

Giovanni Canestrini's heritage at the Zoology Museum of Padova University (Italy): a rediscovery of his arachnological collections and described species

Luis Alessandro Guariento, Maria Chiara Bonvicini, Lorian Ballarin, Umberto Devincenzo, Giulio Gardini, Enzo Moretto, Paolo Pantini & Paola Nicolosi



doi: 10.30963/aramit5506

Abstract. Giovanni Canestrini (1835–1900) was the pioneer of arachnology in Italy, who published the first catalogue of Italian spiders and a total of 87 papers in the field. His interests covered almost all the Italian arachnid orders, although in the last part of his life he focused on acarology, in which he became a leading world expert. The remains of Canestrini's arachnological collection deposited in the Zoology Museum of Padova University are represented by spiders (about 850 tubes), mites (438 microscope slides, 115 tubes), harvestmen (120), pseudoscorpions (63), scorpions (19) and solifuges (1). The collection is now part of a large revision project aiming at better understanding and clarifying the scientific heritage of Canestrini, including an inventory of the type material from Canestrini and other European arachnologists who contributed to his collection (e.g., T. Thorell). The first results of the collection revision outlining different arachnid orders and highlighting the occurrence of type material are presented here. Brief historical information on Canestrini and his pupils is also provided.

Keywords: arachnids, curation, museum collection, type material

Zusammenfassung. Giovanni Canestrinis Erbe am Zoologischen Museum der Universität Padua (Italien): eine Wiederentdeckung seiner arachnologischen Sammlungen und beschriebenen Arten. Giovanni Canestrini (1835–1900) war der Pionier der Arachnologie in Italien, der den ersten Katalog der Spinnen Italiens und insgesamt 87 Fachartikel veröffentlichte. Seine Interessen lagen auf fast allen italienischen Spinnentier-Ordnungen, auch wenn er sich im letzten Abschnitt seines Lebens auf die Milbenkunde konzentrierte, in der er ein weltweiter Experte wurde. Die am Zoologischen Museum der Universität Padua verbliebene arachnologische Sammlung Canestrinis besteht aus Spinnen (circa 850 Röhrchen), Milben (438 Mikroskop-Präparate, 115 Röhrchen), Weberknechten (120), Pseudoskorpionen (63), Skorpionen (19) und Walzenspinnen (1). Der Sammlung wird nun großes Revisions-Projekt gewidmet, mit dem Ziel das wissenschaftliche Erbe Canestrini besser verstehen und einordnen zu können, einschließlich einer Inventarisierung des Typenmaterial von Canestrini und anderer europäischer Arachnologen, die zur Sammlung beigetragen haben (z. B. T. Thorell). Die ersten Ergebnisse der Revision der Sammlung fassen die verschiedenen Arachniden-Ordnungen zusammen und stellen die vorhandenen Typen heraus. Kurze geschichtliche Informationen über Canestrini und seine Schüler werden ergänzt.

The Zoology Museum of the University of Padova finds its roots in the 18th century natural history collections of Antonio Vallisneri (1661–1730), a professor of medicine. It became a proper Museum of Zoology in 1869 under the chair of Giovanni Canestrini (1835–1900), who made great efforts towards enlarging and cataloguing the entire zoological collections and providing the museum with an international profile.

Canestrini was one of the most eminent Italian zoologists of the 19th century, known for his first translation of Charles Darwin's "On the origin of species" in 1864 and for his effort in spreading the evolutionary theory in Italy (Minelli & Casellato 2001). After the completion of his studies at the University of Vienna in 1861, he became a professor of Natural History at the University of Modena from 1862 to 1869, working as a zoologist and anthropologist and publishing the first catalogues of Italian spiders together with Pietro Pavesi (1844–1907) (Canestrini & Pavesi 1868, Canestrini & Pavesi 1870). In 1869, he became Professor of Zoology,

Comparative Anatomy and Physiology at the University of Padova where he remained until his death. During this period he dedicated most of his works to arachnology, publishing the first consistent studies on this field in Italy together with his students, among whom emerged relevant personalities of Italian zoology, such as Filippo Fanzago (1852–1889) and Antonio Berlese (1863–1927) (Minelli 1998, Bagella & Pantaleoni 2011, Guariento et al. 2016a). In the last two decades of his life, Canestrini worked almost exclusively on mites and from 1885 to 1889 published eight volumes of the catalogue of Italian Acari entitled "Prospetto dell'acarofauna Italiana", that was left unfinished, as well as several dozen of papers describing new species (Ragusa 2002). His work continued tirelessly until his death in Padova in 1900.

