufficient for species recognition. The drawings of morphological characters are often missing or scarce and, if provided, generally lack of genitalia illustrations. For the majority of the European species within the family Cixiidae, the use of characters of the male terminalia is essential for determination on species level. Therefore, old type material is needed to clarify the identity of several species. Unfortunately, this material was sometimes misinterpreted by subsequent authors, stays undiscovered in old collections or is even lost.

One of the most important authors concerning Cixiidae in the 19th century was Franz Xaver Fieber (1807–1872). His main work on Auchenorrhyncha, a monograph on the European Fauna, was translated and published only after his death (Fieber 1875, 1876, 1877, 1878, 1879). We have been focussing on the detection of his types for several years now and present the results of our work concerning his handwritten manuscript and his unpublished drawings in general and trace back the identity of two of his names, *Cixius brachycranus* and *Cixius pinicola*.

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Material and methods

Specimens: The examined specimens belong to different institutions identified by the following abbreviations:

BMNH: British Museum of Natural History, London, United Kingdom.
CBGP: Centre de Biologie pour la Gestion des Populations, Montferrier-sur-Lez, France.
MHNG: Muséum d'histoire Naturelle de Genève, Switzerland.
MNHN: Muséum national d'Histoire naturelle, Paris, France.
MWNH: Museum Wiesbaden—Naturhistorische Sammlungen, Germany.
NHMW: Naturhistorisches Museum Wien, Austria.

Preparation and observation: The abdomen of each specimen examined was cut off and cleared for 20 minutes in warm (80°C) 10% KOH. Dissections and cleaning of genital structures were performed in distilled water. If needed, a few drops of blue paragon for dying the ectodermic genital ducts were added for a few minutes. Final observations were done in glycerine using a Leica microscopes (MZ16).

Fieber's original drawings and manuscript: All the original Auchenorrhyncha plates of drawings were scanned in high resolution (300 dpi = 11 000 x 17600 pixel per plate) using an Epson stylus Photo RX520 scanner. The original manuscript, handwritten in German Kurrent lettering, was digitalized by photographing the content, using a Canon DSLR equipment (1DX) in addition with the zoom lens (Canon EF 16–35mm / 1:2.8). It was then used to establish an alphabet of Fieber´s handwriting. This was done using the raster graphic editor Adobe Photoshop CS6. The original drawings and manuscript are deposited in the MNHN Entomological library.

Results

I. Fieber´s manuscript and drawings

In 2009, Adeline Soulier-Perkins and the librarian Jocelyne Guglielmi (entomology MNHN) found Franz Xaver Fieber´s unpublished drawings on Auchenorrhyncha and original plates of Heteroptera in the entomology library of the MNHN. They traced back the history of these drawings and the handwritten original manuscript after the death of Fieber in 1872 (see Gnezdilov *et al*. 2011).

Just within Auchenorrhyncha, Fieber had made around 15,000 single drawings, most of them in colour. The drawings show all European species Fieber had seen, including drawings of his new descriptions. It seems very probable that Fieber had prepared them to illustrate his monograph. After Fieber´s death, Ferdinand Reiber, supported by Jean Baptiste Auguste Jean Baptiste Puton and Lucien François Lethierry, translated the manuscript (originally written in German) into French and published it in the "Revue et Magasin de Zoologie" between 1875 and 1879. Unfortunately, Reiber did not include any drawings, with exception of some black and white drawings that have been published by Fieber before (Fieber 1844, 1866a, 1866b, 1869). Thus, most drawings remained hidden to the entomological audience until now.

The rediscovery of these drawings allow recent scientists to trace missing Fieber types, to review formerly designated lecto- and paralectotypes and to reassess the status of several of his names. In course of the refurbishment of Fieber´s work, two recent publications (Gnezdilov *et al*. 2011 and Webb *et al*. 2013) already give first insights to Fieber´s original colour drawings. As the original manuscript was written by Fieber in a hardly decipherable German Kurrent script, we here provide a "Fieber alphabet" (Fig. 1) as a tool for future workers helping to transliterate the text and understand the notes and abbreviations written on the drawings.

II. The family Cixiidae in Fieber´s publications

Fieber (1861) stated, that there is no publication treating the whole European Auchenorrhyncha fauna, and that he intends to prepare such a monograph, including both descriptions of new species and redescriptions of all species already known. He considers the loss of type material, the difficulties of getting type specimens and the availability of older literature as the main problems to achieve this goal.

Fieber examined (besides his own material) specimens from the collection of NHMW (at that time "k. k. Wiener zoologisches Cabinet") and material from Emil Frey-Gessner (Switzerland), Wilhelm Mink (Germany), Johannes Winnertz (Germany), Gustav Mayr (Austria), Georg Ritter von Frauenfeld (Austria) and Franz Berquier (Italy). In his paper of 1865, he states, that almost half of the species he could discriminate were undescribed. Those species mainly originate from southern Russia, Greece, Turkey, Corsica, Italy and Spain. Concerning the genus *Cixius* Latreille, 1804, he had studied 12 of 14 described species of the genus and discovered another 24 new to science (Fieber, 1865).

