BIG4
Biosystematics, Informatics, Genomics

BIG4 field workshop

June 5-11 2016, Havraníky, Czech Republic

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 642241

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Biodiversity, names and voucher specimens

Martin FIKÁČEK

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Species name

Table 1–Edible insects of *Galos*

Scientific name	Family	Local name	Temporal availability	Parts used	Mode of consumption
Pentatomid sp	Pentatomidae	*Tari*	Dec-Feb	Whole body	Raw/cooked, etc.
Locusta sp	Acrididae	*Mirbo*	Aug-Sept	Whole body	cooked
Apis indica	Apidae	*Tangik*	Oct-Nov.	Hive/Larva	Raw
Apis dorsata		*Tair*	Oct-Sept	Hive/Larva	Raw
Vespa mandrinia	Vespidae	*Iddum*	Aug-Sept	Larva	Raw
Vespa tropicana		*Ille*	Sept-Oct	Larva	Roasting
Polistinae sp		*RegoRero*	Aug-Sept	Larva	Roasting
Polistes sp		*Reli*	Aug-Sept	Larva	Roasting
Vespa bicolor	Apoidae	*Gapu*	Aug-Sept	Larva	Roasting
Cyrtotrechelus buqueti	Curculionidae	*Tak Tapum*	Sept-Oct	Larva	Roasting
Belostoma indicus	Belostomatidae	*Mosap*	Whole year	Whole body	Roasting/cooked
Katydids sp	Tettigonidae	*Takom*	Aug-Sept	Adult	cooked
Unidentified	Unidentified	*Belum Tapum*	Aug-Sept	Larvae	cooked
Unidentified	Unidentified	*Tanyi*	Sept-Oct	Larva	cooked
Unidentified	Unidentified	*Pagap*	Whole year	Larva	cooked
Unidentified	Unidentified	*Oso Nyobuk*	Whole year	Adult	cooked

Table 5 Inventory of edible Coleoptera

Scientific name	Family	English name	Vernacular name (G = Galo; N = Nyishi)	Seasonal availability	Mode of intake	Remark
Sternocera sp.	Buprestidae	Jewel beetle	Togum (G) Jorjo punyo (N)	June-July	Adult form is preferred. Boiled or smoked.	Not consumed by Galo people
Oplatocera sp.	Cerambycidae	Long horned beetle	Rigyo tapum (G) Sikse regret (N)	June-July	Adult form is preferred. Smoked, roasted or boiled. Wings and appendages are discarded.	Preferred by old people; may cause hair loss in adults. Not consumed by Galo.
Aristobia sp.	Cerambycidae	Long horned beetle	Anyo tapum (G) Sikse regre (N)	June-Aug	Adult form is preferred. Smoked, roasted or boiled. Wings are discarded	Not consumed by Galo.
Batocera roylei	Cerambycidae	Long horned beetle	Anyo tapum (G) Sikse regret (N)	June-Aug	Both larval and adult forms are taken. Smoked, roasted or boiled. Wings are discarded	Not consumed by Galo.
Xylorhiza sp.	Cerambycidae	Long horned beetle	Tani ane (G) Sikse regret (N)	June-Sept	Larval form is preferred. Boiled or fried.	
Monochamus versteegi	Cerambycidae	Long horned beetle	Sikse regret (N)	June-Sept	Adult form is preferred. Smoked, roasted or boiled. Wings are discarded.	Not consumed by Galo.
Unidentified	Cerambycidae	Long horned beetle	Anyo tapum (G) Sikse regre (N)	June-Aug	Adult form is preferred. Smoked, roasted or boiled. Wings are discarded.	Not consumed by Galo.
Unidentified	Cerambycidae	Long horned beetle	Anyo tapum (G) Sikse regre (N)	June-Aug	Adult form is preferred. Smoked, roasted or boiled. Wings are discarded.	Not consumed by Galo.
Dorcus sp.	Lucanidae	Stag beetle	Tonge lote (Male) (G) Tapu yagar nya (Male) (N)	Aug-Sept	Both larval and adult stages are preferred. Roasted, boiled or paste (chutney) preferred with alcohol. If	Stem borer remains inside the bamboo shoot. Both adult and

Galo and Nyishi tribes in Arunachal Pradesh

Species name

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Names usually correspond to genera of taxa which can be useful

In some cases the tribes distinguish even species withina genus

e.g. Bees and wasps

Tair (*Apis dorsata*)

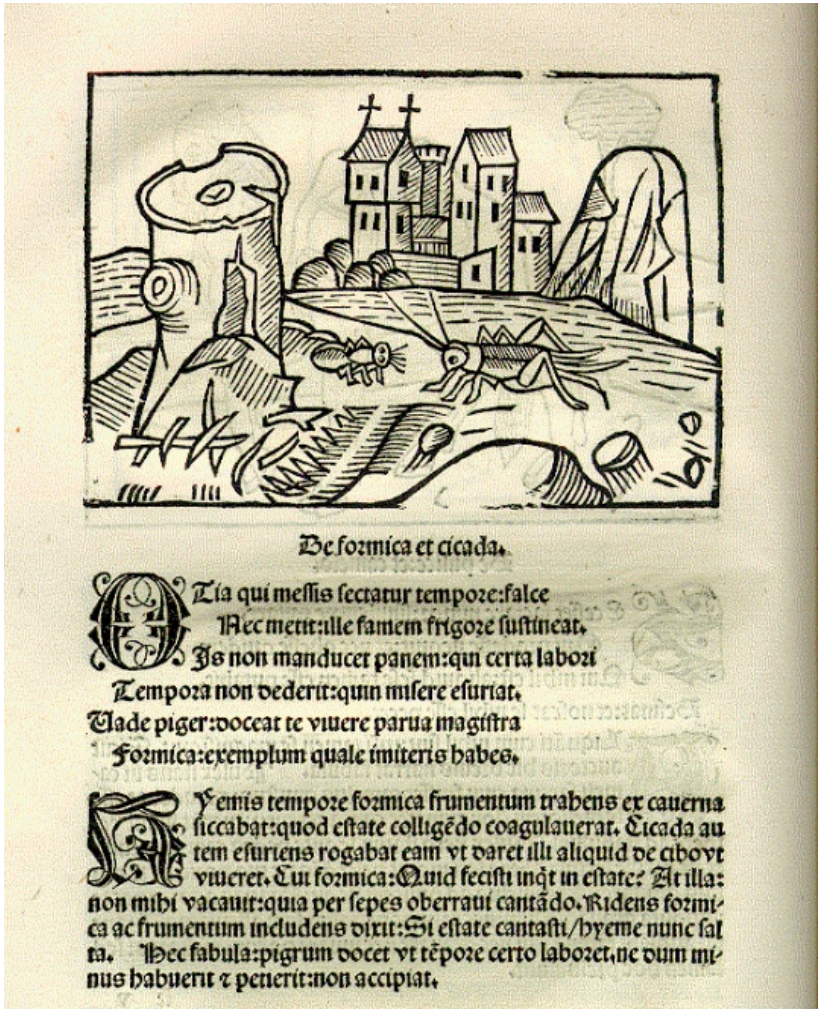
Tangik (*Apis celata indica*)

Iddum (*Vespa mandarinia*)

Ille (*Vespa tropica*)

Gapu (*Vespa bicolor*)

Species name



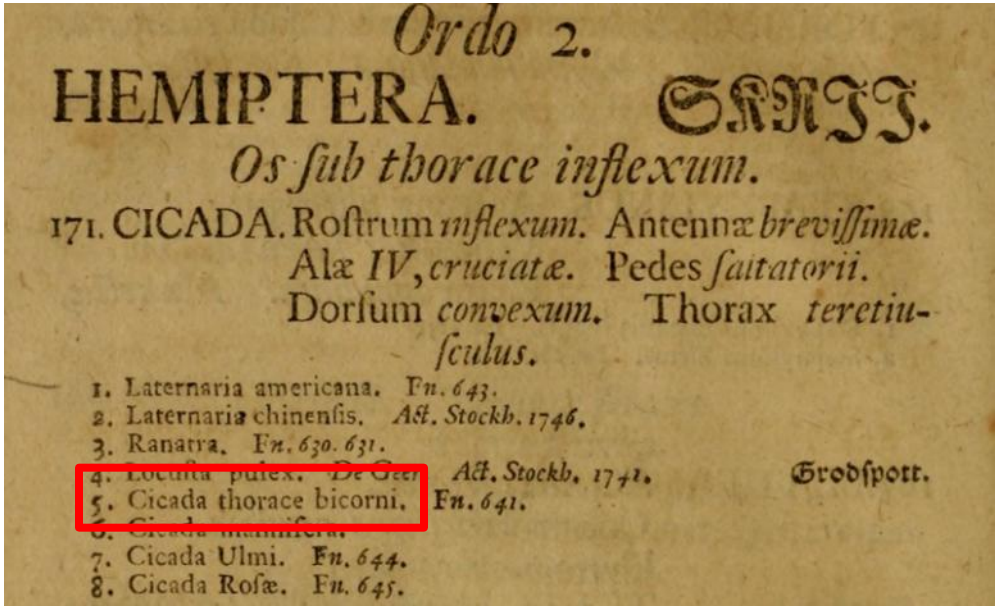
De formica et cicada.

Tia qui messis secatur tempore: falce
Nec metit: ille famem frigore sustineat.
Is non manducet panem: qui certa labori
Tempora non dederit: quin misere esuriat.
Vade piger: doceat te viuere parua magistra
Formica: exemplum quale imiteris habes.

Hyemis tempore formica frumentum trabens ex caverna siccabat: quod estate colligẽdo coagulauerat. Cicada autem esuriens rogabat eam vt daret illi aliquid de cibovt viueret. Cui formica: Quid feceris inqt in estate? At illa: non mihi vacauit: quia per sepes oberrauit cantãdo. Ridens formica ac frumentum includens dixit: Si estate cantasti/hyeme nunc saltа. Hec fabula: pigrum docet vt tẽpore certo laboret, ne dum minus habuerit & petierit: non accipiat.

Aesopian fable *About the ant and the cricket* in a book published in 1501

When people started to catalogorize biodiversity, they used Latin and Greek words for scientific purposes, and distinguished particular species of ants and cicadas by a diagnosis written in Latin



Ordo 2.

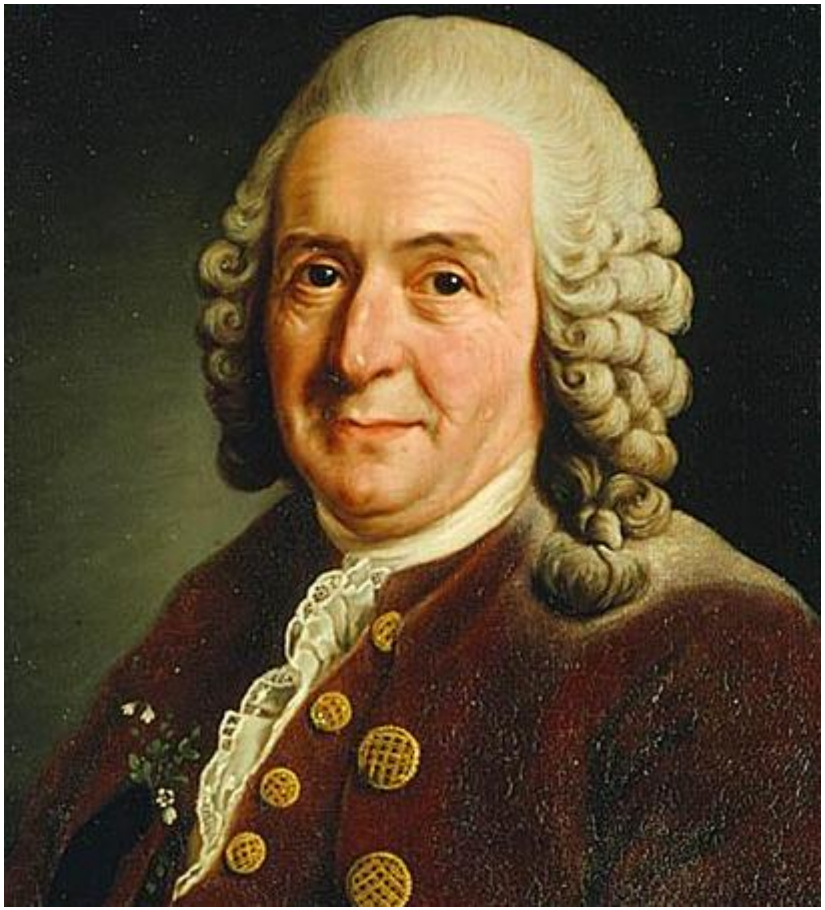
HEMIPTERA. SKIÖ.