After Canestrini, the museum went through several periods of abandonment in the 20th century, with a discontinuous management and curation which resulted in the loss of important parts of the collections. A temporary recovery of the collections was completed by Marcuzzi (1966) but the museum reopened to the public only in 2004 (Nicolosi 2016). In 2015, when our project started, Canestrini's arachnological collection was in a precarious status with its content being unknown, despite an attempt at revision in the 1980s.

Material and methods

First, a comprehensive collection database has been completed, registering locality information from data labels in the Darwin Core standard (Wieczorek et al. 2012). Each label provides the name of a taxon, the locality, the date (often the date of inventory in the collection) and an inventory number referring to the original catalogues compiled by Canestrini. These catalogues, deposited in the Museum and descri-

This contribution was presented at the 30th European Congress of Arachnology, Nottingham, 2017 August 20-25

Luis Alessandro GUARIENTO, Maria Chiara BONVICINI, Paola NICOLOSI, Museum of Zoology, University of Padova Via Giuseppe Jappelli 1/A, Padova 35121, Italy; E-mail: guarientoluis@gmail.com <https://orcid.org/0000-0002-0068-8234>; mc.bonvi@gmail.com; paola.nicolosi@unipd.it
Lorian BALLARIN, Department of Biology, University of Padova, Via Ugo Bassi, 58/B, Padova 35131, Italy; E-mail: lorian.ballarin@unipd.it
Enzo MORETTO, Umberto DEVINCENZO, Esapolis Invertebrate Museum, Via dei Colli 28, Padova 35143, Italy; E-mail: info@butterflyarc.it; umberto.gbr92@gmail.com
Giulio GARDINI, Società Entomologica Italiana, Via Brigata Liguria 9, Genova 16121, Italy; E-mail: giulio.gardini@libero.it
Paolo PANTINI, Museo Civico di Scienze Naturali 'Enrico Caffi', Piazza Cittadella 10, Bergamo 24129, Italy; E-mail: ppantini@comune.bg.it

submitted 17.1.2018, accepted 10.2.2018, online 30.4.2018

bed by Minelli & Pasqual (1982), are divided in: "Aracnidi e Miriapodi", registering specimens of Araneae, Opiliones, Pseudoscorpiones, Scorpiones and Solifugae from 1870 to 1889 (1035 records); "Catalogo degli acari conservati in alcool" registering mites preserved in ethanol from 1874 to 1898 (865 records); "Acari preparati microscopici" registering microscope slides from 1876 to 1888 (1078 records). Each catalogue mostly provides the same information as on the data labels, in addition to eventual notes on the collectors or regarding the exchanges of specimens with different arachnologists (e.g. T. Thorell, L. Koch). Both catalogues and data labels have been digitized and the database integrates the data obtained from both sources. Furthermore, an extensive search for historical documents (notebooks, correspondence, as well as Canestrini's scientific output) was performed in order to add additional information on the collections. Moreover, during the curatorial restoration, each glass tube was replaced with a new one and filled with 75% ethanol, while microscope slides are kept in the original folders.

The taxonomic revision of the collection is now under way involving three of us: Paolo Pantini (Araneae), Giulio Gardini (Pseudoscorpiones) and Luis A. Guariato (Scorpiones, Solifugae). Other arachnologists revised part of the collection in the past: Valle (1955) worked on the acaroteca preserved in ethanol, Brignoli (1983) on the spiders described by Canestrini, Hansen (1986) on spiders of the family Salticidae, and Chemini (1986) on Opiliones. The whole acaroteca needs extensive revision, and awaits an availability of acarologists.

Results

The results concerning each arachnid order are presented below. From a curatorial perspective, the overall conservation status of the collection was precarious since several tubes were found partially or completely dried, especially in the case of pseudoscorpions, and several microscope slides present a rather deteriorated mounting medium. Parts of the collection were returned by Italian museums where they were on loan since the last century, in particular the entire collection of harvestmen (Trento Museum of Science – MUSE) and some folders of microscope slides belonging to the acaroteca (Bergamo Museum of Natural Sciences). Concerning the search for historical documents, three notebooks have been recovered in the library of the Trento Museum of Science: i) "Studi sugli acari italiani di G. Canestrini e F. Fanzago e sul genere *Dermaleichus* (ed affini) di G. Canestrini, 1876 a 1878, studi fatti a Doss Tavon, Padova e Santa Maria di Cervarese"; ii) "Note di Giovanni Canestrini 1881, 1882, 1883" that deals with mites of the genus *Gamasus* and pseudoscorpions; iii) "Raccolta di acari parassiti degli insetti di Riccardo Canestrini, incominciata a Dos Tavon (Trentino) il 15 Agosto 1880". Moreover, from the same library about a hundred letters were recovered, some of which contained the signatures of T. Thorell and L. Koch. The study and translation of these documents could provide interesting information regarding the collection and the taxonomic research conducted by Canestrini.