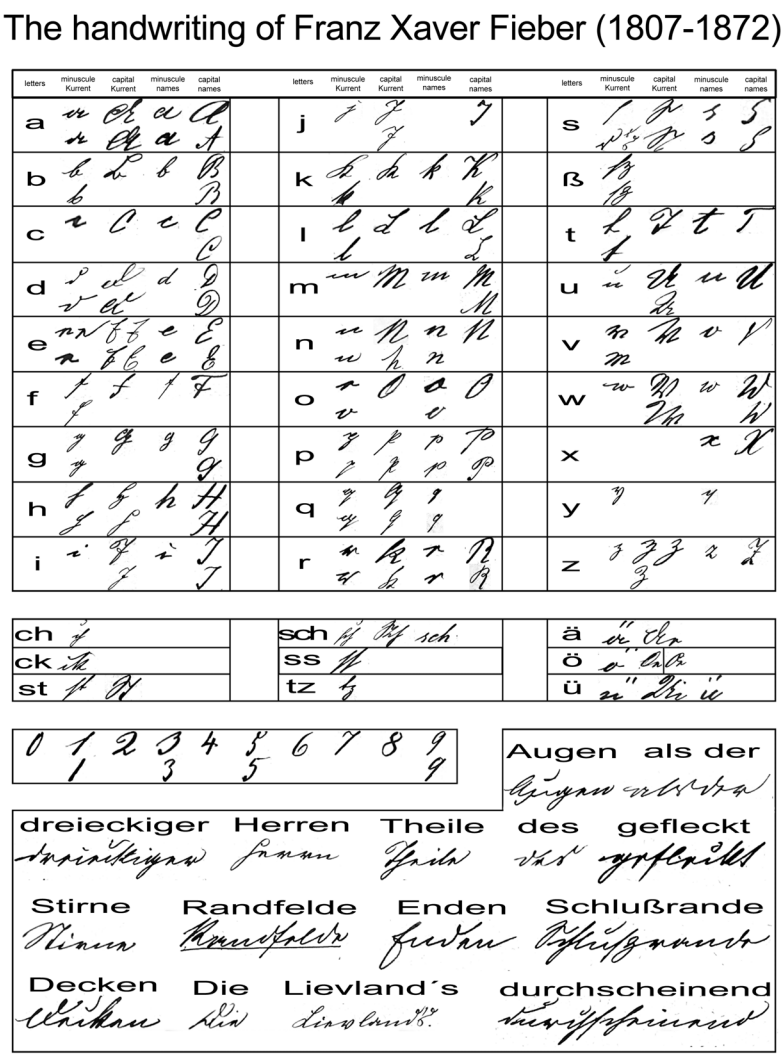


FIGURE 1. Handwriting of Fieber, in German Kurrent and modern script, presented in alphabetic order with some examples of words extracted from his original manuscript.

One year later, Fieber provided an identification key to genus level (Fieber, 1866a). In addition, he provides the descriptions of two new monotypic genera, *Entithena* Fieber, 1866 with *E. musiva* (Germar, 1825) as type species and *Hemitropis* Fieber, 1866 with the type species *H. bipunctata* Fieber, 1866. Fieber´s complete illustrations of both species are provided here for the first time (Fig. 2).

Six years later, after a long lasting illness, Fieber published the first catalogue of European Auchenorrhyncha (Fieber 1872). It already includes the names of taxa Fieber planned to describe later on. Finally, in his monograph published posthumously, a total of 30 Cixiid species including varieties were described. One was transferred to the family Tropiduchidae, 13 species names are still valid Cixiidae names, three are considered as synonyms, four concern colour morphs, and the species identity of another eight names is still unclear. These old names in need of revision refer to Pentastirini taxa from southern and southeastern Europe (see Table 1).

TABLE 1. List of species names in Cixiidae published by Fieber (1876), with remarks on their current status (after Bourgoin 2018 and other sources).

Name in Fieber (1876)	current status / valid name	References
Cixius brachycranus, Fieb.	synonym of *Cixius distinguendus* Kirschbaum, 1868	(1876: 188–189) synonymized with *C. intermedius* by Fieber
Cixius cunicularius var. *fusca*	colour morph	(1876: 190)
Cixius cunicularius var. *vulgaris*	colour morph	(1876: 189)
Cixius desertorum, Beck.	*Tachycixius desertorum* (Fieber, 1876)	(1876: 181–182) transferred to *Tachycixius* Wagner, 1939 by Wagner (1939)
Cixius discrepans, Fieb.	*Nanocixius discrepans* (Fieber, 1876)	(1876: 176–178) transferred to *Nanocixius* Wagner, 1939 by Wagner (1939)
Cixius pallipes, Fieb.	*Cixius (Ceratocixius) pallipes* Fieber, 1876	(1876: 191)
Cixius pilosus var. *infumata*, Fieb.	colour morph	(1876: 179)
Cixius pinicola, L. Duf.	synonym of *Tachycixius venustulus* (Germar, 1830) synonymy with *T. venustulus* invalidated and placed in synonymy with *T.distinctus* in this paper	(1876: 180–181) synonymized with C.(*T.) venustulus* by Wagner (1939)
Cixius pyrenaicus, Fieb.	*Tachycixius pyrenaicus* (Fieber, 1876)	(1876: 183–184) transferred to *Tachycixius* Wagner, 1939 by Wagner (1939)
Haplacha seticulosa, Fieb.	*Duilius seticulosus* (Lethierry, 1874)	(1876: 166–167) transferred to *Duilius* Stål, 1858 by Dlabola (1952: 28)
Hyalesthes luteipes, Fieb	*Hyalesthes luteipes* Fieber, 1876	(1876: 196–197)
Oliarus adustus, Fieb	species identity unclear, revision needed	(1876: 198) see Emeljanov (2015)
Oliarus apiculatus, Fieb	*Setapius apiculatus* (Fieber, 1876)	(1876: 215–216) transferred to *Setapius* Dlabola, 1988 by Dlabola (1988)
Oliarus concolor, Fieb	*Reptalus concolor* (Fieber, 1876)	(1876: 208–209) redescribed by Linnavuori (1965) and Mitjaev (1971), transferred to *Reptalus* Emeljanov, 1971
Oliarus cuspidatus, Fieb	*Reptalus (Trepalus) cuspidatus* (Fieber, 1876)	(1876: 215) transferred to *Reptalus* Emeljanov, 1971, subgenus *Trepalus* Emeljanov, 1996 by Emeljanov (1996)
Oliarus hyalinus, Fieb	species identity unclear, revision needed	(1876: 203–204)
Oliarus limbatus, Fieb	probably conspecific with *Reptalus venosus* Rambur, 1840 (Webb *et al.* 2013)	(1876: 200) transferred to *Reptalus* by Webb *et al.* (2013); these authors also provide a description
Oliarus lugubris, Fieb	species identity unclear, revision needed	(1876: 210–211)
Oliarus lutescens, Fieb	species identity unclear, revision needed	(1876: 211–212)
Oliarus melanochaetus, Fieb	*Reptalus melanochaetus* (Fieber, 1876)	(1876: 197–198) transferred to *Reptalus* Emeljanov, 1971 by Emeljanov (1971)