Os sub thorace inflexum.

171. CICADA. Rostrum *inflexum.* Antennæ *breviſſimæ.* Alæ *IV, cruciatæ.* Pedes *ſaltatorii.* Dorsum *convexum.* Thorax *teretiuſculus.*

1. Laternaria americana. *Fn. 643.*
2. Laternaria chinenſis. *Act. Stockh. 1746.*
3. Ranatra. *Fn. 630. 631.*
4. Locusta pulex. De Geer *Act. Stockh. 1741.* Grodſpott.
5. Cicada thorace bicorni. *Fn. 641.*
6. Cicada mammifera.
7. Cicada Ulmi. *Fn. 644.*
8. Cicada Roſæ. *Fn. 645.*

Species name



Carl Linnaeus

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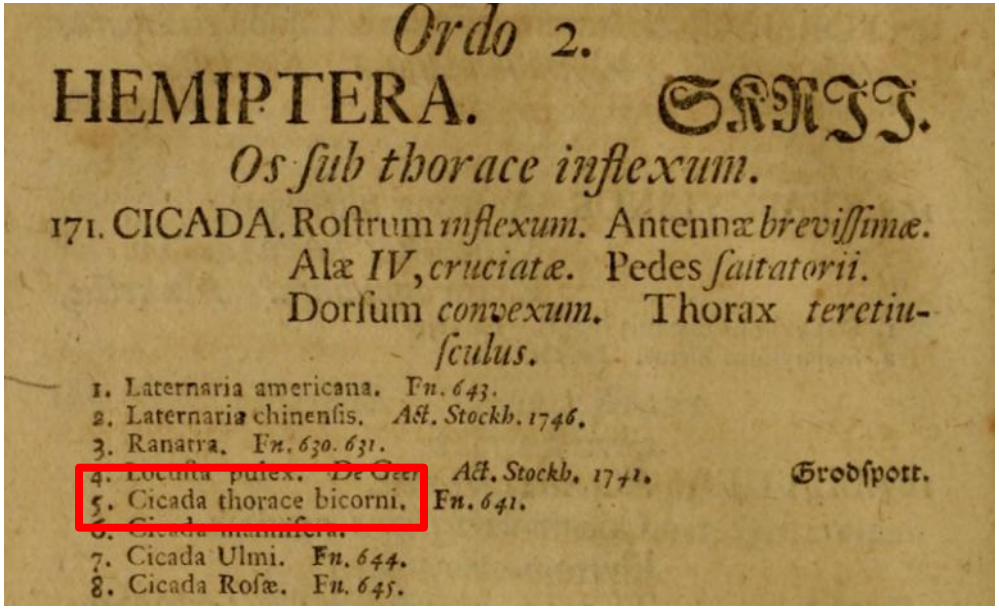

Ordo 2.

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Os ſub thorace inflexum.

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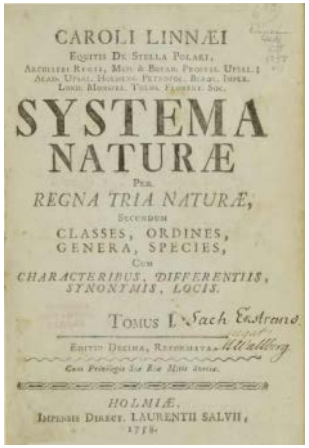
Cicada chapter in 6th edition of Linnean *Systema naturae* (1748)

Species name


CAROLI LINNÆI
EQUITIS DE STELLA POLARI,
ARCHIATRI REGII, MED. & BOTAN. PROFESS. UPSAL.
ACAD. UPSAL. HOLMENS. PETROPOL. BEROL. IMPER.
LOND. MEDICOL. THESM. FLORENT. SOC.

SYSTEMA NATURÆ

PER
REGNA TRIA NATURÆ,
SECUNDUM
CLASSES, ORDINES,
GENERA, SPECIES,
CUM
CHARACTERIBUS, DIFFERENTIIS,
SYNONYMIS, LOCIS.

TOMUS I. Sach. Extrane

EDITIO DECIMA, REFORMATA.

Cum Privilegio Sac. Reg. Majt. Suecie.

HOLMIÆ,
IMPENSIS DIRECT. LAURENTII SALVII,
1758.

10th edition of *Systema Naturae* (**1758**)

II. HEMIPTERA.

Roſtrum *inflexum ſub Pectore.*
Alæ *vel ſemicoleoptra: alis ſuperioribus dimidiato-cartilagineis vel alteri ſexui tantum.*

195. CICADA. *Roſtrum* inflexum.
Antennæ thorace breviores.
Alæ IV, membranaceæ, deflexæ.
Pedes plerisque ſaltatorii.

* NOCTILUCÆ. *Capite antice protracto in veſicam oblongam.*

Laternaria. 1. C. fronte roſtrata ovali recta, alis lividis: poſticis ocellatis.
Grew. muſ. 158. *t.* 13. Cucujus peruvianus.
Merian. Jur. t. 49. Laternaria.
Reaum. inſ. 5. *t.* 20. *f.* 6. 7.
Roſ. inſ. 2. *gryll. t.* 28. 29.
Habitat in America *calidiore.*
Prominente fronte noctu lucem vivaciſſimam ſpargit.

Candelaria. 2. C. fronte roſtrata ſubulata adſcendente, elytris viridibus luteo punctatis, alis flavis: apice nigris.
Act. Stockh. 1746. *p.* 63. *t.* 1. *f.* 5. 6.
Edw. av. t. 120.
Roſ. inſ. 2. *gryll.* 189. *t.* 30.
Habitat in China.

phoſphorea. 3. C. fronte roſtrata ſubulata adſcendente, corpore griſeo-glauco.
Habitat in America. *Rolander.*

noctiviga. 4. C. fronte roſtrata acuminata adſcendente, corpore viridi, alis hyalinis.
Habitat in America. *Rolander.*

lucernaria. 5. C. fronte roſtrata prominente, corpore ſupra virideſcente ſubtus flavo.
Habitat in America. *Rolander.*

** Fo-

** FOLIACEÆ. *Thorace compreſſo-membranaceo, corpore majore.*

foliata. 6. C. foliacea rotundata nigra area alba.
Merian. ſurin. t. 5. *f. ult.*
Habitat in India. *De Geer.*
Thorax *e ſolio perpendiculari, ſemicordato, atro, antice rotundato, utrinque, in altero ſexu, area alba, in altero vero antice linea alba, poſtice area alba.* Poſtice *ſubtus corpus* Elytris 2 *nigris* Alisque 2 *albis.* Pedes *anteriores extimo articulo gibboſi.*

frondifia. 7. C. foliacea dorſo repando: roſtro obtuſiſſimo.
Habitat in America. *Rolander.*
Thorax *e ſolio perpendiculari griſeo margine ſuperiore repando, antice producto in roſtrum ſubtruncatum; poſtice anguſtatum, longitudine corporis, devrſum acutum.* Elytra *obovata, concoloria.* Alæ *hyalinæ.* Pedes *breves.*

ſquamigera. 8. C. foliacea antice poſticeque roſtrata acuta.
Habitat in America. *Rolander.*
Simillima priori, ſed minor, livido-griſea. Thorax *antice adſcendens in roſtrum acuminulum, poſtice acute deſcendens.* An *prioris Mas?*

*** CRUCIATÆ *Thorace utrinque cornuto.*

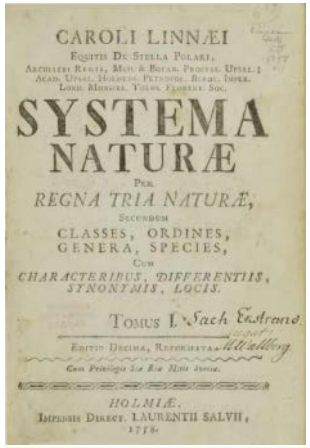
Crux. 9. C. thorace cruciformi corpus totum tegente.
Habitat in Indiis.
Thorax forma crucis: brachiis expanſis compreſſis; columna poſtice longitudine abdominis, latior, ſubcarinata.

cornuta. 10. C. thorace bicorni poſtice producto, alis nudis. *Fn. ſuec.* 641.
Pet. gaz. t. 47. *f.* 2. 3. Ranatra cornuta.
Habitat in Carduis, Salicibus.

aurita. 11. C. thorace biaurito, capitis clypeo antrorſum dilatato rotundato.
Habitat in Germania. *P. Forſkål.*
Magnitudo Tabani, tota cinerea. Thorax *a tergo gerit cornua duo, compreſſa, erectiuſcula, rotundata, at*

Cicadæ, *quotquot novimus, ſtrident uti Gryli, ſed alio inſtrumento.*

Species name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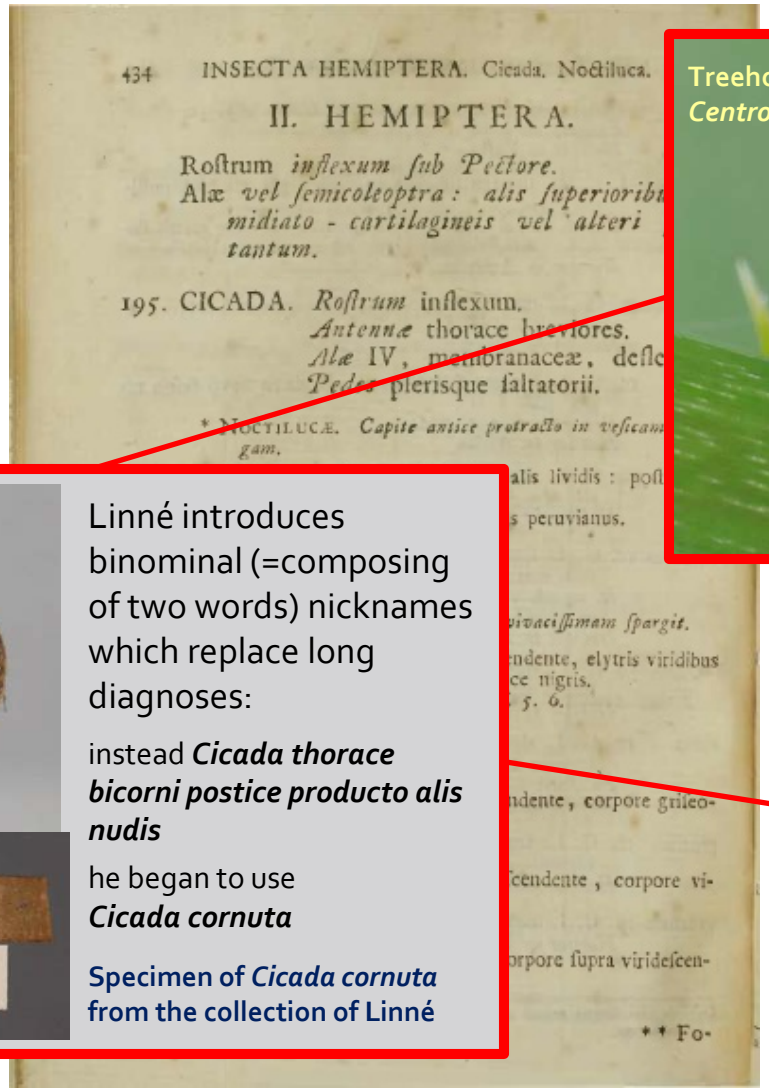
434 INSECTA HEMIPTERA. Cicada. Noctiluca.