Araneae

The spider collection contains specimens that mainly originated from Italy and, to a lesser extent, from European (i.e., Croatia, England, Finland, France, Germany, Spain, Sweden)

and extra-European (i.e., Algeria, Argentina, Eritrea, Turkey, United States) countries. The foreign material often came from exchanges between Canestrini and renowned European arachnologists, as in the case of the collection from Germany (89 specimens from Nuremberg sent by L. Koch) and from Sweden (67 specimens sent by T. Thorell). According to the historical catalogue, the first spider material was registered in 1870; the last material was registered in 1887. The collection was in part revised by Brignoli (1983), who considered the species described by Canestrini. However, it seems that Brignoli (1983) did not see all the specimens in the collection, since the part of Canestrini's type material rediscovered by us was not mentioned in his revision. All but a few specimens of Salticidae were revised by Hansen (1986).

We found 28 out of the 41 species described by Canestrini (solely or in collaboration with Pavesi): they are presented in Tab. 1 following the nomenclature of World Spider Catalog (2018). In nine cases, the material surely represents types, while other eight specimens are recorded as "probable types" because they were not labelled as such and their collection data are too generic. Precisely, most of these probable types belong to the species described before the arrival of Canestrini to Padova in 1869 (Canestrini 1868a, 1868b; Canestrini & Pavesi, 1868) and they are simply indicated in the catalogue as registered "at the end of 1870", while the collection dates are not reported. Among the material, there are also three preserved species considered *inquirendae* by Brignoli (1983), for which further examination would clarify their taxonomic status: *Melanophora kochi* Canestrini, 1868, *Prosthesima prognata* Canestrini, 1876 and *Linyphia furcigera* Canestrini, 1873.

In the collection, type specimens of the species described by Thorell based on the material collected by Canestrini in Italy are preserved (Thorell 1872, 1875): *Drassus tenellus* Thorell, 1875, *Drassus spinulosus* Thorell, 1875, *Epeira limans* Thorell, 1875, *Erigone nigrimana* Thorell, 1875, *Gnaphosa plebeja* Thorell, 1875, *Erigone hilaris* Thorell, 1875, *Linyphia arida* Thorell, 1875, *Erigone phaulobia* Thorell, 1875, *Lycosa nebulosa* Thorell, 1875, *Sagana rutilans* Thorell, 1875, *Theridion histronicum* Thorell, 1875, *Xysticus kempeleni* Thorell, 1872 and *Xysticus ninni* Thorell, 1872. An examination of these specimens should confirm/clarify their status as well.

Pseudoscorpiones

This collection includes specimens from Italy, and three tubes from Paraguay sent to Canestrini by his pupil Luigi Balzan (1865-1893) in 1889. Balzan became a specialist on pseudoscorpions under the supervision of Canestrini and conducted pioneering research on these arachnids in South America (Balzan 1890, 1892; Guariato et al. 2016b). His studies led to the description of 27 new species from Paraguay, many of which are still valid (Mahnert 2016). According to the historical catalogue, the first pseudoscorpion material was registered in 1873; the last material was registered in 1889.

As for spiders and harvestmen, Canestrini published the first consistent works on these arachnids in Italy (Canestrini 1875a, 1875b, 1876), presenting the state-of-the-art in the encyclopedic monograph "Acari, Myriapoda et Scorpiones hucusque in Italia reperta" edited by Berlese (Canestrini 1883, 1884, 1885). Of the six species he described, we found only four. All are represented by putative syntypes which we have examined confirming the current interpretation of these

Tab. 1: Species of the order Araneae described by Canestrini, with their current status in the collection (present in/absent from the collection and/or the historical catalogue; types/not types)