.....continued on the next page

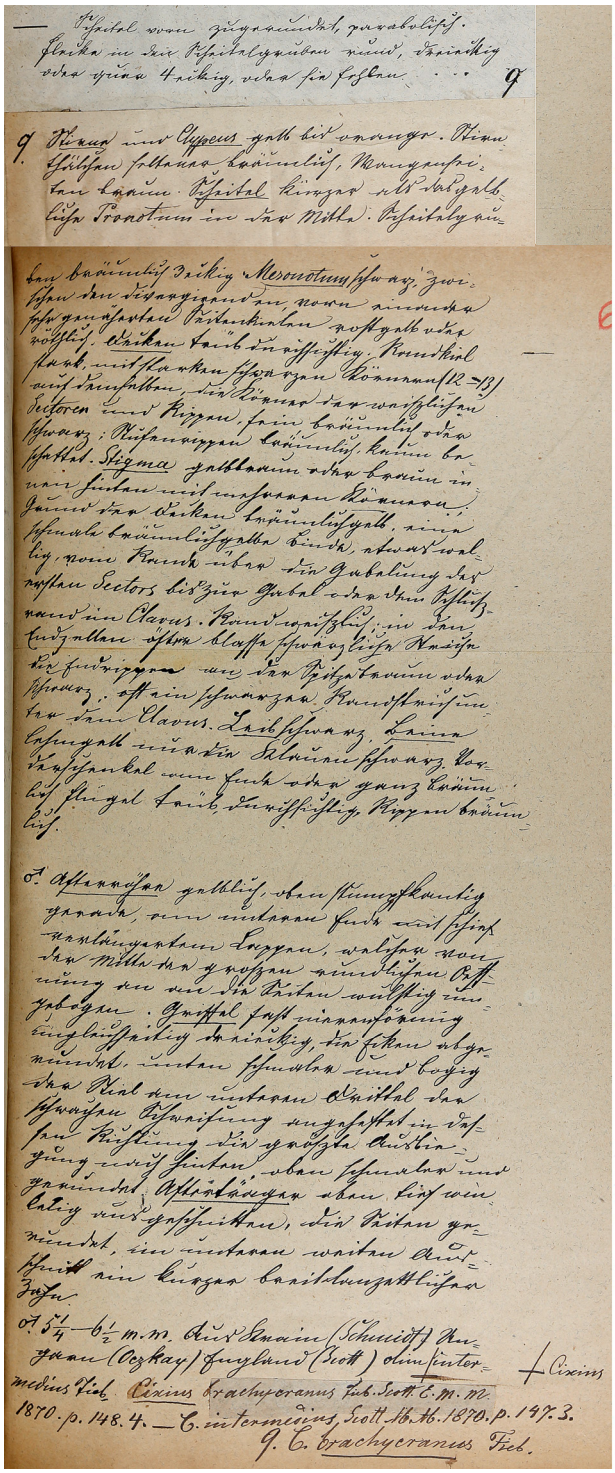
TABLE 1. (Continued)

Name in Fieber (1876)	current status / valid name	References
Oliarus roridus, Fieb	*Pentastira rorida* (Fieber, 1876)	(1876: 200–202) transferred to *Pentastira* Kirschbaum, 1868 by Logvinenko (1975)
Oliarus roridus var. *maculatus*	colour morph	(1876: 201)
Oliarus roridus var. *opalinus*	colour morph	(1876: 202)
Oliarus signatus, Fieb	synonym of *Reptalus obscurus* (Signoret, 1865)	(1876: 209–210) synonymized with *Oliarus obscurus* Signoret, 1865 by Signoret (1884)
Oliarus sordidus, Fieb	species identity unclear, revision needed	(1876: 207–208)
Oliarus splendidulus, Fieb	species identity unclear, revision needed	(1876: 202–203)
Oliarus tristis, Fieb	species identity unclear, revision needed	(1876: 199)
Trigonocranus emmeae, Fieb	*Trigonocranus emmeae* Fieber, 1876	(1876: 168)
Trirhacus setulosus, Fieb	*Trirhacus setulosus* Fieber, 1876	(1876: 175–176)
Ommatissus binotatus, Fieb	*Ommatissus binotatus* Fieber, 1876	(1876: 174–175) transferred to Tropiduchidae by Melichar (1914)

FIGURE 2. Fieber drawings of *Entithena musiva* (Germar, 1825), actually *Myndus musivus* (left) and *Hemitropis bipunctata* Fieber, 1866 (right), [six separated plates, arranged here together: 12x13.4 cm].

III. *On the identity of Cixius intermedius Scott, 1870 and Cixius brachycranus Scott, 1870*

Chronology of names. The name *Cixius brachycranus* was published first by Scott (1870: 148), including a detailed species description. However, Scott refers to Fieber´s unpublished manuscript by adding "Fieb. (M.S.)" [M.S.= Manu Scriptum] next to the species name. As locus typicus he provides "Gosforth, near Newcastle-on-Tyne". The description is based on one male specimen only, therefore it can be regarded as holotype by monotypy. On the same page Scott states the similarity of this species to *Cixius intermedius* Scott, 1870, described by him in the same publication on the previous page. One type locality of this species is, among others, the type locality of *C. brachycranus* (Fig. 3).



„- Scheitel vorn zugerundet, parabolisch. Flecke in den Scheitelgruben rund, viereckig oder ganz 4eckig, oder sie fehlen.....9
9 Stirne und Clypeus gelb bis orange. Stirnthälchen seltener bräunlich, Wangenseiten braun. Scheitel kürzer als das gelbliche Pronotum in der Mitte. Scheitelgruben bräunlich 3eckig. Mesonotum schwarz, zwischen den divergierenden vorn einander sehr genäherten Seitenkielen rostgelb oder rötlich. Decken trüb durchsichtig. Randkiel stark, mit starken schwarzen Körnern (12-13) auf demselben, die Körner der weißlichen Sectoren und Rippen, fein bräunlich oder schwarz; Stufenrippen bräunlich, kaum beschattet. Stigma gelbbraun oder braun innen hinten mit mehreren Körnern; Grund der Decken bräunlichgelb, eine schmale bräunlichgelbe Binde, etwas wellig, vom Rande über die Gabelung des ersten Sectors bis zur Gabel oder dem Schlußrand im Clavus. Rand weißlich; in den Endzellen öfter blasse schwärzliche Striche die Endrippen an der Spitze braun oder schwarz, oft in schwarzen Randstrich unter dem Clavus. Leib schwarz. Beine lehmgelb nur die Klauen schwarz. Vorderschenkel am Ende oder ganz bräunlich flügel trüb, undurchsichtig, Rippen bräunlich.
♂ Afterröhre gelblich, oben stumpfkantig gerade, am unteren Ende mit schief-verlängertem Lappen, welcher von der Mitte der großen rundlichen Öffnung an die Seiten wulstig umgebogen. Griffel fast nierenförmig ungleichseitig dreieckig, die Ecken abgerundet, unten schmaler und bogig der Stiel am unteren Drittel der schwachen Schweifung angehaftet in dessen Richtung die größte Ausbiegung nach hinten, oben schmaler und gerundet. Afterträger oben tief winkelig ausgeschnitten, die Seiten gerundet, im unteren weiten Ausschnitt ein kurzer breitlanzettlicher Zahn.
♂ 51/4-6 1/2 m. m. Aus Krain (Schmidt) Ungarn (Oczkay) England (Scott) olim Cixius intermedius Fieb. Cixius brachycranus Fieb. Scott. E. m. m. 1870. p. 148. 4. - C. intermedius Scott M. M. 1870. p. 147.3
9. C. brachycranus Fieb."