II. HEMIPTERA.

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Alæ *vel ſemicoleoptra: alis ſuperioribus* [illegible] *midiato - cartilagineis vel alteri* [illegible] *tantum.*

195. CICADA. *Roſtrum* inflexum.
Antennæ thorace [illegible]
Alæ IV, membranaceæ, [illegible]
Pedes plerisque ſaltatorii.

* NOCTILUCÆ. *Capite antice protracto in veſicam* [illegible] *gam.*

[illegible] alis lividis : [illegible]

[illegible] s peruvianus.

[illegible] *pivaciſſimam ſpargit.*

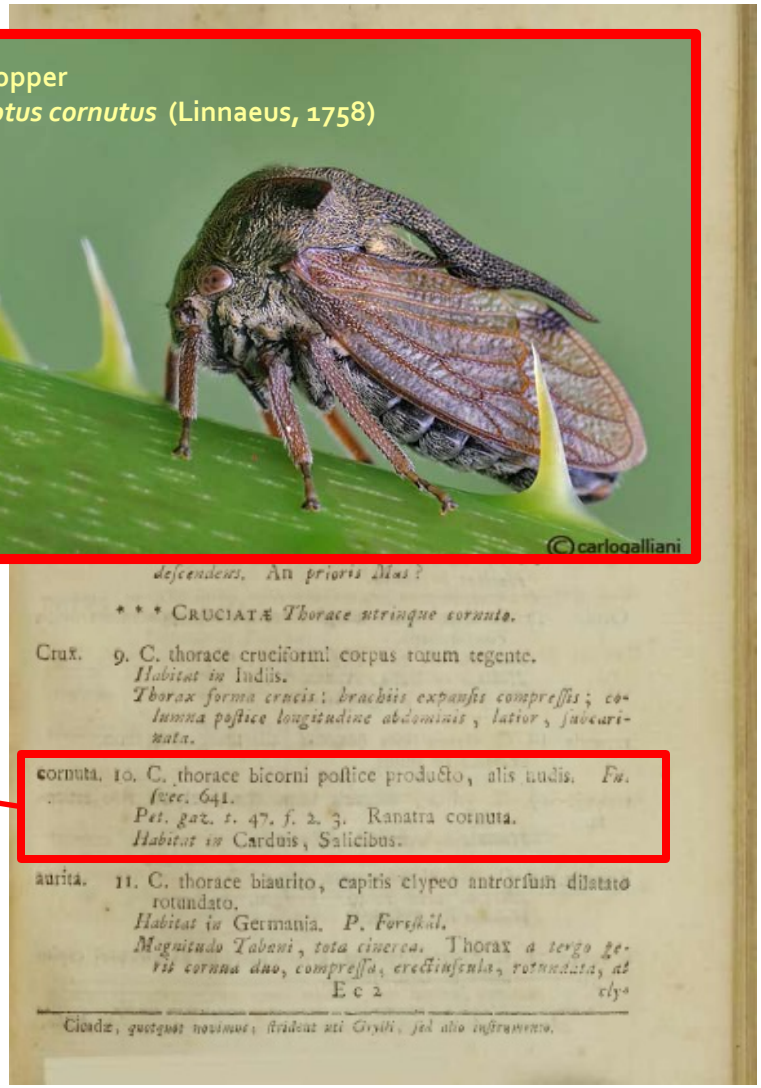
[illegible] ndente, elytris viridibus [illegible] ce nigris. [illegible] 5. 6.

[illegible] ndente, corpore grileo-

[illegible] cendente, corpore vi-

[illegible] orpore ſupra virideſcen-

** Fo-


deſcendens. An prioris Mas?

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Magnitudo Tabani, tota cinerea. Thorax *a tergo gerit cornua duo, compreſſa, erectiuſcula, rotundata, at*

E e 2 *elyt*

Cicadæ, quotquot novimus, ſtrident uti Grylli, ſed alio inſtrumento.

Linné introduces binominal (=composing of two words) nicknames which replace long diagnoses:

instead ***Cicada thorace bicorni postice producto alis nudis***

he began to use ***Cicada cornuta***

Specimen of *Cicada cornuta* from the collection of Linné

Species name

Rules for scientific names of species:

- binominal – *Cicada cornuta* Linnaeus, 1758

  (in case of subspecies trinominal – composing of three words – *Cetonia aurata sicula* Aliquo, 1983)

- Latin or latinized

- unique for each species

Cicada cornuta Linnaeus, 1758 → *Centrotus cornutus* (Linnaeus, 1758)

(Not very good) species name

Anophtalmus hitleri
Scheibel, 1937

Parastratiosphecomyia stratiosphecomyioides
Brunetti, 1923

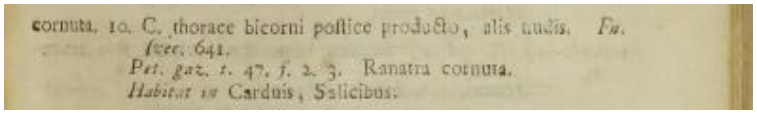
When problems come…

?

?

How to find out which of these two species is the one which Linne described??

Centrotus cornutus **(Linnaeus, 1758)**

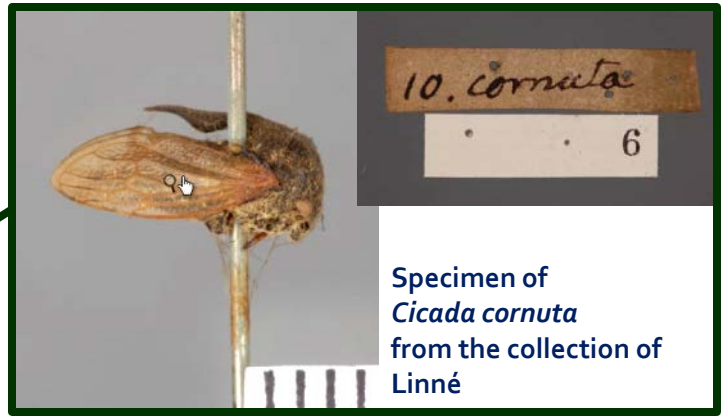

cornuta. 10. C. thorace bicorni pollice producto, alis nudis. *Fn.*
suec. 641.
Pet. gaz. t. 47. *f.* 2. 3. Ranatra cornuta.
Habitat in Carduis, Salicibus.

Original description by Linné: A cicad with the prothorax bearing two horns and projecting posteriad, with wings lacking setae.

When problems come…

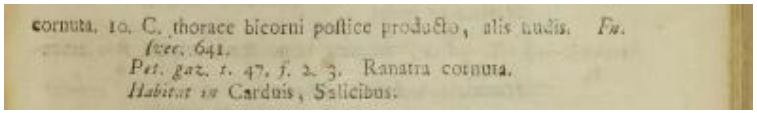
?

?



Specimen of *Cicada cornuta* from the collection of Linné

Centrotus cornutus **(Linnaeus, 1758)**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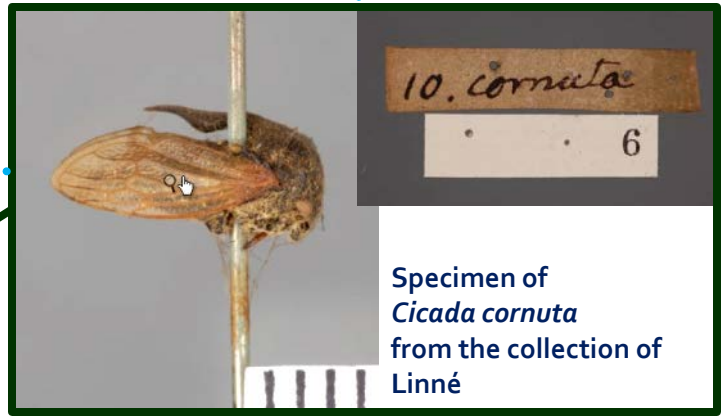

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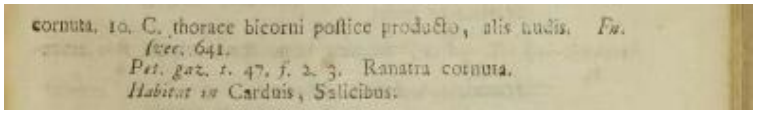
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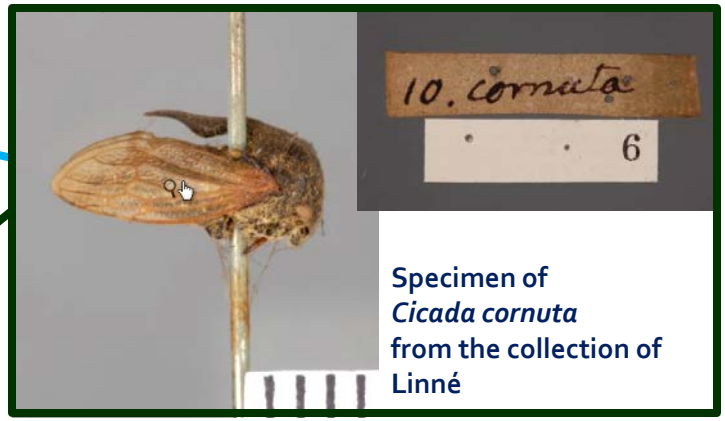
Pet. gaz. t. 47. *f.* 2. 3. Ranatra cornuta.
Habitat in Carduis, Salicibus.

Original description by Linné: A cicad with the prothorax bearing two horns and projecting posteriad, with wings lacking setae.

When problems come…



Specimen of *Cicada cornuta* from the collection of Linné

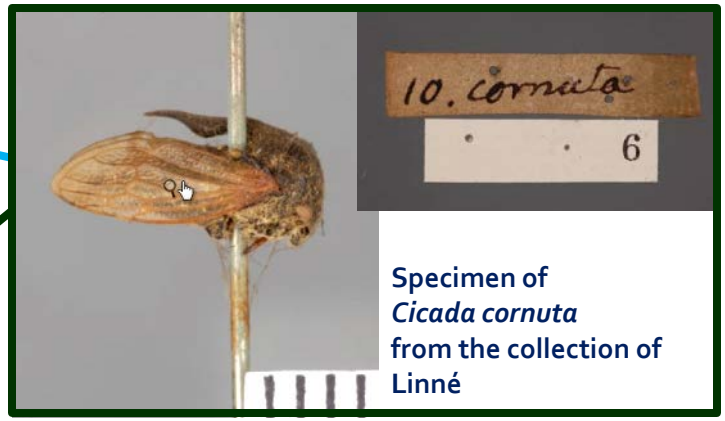
Centrotus cornutus **(Linnaeus, 1758)**

Type specimen – the specimen which Linné had in front of him when he was describing *Cicada cornuta*

When problems come…

Systematic and taxonomic questions:

- how this species looks like and how it differs from others (**identification**)
- to which other species it is similar or related (**classification and phylogeny**)
- how the species lives (distribution, host plants, immature stages - **biology**)



Specimen of *Cicada cornuta* from the collection of Linné

Type specimen – the specimen which Linné had in front of him when he was describing *Cicada cornuta*

***Centrotus cornutus* (Linnaeus, 1758)**

Zoological nomeclature

- keeps the names unique for each species
- determines what to do when this is not the case

Type series and the holotype

Type series of a hydrophilid beetle
***Oocyclus madidus* Short, 2009**

HOLOTYPE – the only specimen which defines the species name

PARATYPES – other specimens which the author had in front of him/her when describing the species

- specifies more how the author understood the species (e.g. in species with variabile coloration)
- often sent to various museums as comparative material for other scientists

***Oocyclus madidus* sp. nov.**
(Figs. 2, 4)

Type material. HOLOTYPE: male, 'INDIA, Meghalaya State (10) / E Khasi Hills, 11km SW Cherra- / punjee, Laitkynsew, 21-24.iv. / 2008, 25°13'N 91°39'E, 810m / Fikáček, Podskalská, Šípek lgt.' // 'seepage: wet rocks algae / blue algae/moss ca. 1.5-2 km / via rd. from 'Cherrapunjee Holid. / Resort' in direct. Cherrapunjee, / exposed' (NMPC). PARATYPES: 24 spec., same data as holotype (KSEM, NHMW, NMPC, USNM).