Family/Species	Status in the collection	Family/Species	Status in the collection
Agelenidae			
<i>Tegenaria circumflexa</i> Canestrini & Pavesi, 1868 = species inquirenda (Brignoli 1983)	Absent from collection and historical catalogue. Loc typ.: Italy, Veneto, Lugo di Vicenza, loc. Lonedo	<i>Linyphia albomaculata</i> Canestrini & Pavesi, 1870 = <i>Neriene furtiva</i> (O. Pickard-Cambridge, 1871)	Present: type material
Amaurobiidae			
<i>Amaurobius crassipalpis</i> Canestrini & Pavesi, 1870	Present: type material	<i>Linyphia furcigera</i> Canestrini, 1873 = species inquirenda (Brignoli 1983)	Present: type material
Araneidae			
<i>Epeira biocellata</i> Canestrini, 1868 = <i>Agalenatea redii</i> (Scopoli, 1763)	Absent from collection and historical catalogue	<i>Linyphia lithobia</i> Canestrini & Pavesi, 1868 = <i>Tapinopa longidens</i> (Wider, 1834)	Absent from collection and historical catalogue
<i>Epeira ornata</i> Canestrini, 1868 = <i>Gibbaranea bituberculata</i> (Walckenaer, 1802)	Present: probable type material. Examined by Brignoli (1983)	<i>Linyphia rubecula</i> Canestrini, 1868 = <i>Nematogmus sanguinolentus</i> (Walckenaer, 1841)	Present: not type material
Clubionidae			
<i>Clubiona pulchella</i> Canestrini, 1868 = species inquirenda (Brignoli 1983)	Absent from collection. Loc typ.: Italy, Trentino	Philodromidae	
Dictynidae			
<i>Dictyna mandibulosa</i> Canestrini & Pavesi, 1868 = <i>Brigittea latens</i> (Fabricius, 1775)	Absent from collection	<i>Philodromus generalii</i> Canestrini, 1868 = <i>Philodromus emarginatus</i> (Schrank, 1803)	Absent from collection
<i>Dictyna scalaris</i> Canestrini, 1873 = <i>Marilynia bicolor</i> (Simon, 1870)	Absent from collection	Salticidae	
Dysderidae			
<i>Dysdera ninnii</i> Canestrini, 1868	Absent from collection	<i>Euophrys obscuroides</i> Canestrini & Pavesi, 1868	Present: not type material. Examined by Hansen (1986)
<i>Dysdera tessellata</i> Canestrini & Pavesi, 1868 = <i>Harpactea hombergi</i> (Scopoli, 1763)	Present: not type material	<i>Marpissa nardoi</i> Canestrini & Pavesi, 1868 (nec Ninni, 1868) = <i>Macaroeris nidicolens</i> (Walckenaer, 1802)	Present: not type material. Examined by Hansen (1986)
<i>Harpactea</i> (= <i>Dysdera</i>) <i>grisea</i> (Canestrini, 1868)	Present: probable type material. Examined by Brignoli (1983)	<i>Mendoza</i> (= <i>Marpissa</i>) <i>canestrinii</i> Canestrini & Pavesi, 1868 (nec Ninni, 1868)	Present: not type material. Examined by Hansen (1986)
Eutichuridae			
<i>Cheiracanthium italicum</i> Canestrini & Pavesi, 1868 = <i>Cheiracanthium punctorium</i> (Villers, 1789)	Present: probable type material. Examined by Brignoli (1983)	<i>Pyrophorus flavicentris</i> Canestrini & Pavesi, 1868 = <i>Myrmarachne formicaria</i> (De Geer, 1778)	Present: not type material. Examined by Hansen (1986)
Gnaphosidae			
<i>Civizelotes</i> (= <i>Melanophora</i>) <i>gracilis</i> (Canestrini, 1868)	Present: type material	<i>Pyrophorus venetiarum</i> Canestrini, 1868 = <i>Myrmarachne formicaria</i> (De Geer, 1778)	Present: type material. Examined by Hansen (1985, 1986)
<i>Melanophora kochi</i> Canestrini, 1868 = species inquirenda (Brignoli 1983)	Present: not type material	<i>Sittilong</i> (= <i>Attus</i>) <i>longipes</i> (Canestrini, 1873)	Present: not type material. Examined by Hansen (1986)
<i>Melanophora latipes</i> Canestrini, 1873 = <i>Setaphis carmeli</i> (O. Pickard-Cambridge, 1872)	Present: type material	Scytodidae	
<i>Micaria aurata</i> Canestrini, 1868 = <i>Micaria sociabilis</i> Kulczyński, 1897	Present: probable type material. Examined by Brignoli (1983)	<i>Scytodes unicolor</i> Canestrini, 1868 = <i>Scytodes velutina</i> Heineken & Lowe, 1832	Absent from collection and historical catalogue
<i>Micaria exilis</i> Canestrini, 1868 = species inquirenda (Brignoli 1983)	Absent from collection. Loc typ.: Italy, Modena	Segestriidae	
<i>Prosthesima anauniensis</i> Canestrini, 1876 = <i>Drassyllus praeficus</i> (L. Koch, 1866)	Present: not type material	<i>Segestia garbigliettii</i> Canestrini & Pavesi, 1870 = <i>Ariadna insidiatrix</i> Audouin, 1826	Present: type material. Examined by Brignoli (1983)
<i>Prosthesima prognata</i> Canestrini, 1876 = species inquirenda (Brignoli 1983)	Present: type material	Sparassidae	
<i>Prosthesima tridentina</i> Canestrini, 1876 = <i>Zelotes longipes</i> (L. Koch, 1866)	Absent from collection	<i>Ocypte nigratarsis</i> Canestrini & Pavesi, 1868 = <i>Olios argelasius</i> (Walckenaer, 1806)	Absent from collection and hist. catalogue
<i>Zelotes</i> (= <i>Melanophora</i>) <i>sardus</i> (Canestrini, 1873)	Present: type material	Theridiidae	
Linyphiidae			
<i>Cresmatoneta</i> (= <i>Formicina</i>) <i>mutinensis</i> (Canestrini, 1868)	Present: not type material	<i>Theridium nicolucci</i> Canestrini & Pavesi, 1868 = <i>Steatoda grossa</i> (C. L. Koch, 1838)	Present: type material. Examined by Brignoli (1983)
<i>Formicina pallida</i> Canestrini, 1868 = <i>Cresmatoneta mutinensis</i> (Canestrini, 1868)	Present: probable type material	Thomisidae	
		<i>Xysticus cor</i> Canestrini, 1873	Present: type material
		Titanoecidae	
		<i>Amaurobius 12-maculatus</i> Canestrini, 1868 = <i>Nurscia albomaculata</i> (Lucas, 1846)	Present: probable type material
		Trachelidae	
		<i>Cetonana</i> (= <i>Drassus</i>) <i>laticeps</i> (Canestrini, 1868)	Present: not type material. Examined by Brignoli (1983)
		Zodariidae	
		<i>Zodarion</i> (= <i>Enyo</i>) <i>italicum</i> (Canestrini, 1868)	Present: probable type material. Examined by Brignoli (1983)