FIGURE 3. Description of *Cixius brachycranus* Scott, 1870 by Fieber. Handwritten original description in kurrent (left) and modern script (right).

In the catalogue of Fieber (1872), "*C. brachycranus* Fieb." is listed and a different locality, namely "Carn." (= abbreviation of "Carniola", a part of Slovenia called "Krain" in German) is given. Finally, in the monograph of Fieber (1876), Fieber presents the description of *C. brachycranus* Fieber, with *C. intermedius* mentioned as a synonym.

Today´s interpretations of these two names is based on William Edward China's revision (China 1942): He dissected a specimen from the syntype series of *C. intermedius* and placed the name in synonymy with *Cixius distinguendus* Kirschbaum, 1868. As *C. brachycranus* was already treated as a synonym of *C. intermedius*, this name was also placed in synonymy with *C. distinguendus* (China, 1942). *C. distinguendus* was described from Germany (Wiesbaden, Griesheim); the lectotype was designated subsequently by Wagner (1939) and is deposited in Kirschbaum´s collection (MWNH). Thus the names and synonymies are:

Cixius distinguendus Kirschbaum, 1868, valid name
Cixius intermedius Scott, 1870: 147, syn. of *Cixius distinguendus* Kirschbaum, 1868, by China, 1942: 87
Cixius brachycranus Scott, 1870: 148, syn. of *Cixius intermedius* Scott, 1870, by Fieber, 1876: 147
Cixius brachycranus Fieber, 1872: 3, nomen nudum
Cixius brachycranus Fieber, 1876: 189, nomen praeoccupatum of *Cixius brachycranus* Scott, 1870: 148

Tracing the types. Scott's collection is stored in the BMNH (Horn et. al. 1990 and Mick Webb, pers. comm.). The type of *C. intermedius* is retained in the collection (China 1942), but the holotype of *C. brachycranus* is untraceable there (China 1942: 87 and Mick Webb, pers. comm.).

In the preface of Fieber (1875), the author thanks Scott for the loan of several species from England. In his handwritten manuscript, Fieber gives the following localities: "Aus Krain (Schmidt), Ungarn (Oczkay), England (Scott)" [= "from Carniolia (Schmidt), Hungary (Oczkay), England (Scott)"]. In Reibers translation, published as Fieber (1876: 189), the localities are: "Ukraine (Schmidt), Hongrie (Oczkay), Angleterre (Scott)". Thus, Reiber incorrectly translated "Aus Krain" as "Ukraine".

A single unpublished plate of Fieber´s drawings is dedicated to *C. brachycranus*. On its lower right corner the collecting locality "Anglia" is mentioned. The drawings reflect perfectly Scott description of the species and therefore show most likely the holotype (Fig. 4).

Two unpublished plates are dedicated to *C. intermedius*. One gather parts of the head with a frontal view of the frons and clypeus, a dorsal view of the vertex, eyes and thorax and the left forewing. On the bottom of the plate, adjacent to the epithet "*intermedius"*, Fieber writes "Anglia". Therefore it has to be regarded as a specimen from Scott type series (Fig. 5). The other plate shows drawings of the anal tube in dorsal and lateral views, the styli of a male specimen in lateral view and the ventral view of last abdominal segments of a female (Fig. 6).

The drawings of *C. brachycranus* published by Buckton (1890) do not fit in coloration to Scott's original description. Thus, we assume that he had drawn two specimens from his own localities and has not seen the type material.

The Noualhier collection (MNHN), which counts as well Lethierry specimens, comprises one male and four female specimens under *C. brachycranus*, determined as *C. distinguendus* by Jean Henri Ribaut (1872–1967). The male specimen bears, beside a green square label, a handwritten label from Fieber stating its provenance from "Emmerin" (northern France). On another pin, a female, glued on a similar plate as the male specimen, bears a ball pen handwritten label from the same locality. Both specimens were obviously separated from one pin and are, without any doubt, the specimens from Lethierry that Fieber had used to draw parts of the male and female genitalia (Fig. 7).

The Puton collection (MNHN) comprises two males and five females grouped under the double labelling: *C. brachycranus* and *C. intermedius*. Those specimens were collected in Austria, France, Russia and Algeria. The only male specimen from France (Department Nord) was identified by Ribaut as belonging to the species *C. distinguendus*. The second male was determined by Ribaut as *Tachycixius pilosus* (Olivier, 1791) and is part of a series of three specimens collected in Algeria. The remaining three females were collected from Goritz (Austria), Sarepta (Russia) and Toulon (France). They still need to be re-identified but definitely do not belong to Scott's type series (Fig. 8).

The Fieber collection in Vienna (NHMW) comprises 40 specimens grouped under a double labelling: *C. brachycranus* and *C. distinguendus*. None of them could be identified as Scott's type.