Syntypes and lectotype

Second possibility – the author did not designate the holotype:

syntypes

A taxonomist who is revising the group can select single syntype and make it the unique specimen defining the name – **lectotype**
(other syntypes then become **paralectotypes**).

Original description (Régimbart 1903)

Cercyon dieganus (Bedel, *in litt.*), n. sp. — Long. 2 2/3-3mill. — *Elliptico-ovalis, modice convexus, niger, prothoracis lateribus elytrorumque macula lata obliqua apicali flavis, pedibus ferrugineis, fortiter dense punctatus; elytris subcoriaceis, seriebus postice et ad latera canaliculatis et fortiter punctatis, antice planis, punctis minoribus, stria suturali ceteris haud profundius impressa.*

Ressemble beaucoup comme forme et coloration à notre *C. aquaticus* Cast. (*terminalis* Zett.), mais en diffère par les stries des élytres beaucoup plus profondes et par la tache apicale oblique, parallèle au bord qu'elle occupe dans son dernier tiers au moins.

Tananarive (Sikora); Diégo-Suarez, Fort-Dauphin (Alluaud); baie d'Antongil (Mocquerys).

Syntypes and lectotype

Second possibility – the author did not designate the holotype:

lectotype
defines the meaning of the name

paralectotypes

A taxonomist who is revising the group can select single syntype and make it the unique specimen defining the name – **lectotype**
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Tananarive (Sikora); Diégo-Suarez, Fort-Dauphin (Alluaud); baie d'Antongil (Mocquerys).

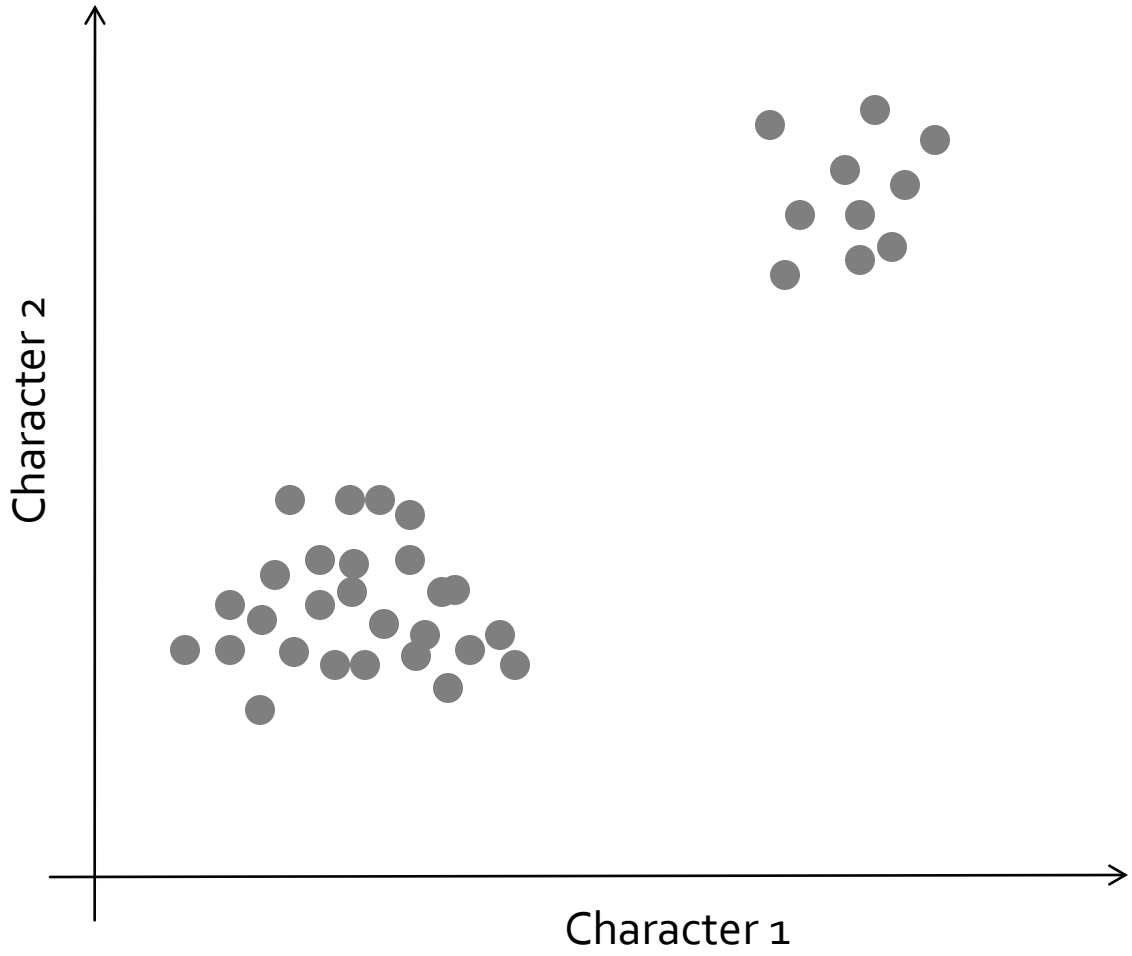
Cercyon dieganus RÉGIMBART, 1903
Figs. 7-10, 26-28, 35, Map 1

Cercyon dieganus RÉGIMBART, 1903: 48
Cercyon dieganus RÉGIMBART: ALFIERI (1976), BALFOUR-BROWNE (1950, 1957), HANSEN (1999), HEBAUER (1988, 1997, 2005), ORCHYMONT (1937, 1948 (partim.)).

TYPE MATERIAL EXAMINED:
Cercyon dieganus: Lectotype (here designated): ''Tananarive / Sikora (handwritten) // Museum Paris / coll Maurice Régimbart / 1908 (printed on blue label) // Dieganus / (Bed.) Rég.'', 1 female (MNHN). Paralectotypes (here designated): ''Madag. B / d'Antongil (handwritten) // Museum Paris / coll. Maurice Régimbart 1908 (printed on blue label)'', 2 females (MNHN). (Both paratype specimens are pinned on the same pin, the second one is pinned below the locality label). All specimens bearing the label: ''(PARA)LECTOTYPE / Cercyon dieganus / Régimbart, 1903 / des. M. Fikáček 2004''.

Sebsequent revision and lectotype designation (Fikáček 2004)

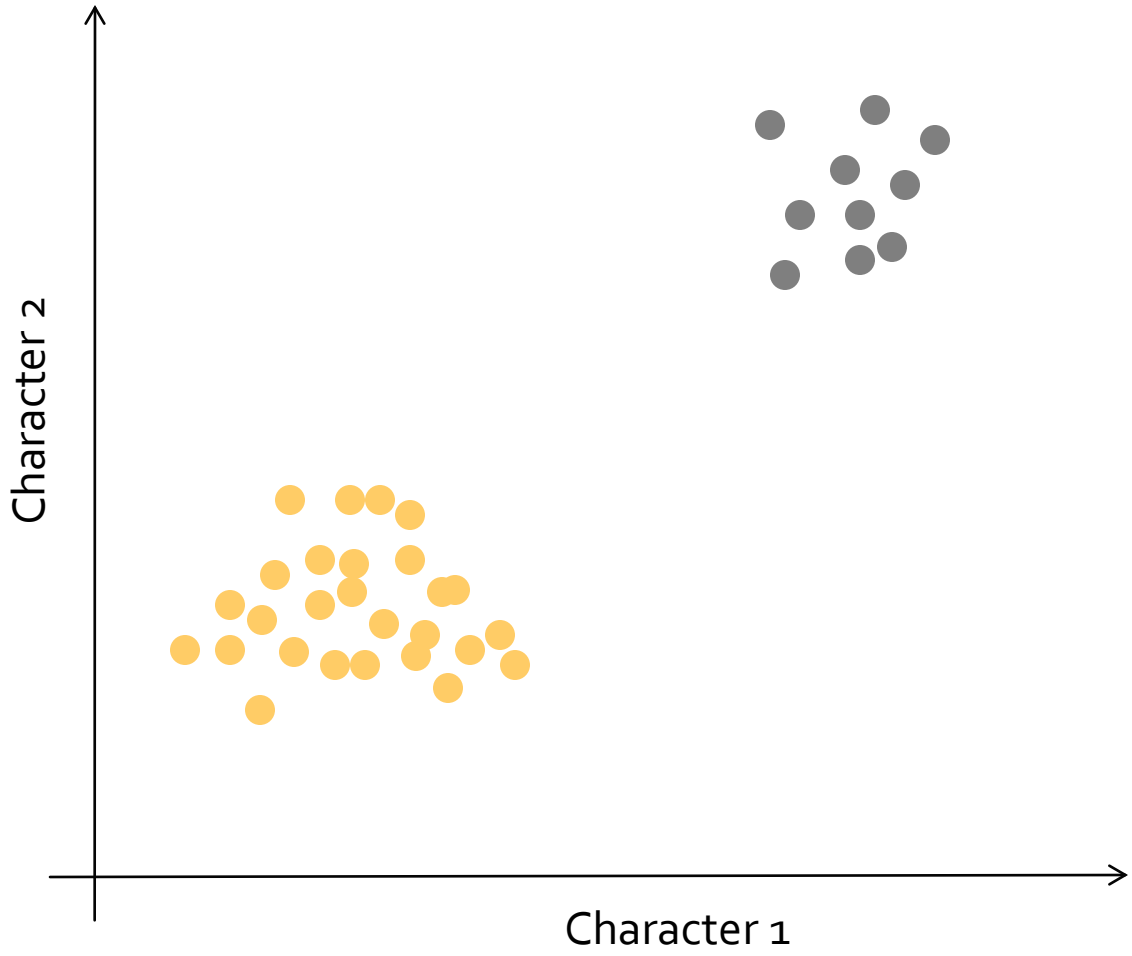
Type is NOT necessarily typical



Type is NOT necessarily typical

We have two species:

Which of those is *Oocyclus madidus*?



Type is NOT necessarily typical

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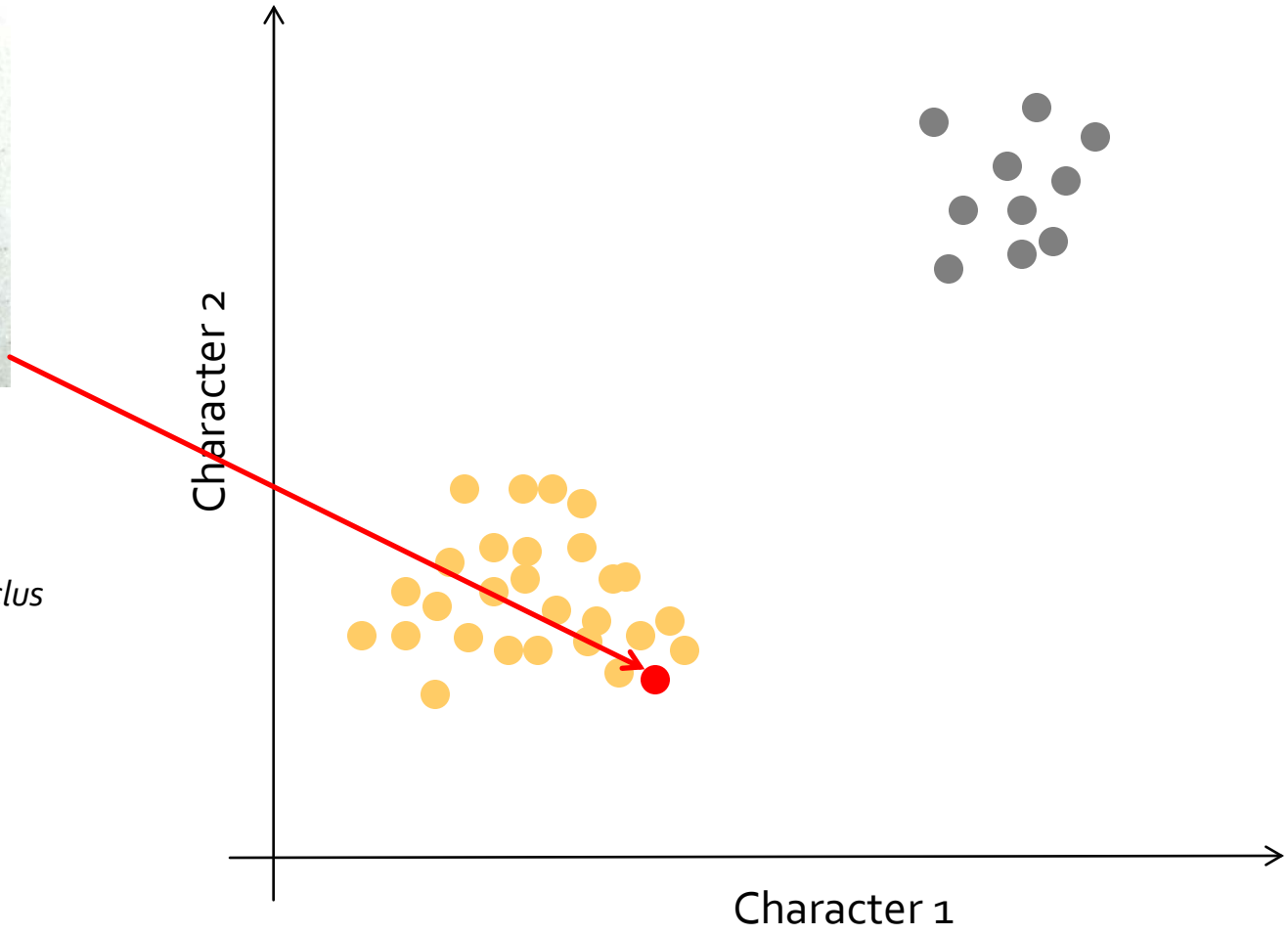