species (Tab. 2). The syntype of the valid species *Neobisium* (= *Obisium*) *dolicodactylum* (Canestrini, 1874) was examined by Callaini (1985), but it was absent from the collection during the cataloguing work. The three specimens collected by Balzan in Paraguay comprise *Gomphoebarnes* (= *Chernes*) *communis* (Balzan, 1888) (Chernetidae), *Paratemnoides* (= *Chernes*) *nidificator* (Balzan, 1888) (Atemnidae) and *Chernes cap-reolus* Balzan, 1888 = *Lustrochernes argentinus* (Thorell, 1877) (Chernetidae), all of which seem to appertain to the original type series.

Tab. 2: Species of the order Pseudoscorpiones described by Canestrini, with their current status in the collection (present in/absent from collection and/or the historical catalogue; types/not types)

Family/species	Status in the collection
Atemnidae	
<i>Acis brevimanus</i> Canestrini, 1883 = <i>Atemnus politus</i> (Simon, 1878)	Present: type material
Cheliferidae	
<i>Chelifer ninnii</i> Canestrini, 1876 = <i>Dactylochelifer latreillii</i> (Leach, 1817)	Present: probable type material
<i>Chelifer brevipalpis</i> Canestrini, 1874 = <i>Dactylochelifer latreillii</i> (Leach, 1817)	Absent from collection
<i>Chelifer romanus</i> Canestrini, 1883 = <i>Rhacochelifer maculatus</i> (L. Koch, 1873)	Present: probable type material
Geogarypidae	
<i>Garypus meridionalis</i> Canestrini, 1885 = <i>Geogarypus minor</i> (L. Koch, 1873)	Present: type material
Neobisiidae	
<i>Neobisium</i> (= <i>Obisium</i>) <i>dolicodactylum</i> (Canestrini, 1874)	Absent from collection