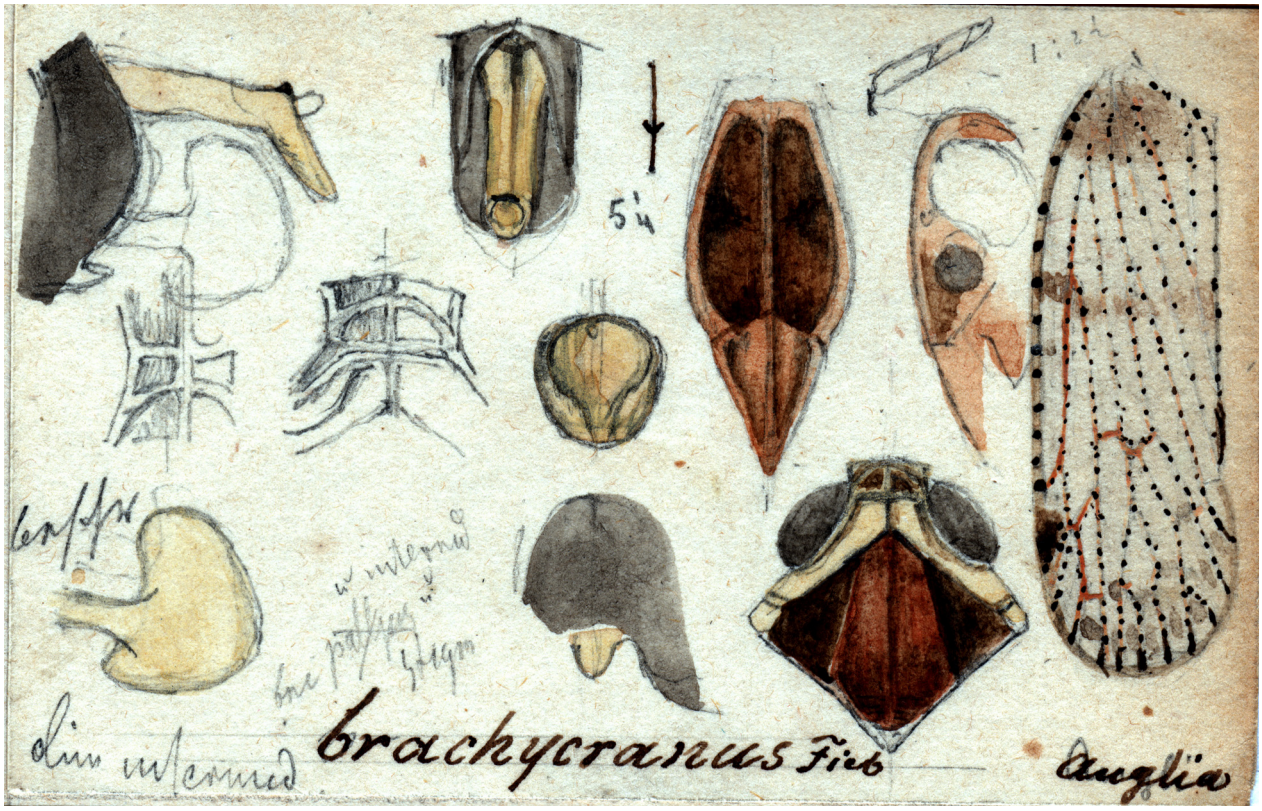


FIGURE 4. Fieber drawings of "*Cixius brachycranus* Fieber". Mentions in the bottom left corner of the synonymy with *Cixius intermedius* Scott, 1870: "olim intermed" and in the bottom right corner the locality: "Anglia", [5.7x3.7 cm].

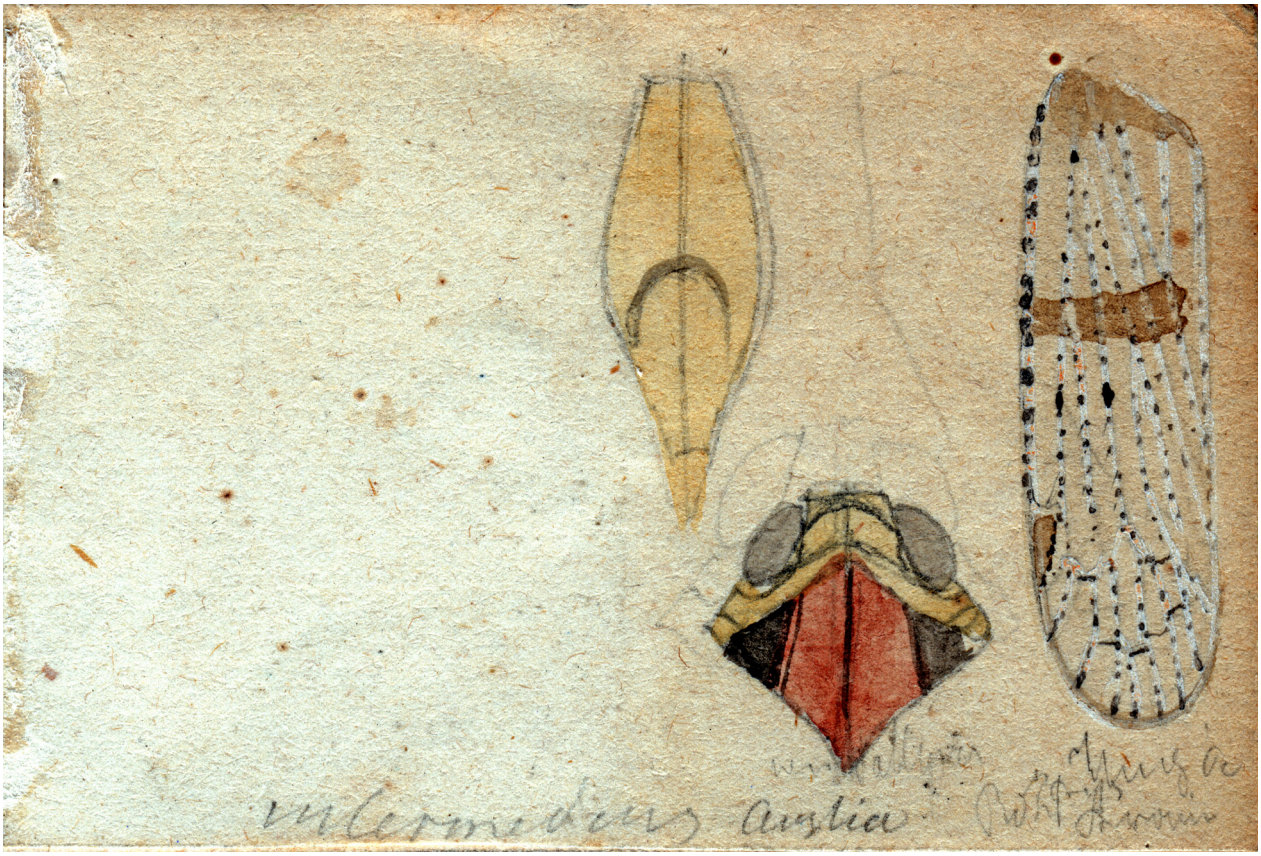


FIGURE 5. Fieber drawings of *Cixius intermedius* Scott, 1870. Mentions of the locality: "Anglia", just above it: "wie pallipes" [= like pallipes] and in the bottom right corner: "Ung Oc", obviously referring to Hungary and the collector Oczskay, and "Krain", the german name for Carniolia, [5.7x3.7 cm].

FIGURE 6. Fieber drawings of male and female of *Cixius intermedius* Scott, 1870. Mentions on the bottom right corner of the locality: "Emerin" [=Emmerin in the north of France] and the person who provided the specimen: "Leth" for Lethierry, and on the upper left side: "Zahn gelb" [= teeth yellow], [2.8x3.5 cm].