Type is NOT necessarily typical

We have two species:

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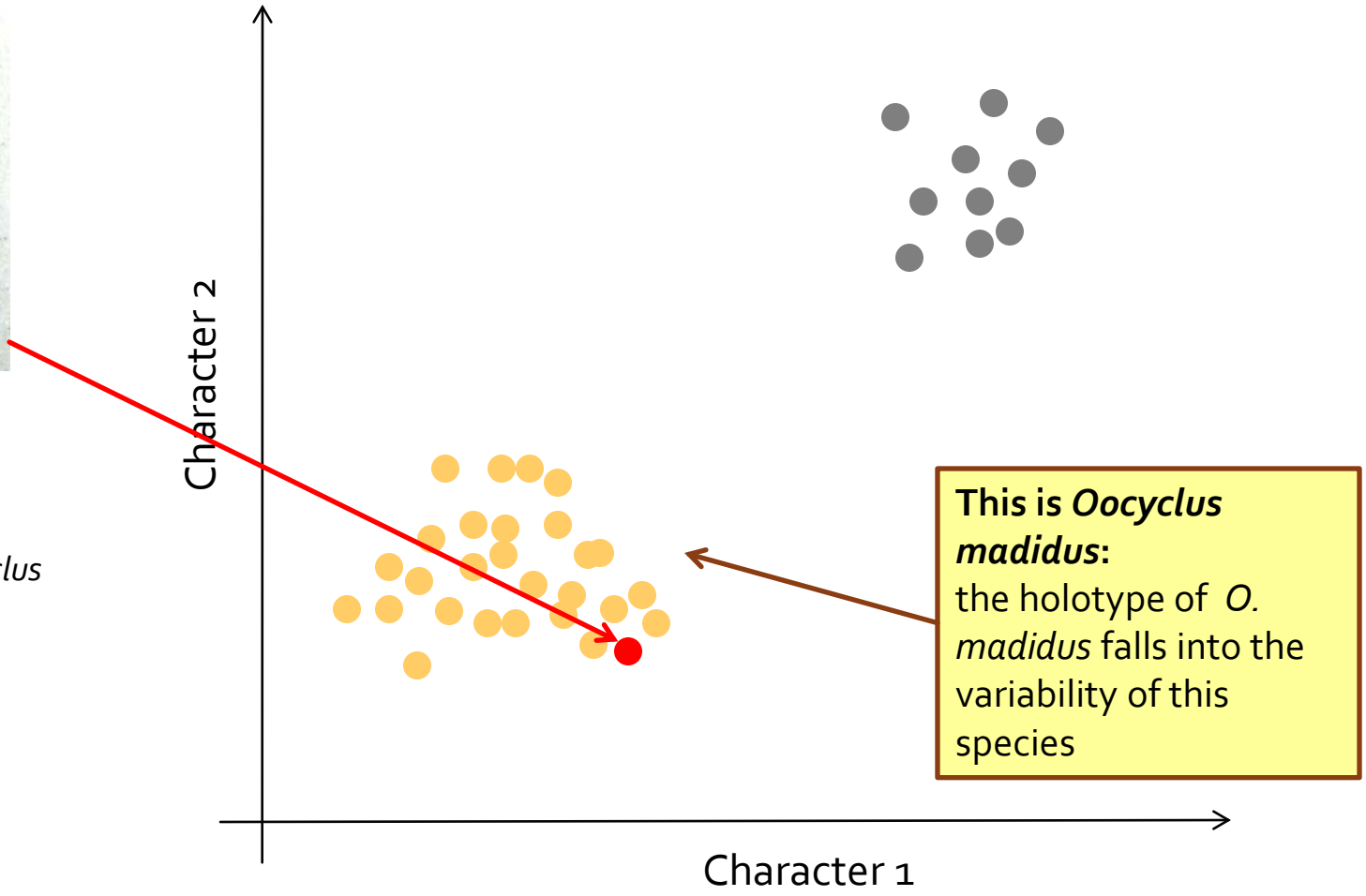
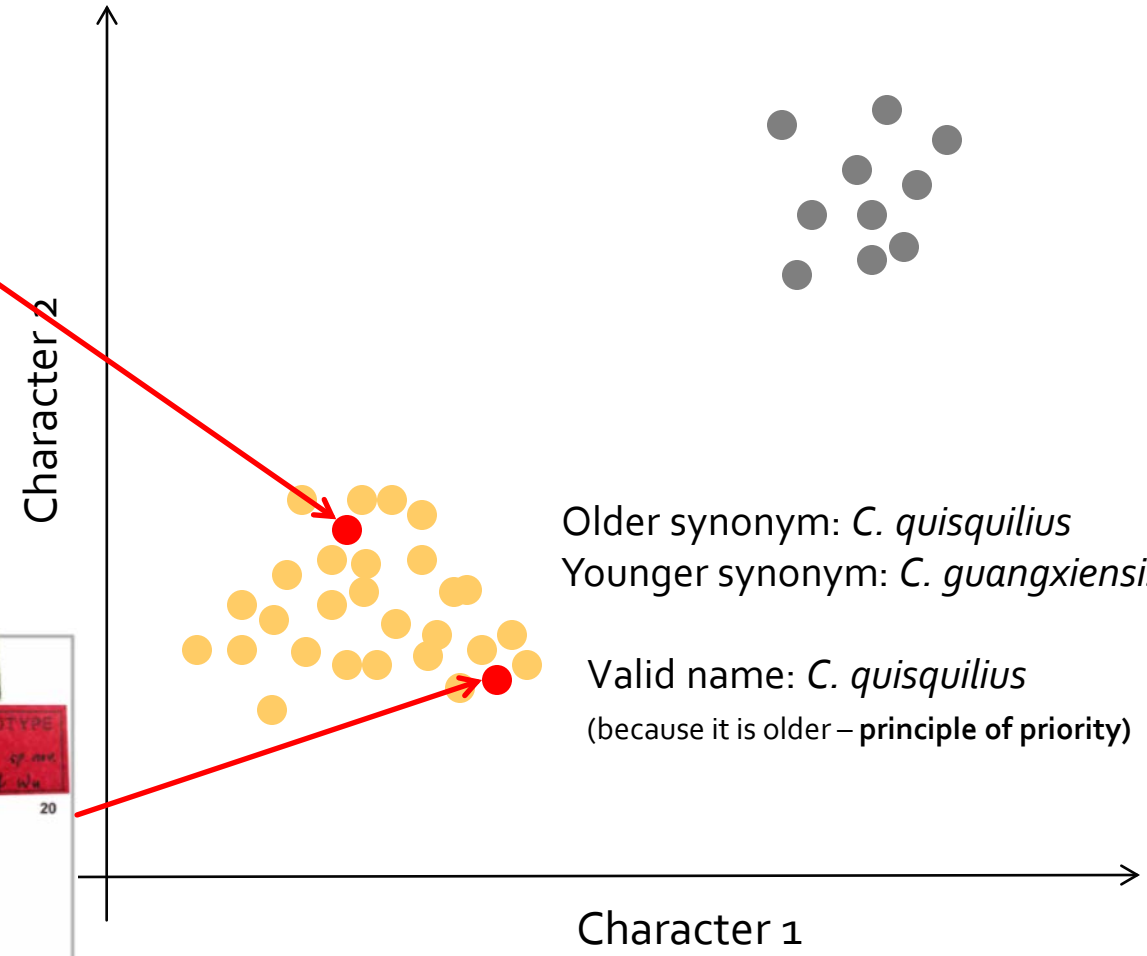


This is *Oocyclus madidus*:
the holotype of *O. madidus* falls into the variability of this species

Synonyms

Cercyon quisquilius (Linnaeus, 1761)