Conclusions. The holotype of *C. brachycranus* from Scott was drawn by Fieber and remains untraceable. Even if Fieber's drawing is of a good quality, it was not published together with the description and cannot be considered as iconotype. *C. brachycranus* is considered as a synonym of *C. intermedius* and subsequently of *C. distinguendus* (China 1942). We do not have evidence for characters allowing us to differentiate the species from *C. distinguendus*. Thus, following the International Code of Zoological Nomenclature (Art. 75.3.2), it is neither necessary nor possible to designate a neotype for *C. brachycranus*.

IV. On the identity of *Cixius pinicola* Fieber, 1876

The identity of *Cixius venustula* sensu Fieber. *Flata venustula* was described by Germar in 1830 from southern France ("Gallia méridionale"). Wagner (1939: 96; figs 22–24) redescribed the species based on a male from Ronda (near Málaga, southern Spain) and placed it into his new (sub)genus *Tachycixius* Wagner, 1939. Later, Ribaut & Lacroix (1958: 487) published the drawing of a wing from a specimen sampled in the north of France (Normandie).

FIGURE 7. Specimens placed under the name *Cixius brachycranus* in Noualhier collection. The specimen with the green square label so as the female on the right were used by Fieber for the drawings of genitalia of *Cixius intermedius* Scott, 1870.

FIGURE 8. Specimens placed under the name *Cixius brachycranus* and *Cixius intermedius* in Puton collection.

Fieber (1876) states that he had obtained some type species from Germar´s collection. On his only unpublished plate concerning this species (Fig. 9), we can read “Corfu” and crossed out “Escorial”. As Fieber´s drawings fit well to the drawing in Ribaut & Lacroix (l.c.) and also fit to Wagner´s redescription, we follow Wagner´s opinion on the identity of this species. Its actual name is *Tachycixius venustulus* (Germar, 1830).

Tracing the meaning of *pinicola* sensu Amyot and Dufour. The specific name *pinicola* was first mentioned in the literature within the description of the mononominal name *Entæniothes* by Charles Jean-Baptiste Amyot (1847: 362; Fig. 10). He provides the name of Jean-Marie Léon Dufour (1780–1865) as information source (“*pinicola* L. Duf. in litt.”), gives “Midi de la France” [southern France] and “environs d’Orléans” [around Orléans] as loci typici and mentions Edouard Perris (1808–1878) and Léon Marc Herminie Fairmaire (1820–1906) as collectors. Amyot did not write where the syntypes were kept. Therefore, the collections of Amyot, Dufour, Perris and Fairmaire had to be checked for the present paper.

FIGURE 9. Fieber drawings of male and female of *Tachycixius venustulus* (Germar, 1830), [6x4 cm].

ENTÉNIOTHE.

391. *Entæniothes* (1). Deux principales bandes transverses sur les homélytres, avec deux plus petites et interrompues, partant de la côte externe, l'une près de la base et l'autre à l'extrémité, ces bandes disparaissant plus ou moins quelquefois. Long. 0,005-6.

♂ *pinicola* L. Duf. *in litt.* — *serratulæ* Fabr.? R. 54. 46.

La bande basilaire très peu distincte plus étroite que les autres, partant de l'angle huméral externe, et très oblique; un point brunâtre touchant la côte externe entre les deux bandes intermédiaires, ces deux bandes assez larges; la première plus oblique que la seconde; une petite tache brune touchant l'extrémité, derrière la quatrième bande; quelquefois cette bande occupant toute l'extrémité. ♀.

Midi de la France (Perris); environs d'Orléans (Fairmaire).

(1) Ἐ, ταινιοθής, qui a des bandes.

FIGURE 10. Amyots (1847) description of the mononominal name Entæniothes

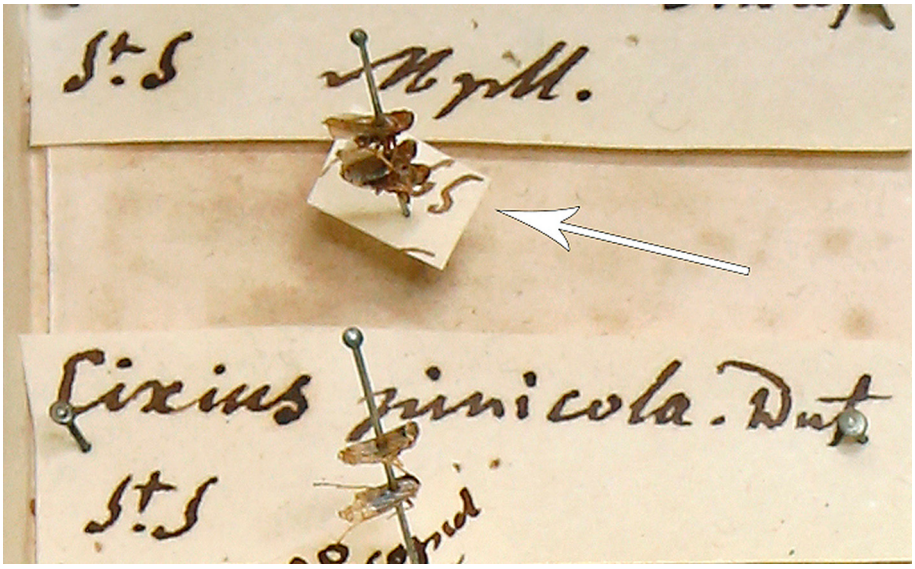


FIGURE 11. Specimens wrongly placed by Perris during his restoration work of Dufour collection.

FIGURE 12. Specimens placed under the name *Cixius pinicola* in Fairmaire collection and identified here as *Tachycixius distinctus* (Signoret, 1865).

When Dufour died in 1865, his collection was was given to Joseph Alexandre Laboulbène (1825–1898). Strongly damaged, it was completely remounted by Perris, before it was transported to the MNHN. Laboulbène prepared a catalogue of the collection and copied the names and locations of the species written by Dufour on the labels at the bottom of the collection boxes. Each name is followed by the number of specimens saved by Perris. According to this catalogue, just one specimen of *Cixius pinicola* was restored by Perris. In this collection, we found one needle with three specimens (one male and two females) labelled as "*Cixius pinicola* Duf; St. S" (Fig. 11), but they do not fit Amyot's description at all. We identified them as *Nanocixius discrepans* (Fieber, 1876). According to Amyot's description, the species *Entaeniothes* should bear four stripes on the fore wings. We found only two females and one male on two pins fitting this description. They were labelled as "*Cixius albicinctus* Germar; St. S". Only the male specimen bears a label, providing a non-assignable number "1080". All three specimens do not fit Germar's (1818) description of *C. albicintus* but do fit perfectly that of *Entaeniothes* sensu Amyot. The dissection of the male genitalia allowed its identification as *Tachycixius venustulus* (Germar, 1830). The pattern and shape of the forewings and the black coloration of the mesonotum suggest that the females also belong to *T. venustulus*. Therefore we assume that they are most likely those used by Dufour for the description he had sent to Amyot, and that Perris erroneously placed them during his restoration work.

Perris was an amateur entomologist who lived and collected in Mont-de-Marsan (Departement Landes, France). His collection and his handwritten register are kept in the CBGP. No specimen of Cixiidae from the collections of Amyot (MNHN) and Perris fits the description or bears the label "Entaeniothes", "pinicola" or "Dufour".

FIGURE 13. Specimens in Fairmaire collection fitting to Amyot mononominal description of Enthaeniotes and identified here as *Tachycixius venustulus* (Germar, 1830)

FIGURE 14. Type specimens of *Cixius dinstinctus* Signoret, 1865 in Signoret collection

The Fairmaire collection (MNHN) contains three females labelled as *Cixius pinicola* Dufour. They originate from the localities "Catalonia" in Spain and "Vernet" [=Vernet-les-Bains] in the eastern Pyrenees, France (Fig. 12). The examination of the specimens revealed their conspecifity with the species *Tachycixius distinctus* (Signoret, 1865). In this collection three other specimens do fit Amyot's description: one male and two females (Fig. 13). We identified them as *Tachycixius venustulus* (Germar, 1830). The male specimen is labelled with "enthaeniotes amy. Landes", indicating that it was collected within the area of the loci typici provided by Amyot and might thus be a specimen from Amyot's type series. The first female specimen bears the label "*Cixius pilosus* Ol. Madrid". Thus it is definitively not from Amyot's type series. The second female bares just a label with the non-assignable number "83".

In total, we found four specimens fitting to Amyot's description of Entæniothes resp. of *pinicola* sensu Amyot and Dufour: three in the Dufour and one in the Fairmaire collection. They all belong to *Tachycixius venustulus* (Germar, 1830).

The identity of *Cixius pinicola* sensu Fieber. Signoret (1865) described the species *Cixius distinctus* from "France mérid" (south of France). His description is based on (at least) one male and one female. Auguste Jean François Grenier (1814–1890) and Charles Nicolas Aubé (1802–1869), both amateur entomologists, provided him these specimens. Signoret did not mention where the types were deposited.

In Signoret's collection (NHMW), on six pins, four males and one female of *Cixius distinctus* can be found (Fig. 14). All specimens originate from the locus typicus and were identified by Signoret himself. They must be

considered as (part of the) syntype series. As for all Signoret's collection, the original labels, written in French, were replaced with labels in German (H. Zettel, pers. comm.). Wagner has studied these specimens and published drawings of the male genitalia (Wagner 1939).

FIGURE 15. Specimen from the collection Signoret recognized by Wagner in 1939 as being Fieber´s holotype for *Cixius pinicola*.

In the catalogue of Fieber (1872), the name *pinicolus* appears as the specific epithet of *Cixius* and Leon Dufour is cited as author. Fieber provides the locality "Pyreneae" which could concur with "Midi de la France" given by

Amyot as locus typicus for his name “Entæniothes”. Fieber certainly referred to Amyot´s species, even if he published the name *Cixius pinicolus* Dufour. In this list, Fieber also includes names of species he had not seen, such as *C. distinctus*.

Puton (1874) refers to Fieber´s catalogue and lists “pinicolus Duf, in Fieb., cat.” as a synonym of *C. distinctus*, (Puton, 1874). For an unclear reason, Puton (1875) turns around the synonymy and lists *C. distinctus* as synonym of *C. pinicola*.

In Fieber (1876), a clear description of a female from the eastern Pyrenees is provided, with the reference ”*Flata pinicola* L. Duf. in lit. Entaeniothes am. mon. 391.”. This specimen, deposited in the Swedish Museum of Natural History in Stockholm, was used for the formal description of *Cixius pinicola* sensu Fieber (1876).

FIGURE 16. Fieber drawing of the holotype of *Cixius pinicola* Fieber, 1876, [9x12 cm]

Wagner (1939) made the first revision of *C. pinicola* sensu Fieber. He states, that the type at the Museum of Stockholm had been lost, but in the Fieber collection of the NHMW, he found a specimen bearing the labels

"Europe coll. Signoret; pinicola det. Signoret; aeniothes am" (Fig. 15). Wagner had no doubt that he had found the Fieber type. As evidence, he mentions the old, handwritten, strongly cut label "aeniothes am.", which is in accordance with Fieber´s original description. Wagner examined the specimen, found no difference between *C. pinicola* and *Cixius venustulus* and thus placed *Cixius pinicola* Fieber, 1876 in synonymy with *C. venustulus* Germar, 1830, today *Tachycixius venustulus* (Germar, 1830).

Now, when we examine the unpublished plate drawn by Fieber, we can see what he believed to be the type specimen of *Cixius pinicola* (Fig. 16). It is annotated "mus. Holm. Fieber 1865 det". Both drawing and description refer to a specimen with a reddish mesonotum, which does not go in accordance with *T. venustulus* (Germar, 1830), but with *T. distinctus* (Signoret, 1865). In addition, Fieber had also drawn the head in frontal and dorsal view, the left forewing, parts of the genitalia in lateral and ventral view, hind tibia and a small part of the hindwing of another female (Fig. 17) which is not mentioned in Fieber´s species description. These drawings also fit to *T. distinctus* but not to *T. venustulus*.

In Signoret´s collection, the specimen designated as holotype of *C. pinicola* Fieber by Wagner (1939) is available. We examined the specimen and confirm its identity as *T. venustulus.* This specimen, torn into three parts and placed on three pins, is completely different from Fieber´s description and drawing of *C. pinicola*. Main differences can be found within the colouration of head, thorax and wings (Fig. 18). This observation, together with the handwritten name "taeniothes am." on the label, led us to recognise this specimen as another one of the series used by Amyot to describe Entæniothes but not as the type of *C. pinicola* Fieber, 1876. Consequently, the synonymy published by Wagner (1939) has to be invalidated.