Cercyon guangxiensis Wu & Pu, 1995

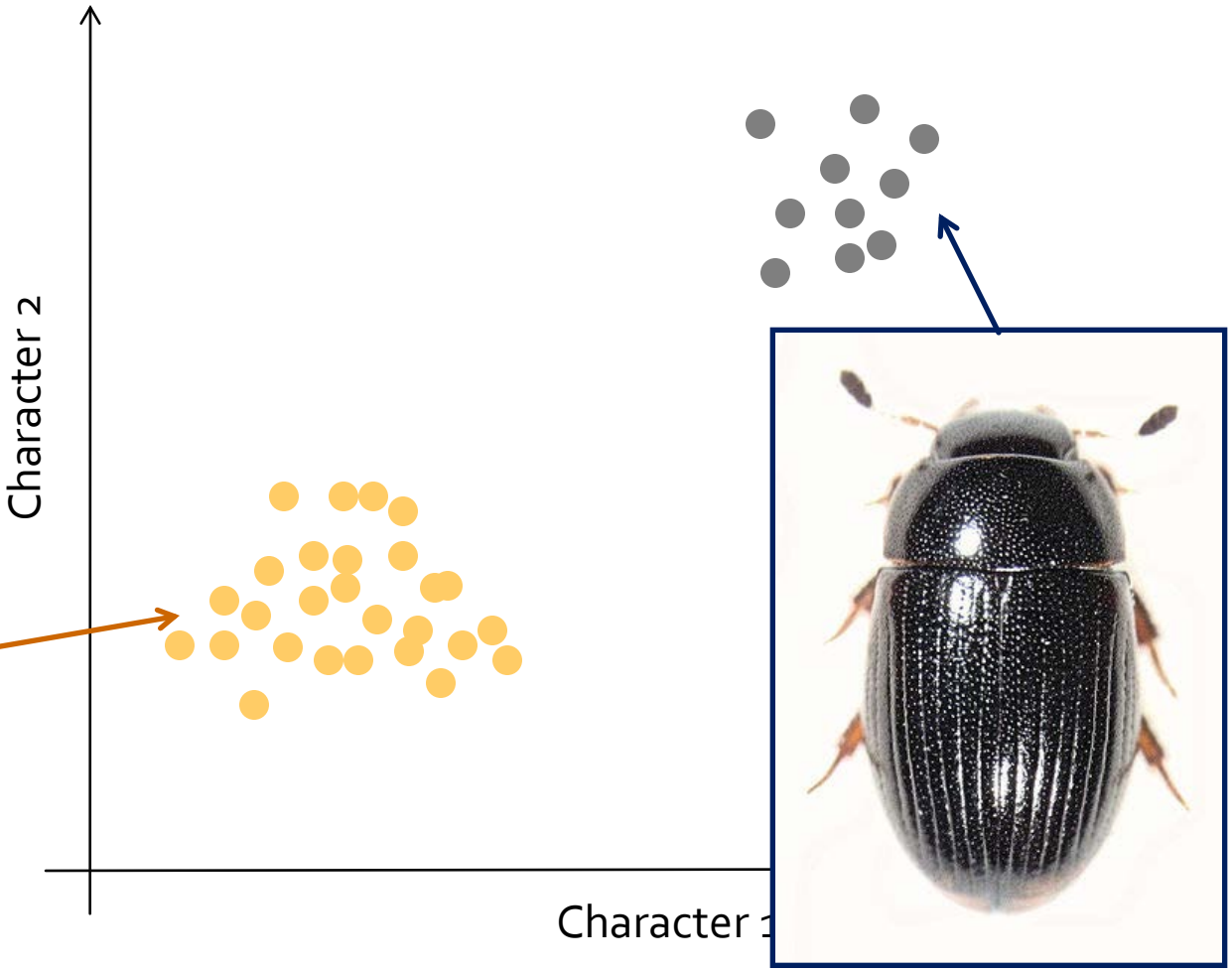


Older synonym: *C. quisquilius*
Younger synonym: *C. guangxiensis*

Valid name: *C. quisquilius*
(because it is older – **principle of priority)**

Homonyms

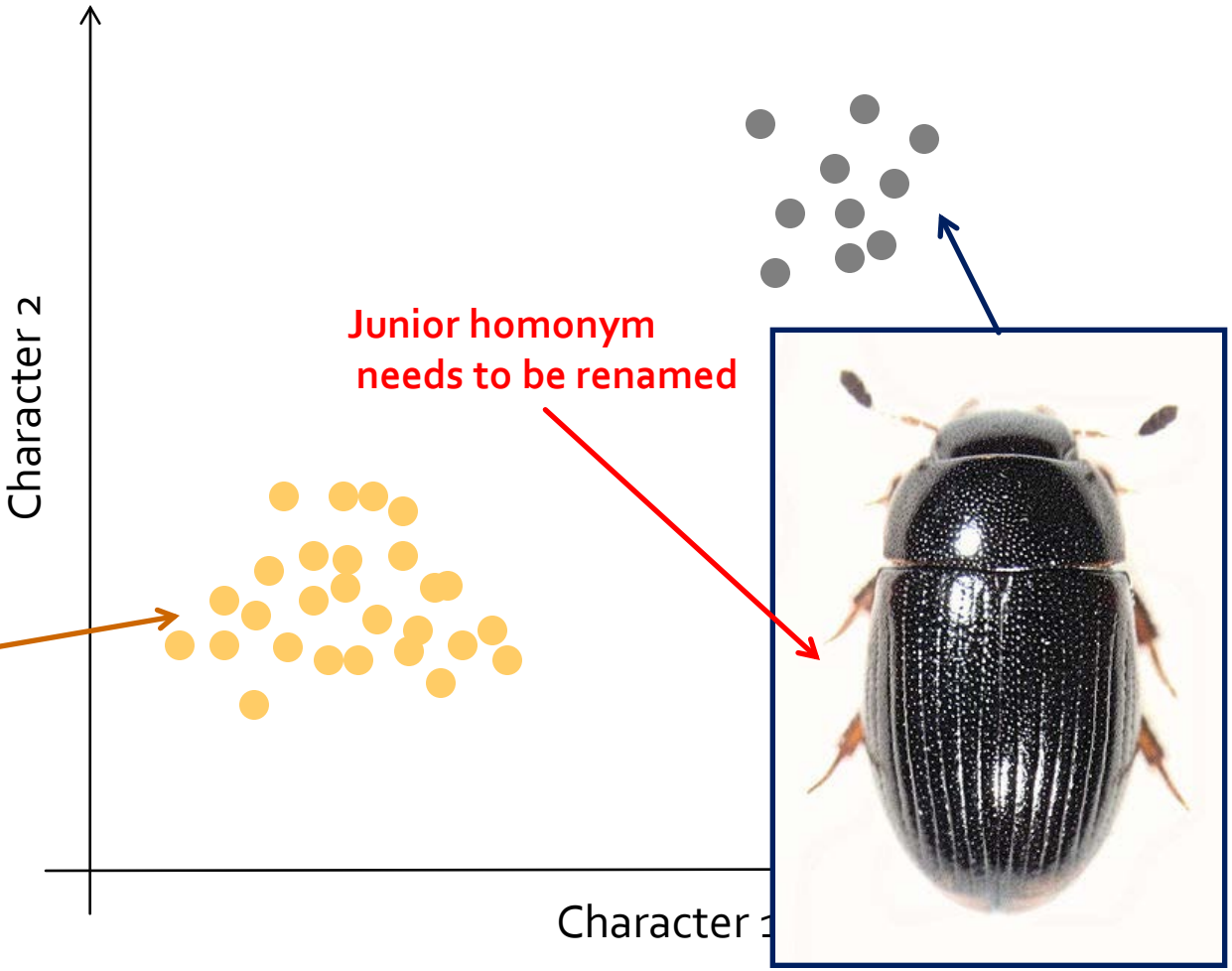
Cercyon quisquilius (Linnaeus, 1761)



Cercyon quisquilius Coyote, 1897

Homonyms

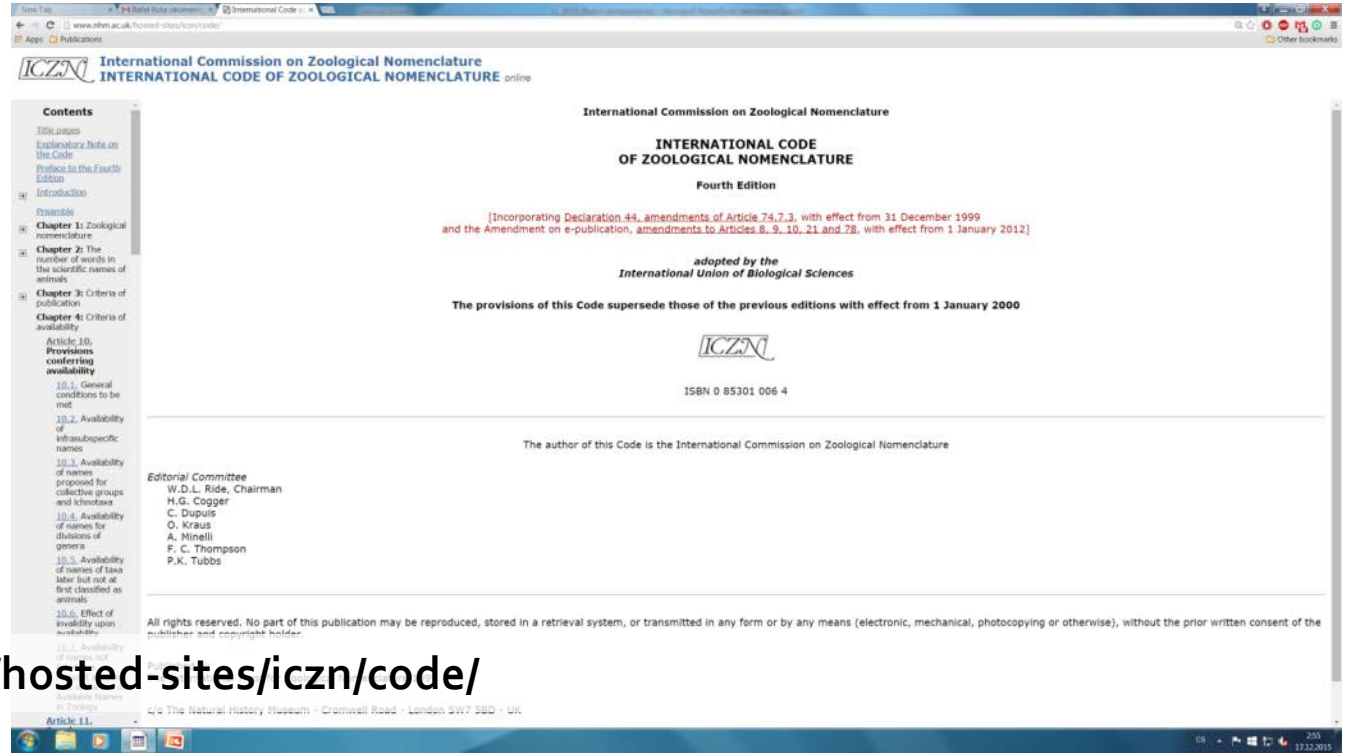
Cercyon quisquilius (Linnaeus, 1761)



Cercyon ***coyotei*** Fikáček, 2076

Zoological nomenclature

International Commission of Zoological Nomenclature (ICZN):
International Code of Zoological Nomenclature (4th edition)



http://www.nhm.ac.uk/hosted-sites/iczn/code/

Description of a new species

***Oosternum convexum* sp. nov.**
(Figs. 1, 2, 7–9, 11, 14, 17, 19, 22–24)

Type locality. Panama, Chiriqui Province, 4.5 km SE of Cerro Punta, oak and bamboo forest.
Type material. HOLOTYPE: ♂ (CNC): 'PAN. Chiriqui, 4.5 / km SE Cerro Punta / oak & bamboo forest / 28.V.1977 / S&J Peck'. PARATYPES (205 spec.): **PANAMA:** 11 spec. (CNC, ZMUC, NMPC): same data as holotype; 1 ♂ (ZMUC): 'PAN., Chiriqui, 1700m / 2km. W. Cerro Punta / 24.-28.V.77 S. & J. / Peck. Ber. 376 / litter & carrion'; 1 ♂, 37 spec. (ZMUC, BMNH, FEFU, NHMW, NMPC, SRBC): 'PANAMA: Chiriqui / P. Nac. Volcan Baru / 5.9km E Cerro Punta, 2150m / 14.Jun.1995 R. Anderson / riparian alder forest litter'; 1 spec. (KSEM): 'PANAMÁ: Chiriqui / 5.9 km N Cerro Punta / Par. Nac. Volcan Baru, 2150 m / 8°22'0"N [sic!, = 8°52'0"N] , 82°34'0"W / 14 JUN 1995; R. Anderson / PAN2A95 22A / ex: alder forest litter'; 1 ♂, 21 spec. (ZMUC): 'PANAMA: Chiriqui / P. Nac. Volcan Baru / 5.9km E Cerro Pu… UC, BMNH, FEFU, NM… 15.Jun.1995 R. Anderso… Cerro Punta / Par. Nac. … R. Anderson / PAN2A95… Santa Clara, Cerro Pand… 4C'; 1 spec. (KSEM): 'P… 17 VI 1996; R. An… riqui, 12 km NE / Santa … d forest litt. 96-135C'; 1… / alt. 7000 ft // CNHM Panama … on / steep wooded slope'; 1 ♀, 1 spec. (FMNH): 'PANAMA: Chiriqui Prov. / 'Casita Alta', Finca / Lerida nr. Boquete / III. 18. 1959, 6900 ft // Berlese (B-543) / conc. floor debris / in damp ravine / leg. / H. S. Dybas'; 1 ♀ (ZMUC): 'PANAMA: Chiriqui / 30.7 km W Volcan / Hartmann's Finca, 1450m / 14. Jun.1995 R. Anderson / wet montane trop. fore. litter'. **COSTA RICA:** 4 spec. (KSEM): 'COSTA RICA: Limon / Valle de Silencio, Estación / 82°57'43"W 09°06'37"N / 2473m, 26-27.ii.2005 / R. Anderson, oak forest litter / CRA105 002'; 3 ♂♂, 50 spec. (INBio, KSEM, NMPC): 'COSTA RICA: Limon Prov. / Valle de Silencio, Estacion / 26-27.ii.2005, 2473 m / 82°57'43"W 09°06'37"N / Oak Forest Litter, R. Anderson'.
Additional material. COSTA RICA: 4 ♀♀ (KSEM, NMPC): 'COSTA RICA: Limon Prov. / Valle de Silencio, Estacion / 26-27.ii.2005, 2473 m / 82°57'43"W 09°06'37"N / Oak Forest Litter, R. Anderson'.

Material examined: detailed locality data of examined specimens + where these specimens are deposited

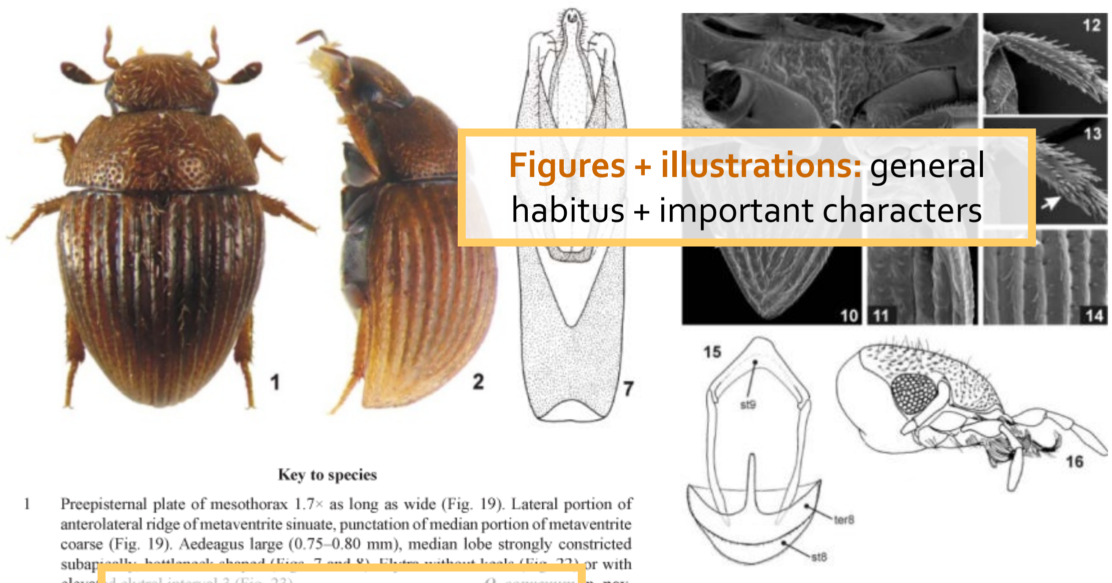
Differential diagnosis. Preepisternal plate of mesothorax 1.7× as long as wide (Fig. 19); anterolateral ridges sinuate near lateral margin of metaventrite (Fig. 19); punctation of median portion of metaventrite coarse (Fig. 19); punctation of mentum sparse (Fig. 17); number of spines of … 3); aedeagus large … bapically; paramere…

Ooster… cies of the group by … ted apical portion o… *O. intermedium* sp. nov. b… different coloration of elytra, which are often slightly paler, at least on the base of elytral intervals 2 and 4 (elytra of the other two species are uniformly coloured). Specimens with costate elytra (see Variability) are very distinct from *O. simplex* sp. nov., *O. intermedium* sp. nov. as well as from typical form of *O. convexum* sp. nov. and cannot be confused with any other *Oosternum* species known to us.

Differntial diagnosis: list of most important characters in which the species differs from others

Descript… ly length: 1.30–1.8… holotype: 1.05 mm)

Detailed description



Figures + illustrations: general habitus + important characters

Key to species

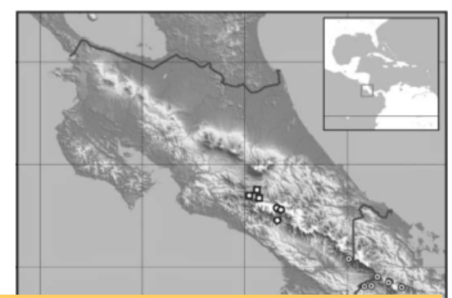
1 Preepisternal plate of mesothorax 1.7× as long as wide (Fig. 19). Lateral portion of anterolateral ridge of metaventrite sinuate, punctation of median portion of metaventrite coarse (Fig. 19). Aedeagus large (0.75–0.80 mm), median lobe strongly constricted subap… or with elevat… *O. convexum* …p. nov.

– Preep… gs. 20 and 21). Lateral portio… tion of median portion of metaventrite fine (Figs. 20 and 21). Aedeagus small (0.55–0.65 mm), median lobe at most slightly concave subapically (Figs. 3–6). Elytra without keels (as in Fig. 22). 2

2 Median lobe of aedeagus wide, lateral margins slightly concave subapically (Figs. 5–6). Preepisternal plate of mesothorax 1.9–2.2× as long as wide (Fig. 20). .... *O. intermedium* sp. nov.

– Median lobe of aedeagus narrow, lateral margins convex subapically (Figs. 3–4). Preepisternal plate of mesothorax 2.5–2.7× as long as wide (Fig. 21). .... *O. simplex* sp. nov.

Identification key



Analysis of known distribution: the map provide a better idea about the distribution of the species

Description of a new species

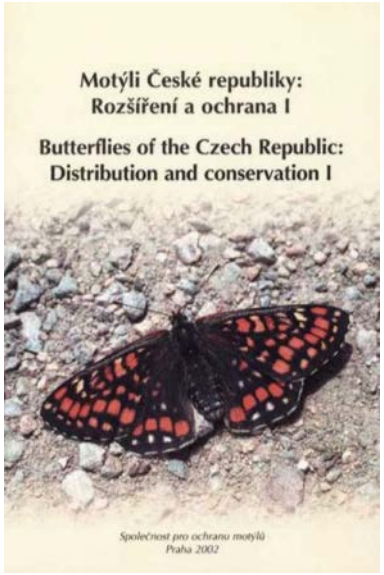
The Code of Zoological nomenlacture defines what is needed for valid description of a new species:

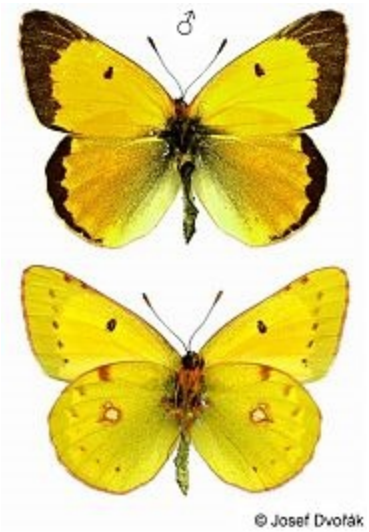
- **has to be Latin or Latinized binomen** (genus + species)
- **statement that it is a new species** (e.g., *Oosternum convexum* **sp. nov.**)
- **specification of the holotype and its depository**
- **diagnosis from other species**
- **needs to be published properly:**
  - it must be published in the way providing a public and permanent scientific record (numerous paper copies, widely accessible electronic copies with fixed content)
  - in electronic publication, the registration of the publication in ZooBank and archiving and archiving in a certified electronic archive is required

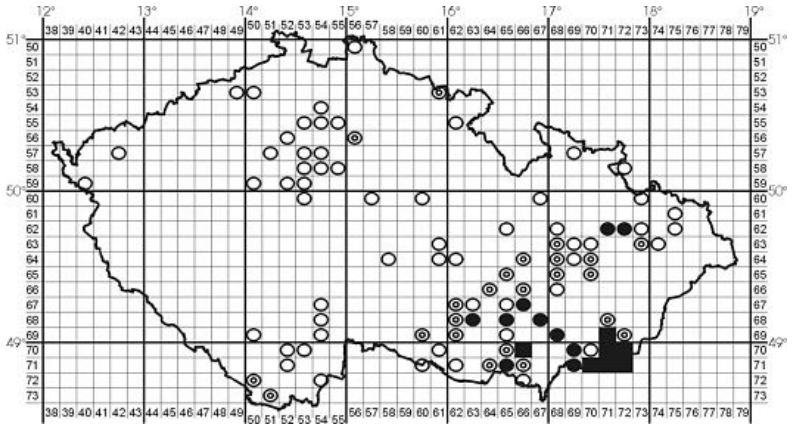
Description of a new species

Museums and collections

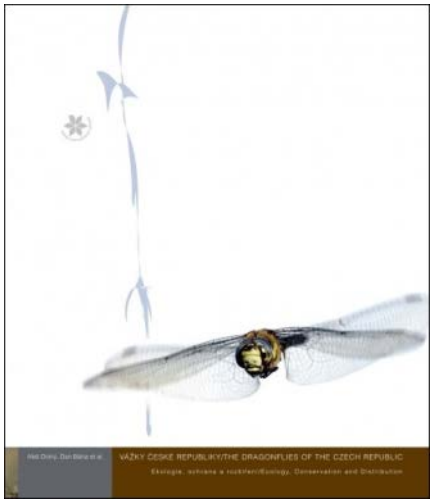
Museums and collections



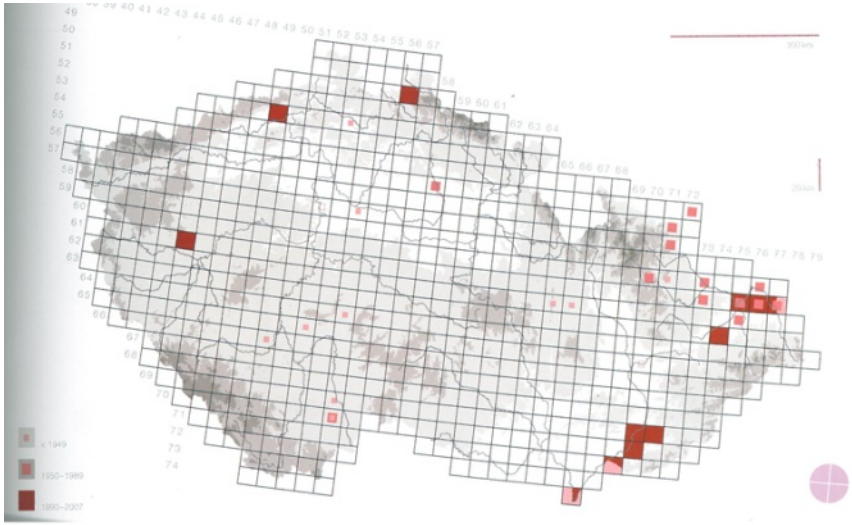




Historical occurrence of *Colias crocea* in the Czech Republic



Historical occurrence of *Sympetrum depressiusculum* in the Czech Republic



Museums and collections

Collections contain specimens which are core of the biodiversity research:

- **type specimens:** define the meaning of species names, i.e. its the foundation for namyn biological sciences
- **identified material:** allows to learn to identify species of a group, check whether your identification is correct
- **vouchers from previous studies:** allow to double-check whether previous studies were correct
- **historical material documenting distribution and biology of the species in the past**
- **historical material which cannot be collected today:** e.g. from areas where nothing lives today, vouchers of extinct species, specimens from inaccessible areas
- **not identified material for future studies:** its cheaper to loan material or visit the museum than to collect all specimens personally

Systematic biology and biodiversity sciences are based on voucher specimens in the collections – without this material it would be not possible to test the hypotheses which would make these disciplines non-scientific.

Are vouchers necessary?

ZooKeys 525: 117–127 (2015)
doi: 10.3897/zookeys.525.6143
http://zookeys.pensoft.net

RESEARCH ARTICLE

ZooKeys

New species without dead bodies: a case for photo-based descriptions, illustrated by a striking new species of *Marleyimyia* Hesse (Diptera, Bombyliidae) from South Africa

Stephen A. Marshall[1], Neal L. Evenhuis[2]

1 *Department of Environmental Biology, University of Guelph, Guelph, Ontario N1G 2W1, Canada* 2 *J. Linsley Gressitt Center for Entomological Research, Bernice Pauahi Bishop Museum, Kaiwi'ula Campus, 1525 Bernice Street, Honolulu, Hawaii 96817-2704, USA*

Corresponding author: *Neal L. Evenhuis* (NealE@bishopmuseum.org)

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http://zoobank.org/05BA7281-7882-4556-853E-BC4D0F69B8C0

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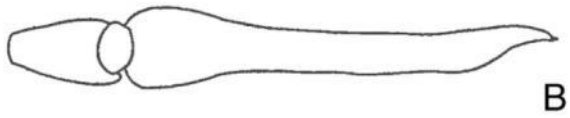
Abstract

A new bombyliid species *Marleyimyia xylocopae* Marshall & Evenhuis, **sp. n.**, an apparent mimic of the carpenter bee *Xylocopa flavicollis* (De Geer), is described from South Africa on the basis of photographs only. The pros and cons of species descriptions in the absence of preserved type specimens are discussed.