In the collection of Puton (MNHN), nine specimens labelled as "*Cixius pinicola* Dufour" are present. One female bears the labels "Gall. M." (South of France) and "*distinctus* Sign. Type". After examination, there is no doubt that this specimen fits the description of *Cixius distinctus* Signoret, 1865 and belongs to the syntype series. The retention of one Signoret syntype in Puton´s collection and also the fact that Puton had access to Fieber´s drawings explain, why Puton (1874) had already published the correct synonymy of *C. pinicola* with *C. distinctus*. The remaining eight specimens were misidentified and belong to the species *Tachycixius pilosus* (Olivier, 1791), mostly to the variation *T. p. discicollis* (Rey, 1894).

Conclusions. The specimen identified by Wagner as type of *C. pinicola* Fieber is possibly one of the specimens used by Amyot for the description of his mononominal name Entaeniothes (*C. pinicola* sensu Dufour), but is not a type of *C. pinicola* Fieber. The type of *C. pinicola* Fieber is not in Stockholm, Paris or Vienna and therefore can be considered as lost. According to Fieber´s unpublished drawings, *C. pinicola* Fieber, 1876 is a younger synonym of *T. distinctus* (Signoret, 1865), and not a synonym of *T. venustulus* (Germar, 1830). As in the case of *C. brachycranus*, the designation of a neotype for *Cixius pinicola* Fieber, 1876 is neither necessary nor possible.

The historical account of the actual valid names are:

Tachycixius venustulus (Germar, 1830)
Flata venustula Germar, 1830: 49, transferred to *Cixius* in Burmeister, 1835: 105
Entaeniothes Amyot, 1847 in litteris *pinicola* Dufour: 362, non. binom.: opinion 686 of the International Commission on Zoological Nomenclature in 1963
Tachycixius subgen. nov. of *Cixius* in Wagner, 1939: 96
Cixius pinicola Fieber, 1876: 180–181, syn. of *Cixius* (*Tachycixius*) *venustulus* (Germar, 1830) in Wagner, 1939: 96
Cixius (Tachycixius) Wagner, 1939 changed rank to *Tachycixius* Wagner, 1939 in Ribaut & Lacroix 1958: 485
Cixius pinicola Fieber, 1876, **syn. error**

Tachycixius distinctus (Signoret, 1865)
Cixius distinctus Signoret, 1865: 127
Cixius pinicolus Fieber, 1872: 3, nom. nud.
Cixius pinicolus Duf. in Fieber 1872 syn. of *Cixius distinctus* Signoret, 1865, in Puton 1874: 229
Cixius distinctus Signoret, 1865 syn. of *Cixius pinicola* Duf., in Puton 1875: 112
Cixius pinicola Fieber, 1876: 180–181, sp. nov.
Cixius pinicola Fieber, 1876 **syn. nov.**

FIGURE 17. Fieber drawings of *C. pinicola* specimen, [8x3.5 cm].

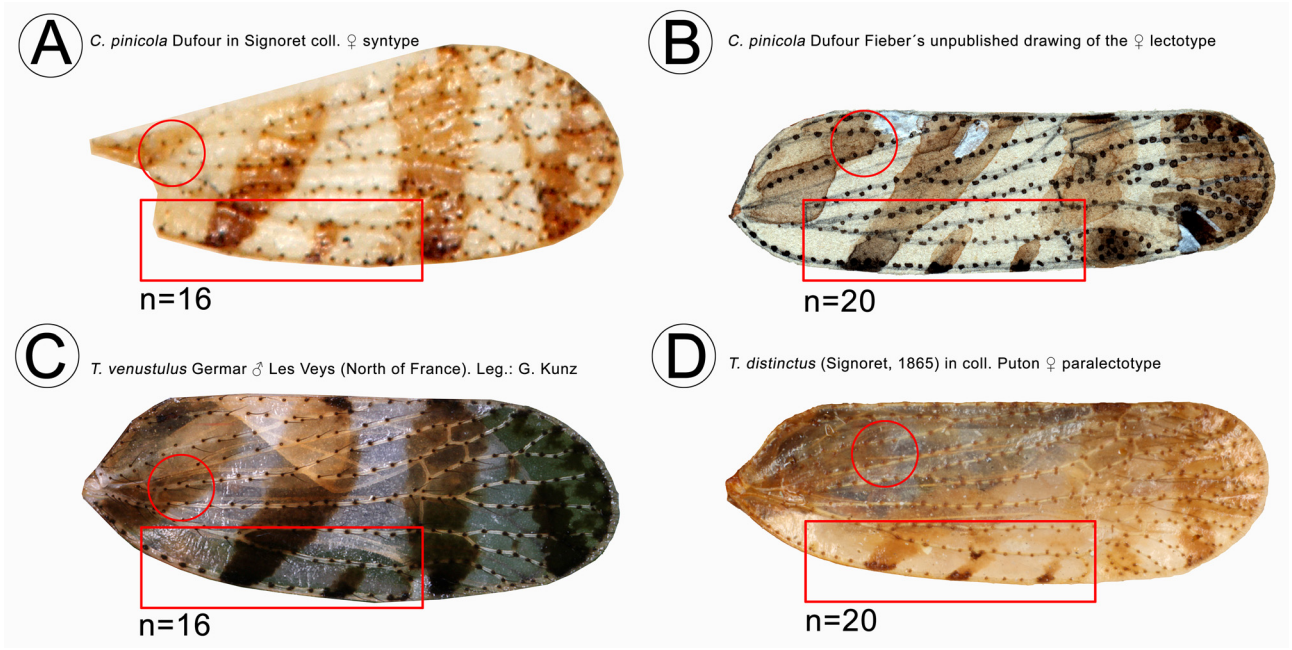


FIGURE 18. Comparison of the left forewing of A) *Cixius pinicola* in Signoret´s collection, designated as "holotype" by Wagner. B) Fieber´s drawing of the species *Cixius pinicola.* C) *Tachycixius venustulus* (Germar, 1830) collected in France/ Les Veys/ Coquebourg/ N49°21'40" W01°09'02"/ 2m/ leg.: Adeline Soulier Perkins, Gernot Kunz, David Ouvard &Thierry Bourgoin/17.05.2010. D) *Tachycixius distinctus* (Signoret, 1865) female paralectotype. "n" indicates the number of tubercles counted within the red rectangle. The red circle points on the same spot of each wing, displaying similarities and differences within the coloration.

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