Are vouchers necessary?

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Revision of the family Nothybidae (Diptera: Schizophora)

O. LONSDALE[1,3] & S.A. MARSHALL[2]
[1]*Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa, K1A 0C6, Ontario, Canada. E-mail: Owen.Lonsdale@agr.gc.ca.*
[2]*Insect Systematics Lab, School of Environmental Sciences, University of Guelph,. Guelph, N1G 2W1, Ontario, Canada. E-mail: samarsha@uoguelph.ca*
[3]*Corresponding author*

Table of contents

Abstract 1
Introduction 1
Biology 2
Materials and methods 3
Diagnosis of Nothybidae 5
Definition of Nothybidae 6
Immature stages 9
Species groups of *Nothybus* 10
Key to species of *Nothybus* 11
Systematic treatment 12
Nothybus Rondani, 1875 12
Nothybus absens spec. nov. 12
Nothybus acrobates Frey 14
Nothybus biguttatus Wulp 16
Nothybus cataractus spec. nov. 17
Nothybus kempi (Brunetti) 19
Nothybus luznetsovorum Galinskaya & Shatalkin 21
Nothybus linefer Enderlein 22
Nothybus longicollis (Walker) 25
Nothybus procerus spec. nov. 27

"*Collecting specimens is no longer required to describe a species or to document its rediscovery.*" Minteer et al. (2014: 260)

"*Describing a new species without depositing a holotype when a specimen can be preserved borders on taxonomic malpractice.*" Krell and Wheeler (2014: 815)

Are vouchers necessary?

Marshall's arguments for using photograph as a holotype:

- Concerns about vulnerable populations and damage by collecting

- Current technologies such as high-resolution photography can often provide enough information for a proper description.

- No permit needed to collect.

General question:

Can we use another non-voucher data for describing new species or documenting biodiversity research?
Photograph, barcode gene sequence, complete genome data, microCT scan??

Are vouchers necessary?

Systematic Entomology

Systematic Entomology (2016), DOI: 10.1111/syen.12180

OPINION

On typeless species and the perils of fast taxonomy

CHARLES MORPHY D. SANTOS[1], DALTON S. AMORIM[2], BRUNA KLASSA[1], DIEGO A. FACHIN[2], SILVIO S. NIHEI[3], CLAUDIO J. B. DE CARVALHO[4], RAFAELA L. FALASCHI[5], CÁTIA A. MELLO-PATIU[6], MÁRCIA S. COURI[6], SARAH S. OLIVEIRA[7], VERA C. SILVA[8], GUILHERME C. RIBEIRO[1], RENATO S. CAPELLARI[9] and CARLOS JOSÉ E. LAMAS[5]

[1]Centro de Ciências Naturais e Humanas, Universidade Federal do ABC, Santo André, Brazil, [2]Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, Brazil, [3]Departamento de Zoologia, Instituto de Biociências, Universidade de São Paulo, São Paulo, Brazil, [4]Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Brazil, [5]Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil, [6]Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil, [7]Departamento de Ecologia, Instituto de Ciências Biológicas, Universidade Federal de Goiás, Goiânia, Brazil, [8]Departamento de Morfologia e Fisiologia Animal, Faculdade de Ciências Agrárias e Veterinárias de Jaboticabal, Universidade Estadual Paulista – UNESP, Jaboticabal, Brazil and [9]Instituto Federal do Triângulo Mineiro, Uberaba, Brazil

Introduction

In taxonomy, a passion for precision and detail is worthwhile. The plethora of available technological tools should not prevent taxonomists from adhering to the very purpose of the activity: to produce an unequivocal reference system of names, which can be achieved only with proper procedures. Depositing type specimens and reference material in museums and public collections and producing complete detailed descriptions after analysing the greatest possible number of specimens available are healthy practices that enable taxonomy to fulfill its role in science (Costello *et al.*, 2013). The urge to achieve such goals, however, may destroy this very system if the applied methods reduce the overall quality.

Recently, Marshall & Evenhuis (2015) described a new dipteran species of the family Bombyliidae based exclusively on a photograph taken during a field trip to the Republic of South Africa. Specimens of *Marleyimyia xylocopae* Marshall & Evenhuis were not collected or dissected, and reference material has not been deposited in any public institution or museum. According to the authors, the published photographic image

they conclude that 'collecting specimens is highly desirable, but is indeed no longer required' (Marshall & Evenhuis, 2015, p. 118). We strongly disagree.

The aim of the present paper is to advocate that certain taxonomic practices must be maintained to ensure the role of taxonomy among the biological sciences. These practices include intense fieldwork, laboratory preparation of specimens, adequate comparison of the specimens with previously described specimens, careful description of new species (with illustrations and digital photographs), proper funding for taxonomic research and, importantly, curating and maintaining biological collections.

Old-but-not-outdated school of taxonomy

Taxonomy is the scientific activity of recognizing and describing the basic unit of biological diversity – the species – based on observable attributes in preserved, dead specimens (Schuh & Brower, 2009). The main task of taxonomy is to generate an unequivocal, stable and reliable system of names capable

Are vouchers necessary?

Marshall's arguments for using photograph as a holotype:

- Concerns about vulnerable populations and damage by collecting

- Current technologies such as high-resolution photography can often provide enough information for a proper description.

- No permit needed to collect.

General question:

Can we use another non-voucher data for describing new species or documenting biodiversity research?
Photograph, barcode gene sequence, complete genome data, microCT scan??

New species cannot be predicted

Soon or later we will find a species which will be close to some already described species (by morphology, sequence data etc.).

In that case we need to find new diagnostic characters distinsguishing both species, and expand the diagnosis of **both species** (the old one and the new one).

Carl Linne's case

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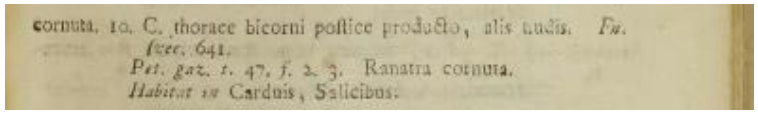
How to find out which of these two species is the one which Linne described??

Centrotus cornutus **(Linnaeus, 1758)**


cornuta. 10. C. thorace bicorni pollice producto, alis nudis. *Fn. suec.* 641.
Pet. gaz. t. 47. *f.* 2. 3. Ranatra cornuta.
Habitat in Carduis, Salicibus.

Original description by Linné: A cicad with the prothorax bearing two horns and projecting posteriad, with wings lacking setae.

Carl Linne's case

?

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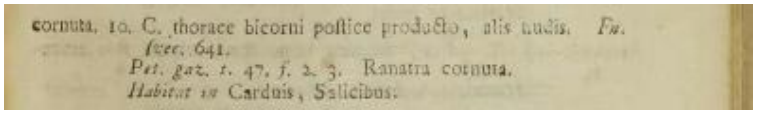
Centrotus cornutus **(Linnaeus, 1758)**


cornuta. 10. C. thorace bicorni pollice producto, alis nudis. *Fn.*
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Both species differ in:

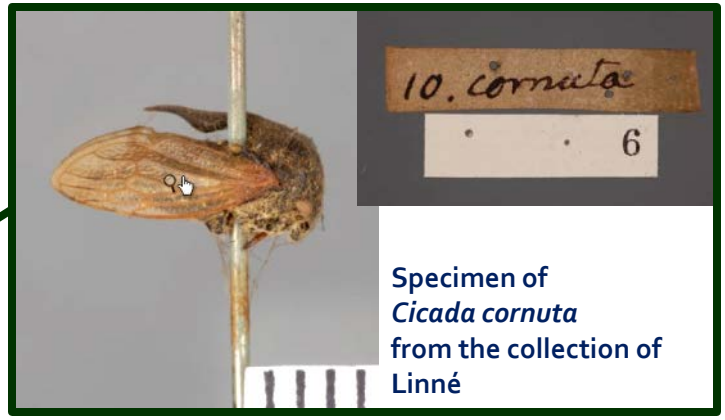
-pubescent versus bare wing veins

- male genitalia

Carl Linne's case

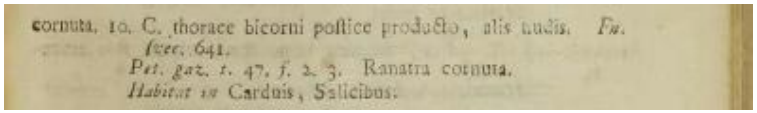
?

?



Specimen of *Cicada cornuta* from the collection of Linné

Centrotus cornutus **(Linnaeus, 1758)**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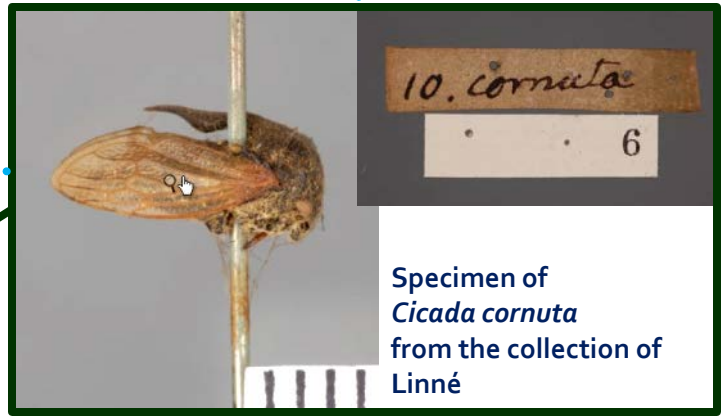

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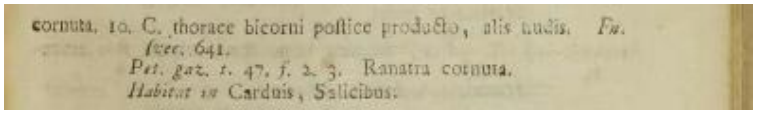
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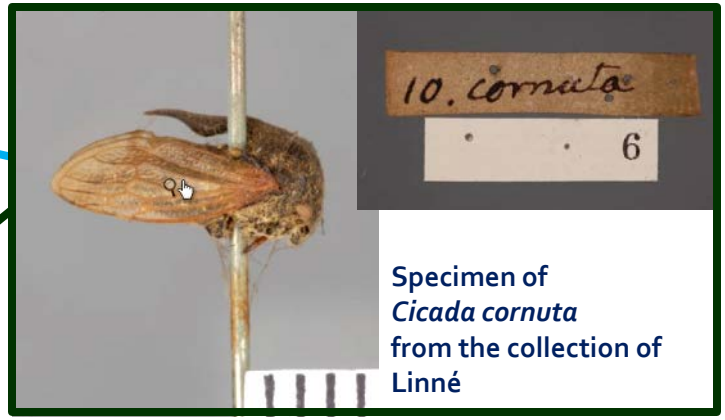

Specimen of
Cicada cornuta
from the collection of
Linné

Centrotus cornutus **(Linnaeus, 1758)**

New character: morphology of male genitalia.

Marshall's case

Both species differ in:
- coloration of ventral surface of abdomen
- male genitalia
- shape of tarsal claws

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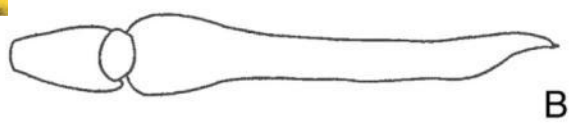
Marleyimyia xylocopae Marshall & Evenhuis, 2015



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