Scorpiones and Solifugae

The scorpions, collected almost exclusively from Italy, partly constituted the basis for the monograph on Italian scorpions published by Fanzago (1872), since several localities in the publication match those given in the catalogue. In fact, Canestrini never dedicated himself to scorpions, as demonstrated by the few specimens preserved in his collection, and left them to his pupil Fanzago who generalized the knowledge on these arachnids in Italy (Canestrini 1875b). In the collection, five specimens of *Euscorpium* (= *Scorpius*) *canestrinii* (Fanzago 1872) (Euscorpiidae) are preserved that almost certainly appertain to the original type series. Vachon (1978) described two specimens of this species belonging to the "Collection Canestrini" and deposited at the Hungarian Natural History Museum (Budapest), consequently designated by Kovarik (1997) as a lectotype and paralectotype. It is likely that these specimens were donated to the Museum in Budapest by Canestrini from the same syntype series currently deposited in Padova.

The collection also contains a single solifuge from Egypt, a Rhagodidae, Pocock, 1897, identified by Canestrini as *Solpuga melanus* Savigny. This specimen has not yet been re-examined.

Opiliones

The harvestmen collection was revised by Chemini (1986) and includes specimens from Italy and France, the latter collected by Eugène Simon. According to the historical catalogue, the first harvestmen material was registered in 1870; the last material was registered in 1875. In his pioneer works

on harvestmen (Canestrini 1871, 1872a, 1872b, 1872c, 1873, 1874, 1875a, 1875b, 1876, 1888), Canestrini described 17 species from Italy and South America, most of which are represented by type series in the collection (Tab. 3).

Tab. 3: Species of the order Opiliones described by Canestrini, with their current status in the collection (present in/absent from collection and/or the historical catalogue; types/not types)

Family/species	Status in the collection
Gonyleptidae	
<i>Pachylus spinosus</i> Canestrini 1888 = <i>Discocyrtus dilatatus</i> Sørensen 1884	Absent from collection and historical catalogue
<i>Pucroliia</i> (= <i>Pachylus</i>) <i>gracilipes</i> (Canestrini, 1888)	Absent from collection and historical catalogue
Ischyropsalididae	
<i>Ischyropsalis adamii</i> Canestrini, 1873	Present: type material, defined by Chemini (1986)
Nemastomatidae	
<i>Histicostoma</i> (= <i>Nemastoma</i>) <i>argenteolumulatum</i> (= <i>dentipalpe</i> var. <i>argenteolumulata</i>) (Canestrini, 1875)	Present: type material, defined by Chemini (1986)
<i>Nemastoma dentigerum</i> Canestrini, 1873	Present: type material, defined by Chemini (1986)
Phalangüidae	
<i>Dicranopalpus</i> (= <i>Liodes</i>) <i>larvatus</i> (Canestrini, 1874)	Present: type material, defined by Chemini (1986)
<i>Eudasylobus</i> (= <i>Opilio</i>) <i>graniferus</i> (Canestrini, 1871)	Present: type material, defined by Chemini (1986)
<i>Dasylobus</i> (= <i>Opilio</i>) <i>argentatus</i> (Canestrini, 1871)	Present: type material, defined by Chemini (1986)
<i>Megabunus</i> (= <i>Platylophus</i>) <i>rhinoceros</i> (Canestrini, 1871)	Present: type material, defined by Chemini (1986)
<i>Odiellus</i> (= <i>Acantholophus</i>) <i>granulatus</i> (Canestrini, 1871)	Present: type material, defined by Chemini (1986)
Sclerosomatidae	
<i>Astrobonus</i> (= <i>Hoplites</i>) <i>laevipes</i> (Canestrini, 1872)	Present: not type material
<i>Hoplites pavesii</i> Canestrini, 1871 = <i>Astrobonus helleri</i> (Ausserer, 1867)	Present: type material, defined by Chemini (1986)
<i>Metasclerosoma</i> (= <i>Homalenotus</i>) <i>depressum</i> (Canestrini, 1872)	Present: type material, defined by Chemini (1986)
<i>Nelima</i> (= <i>Leiobunum</i>) <i>doriae</i> (Canestrini, 1871)	Present: type material, defined by Chemini (1986)
<i>Leiobunum agile</i> Canestrini, 1876 = <i>Nelima doriae</i> (Canestrini, 1871)	Present: type material, defined by Chemini (1986)
<i>Pectenobunus</i> (= <i>Opilio</i>) <i>paraguayensis</i> Canestrini, 1888	Absent from collection and historical catalogue
Trogulidae	
<i>Trogulus tuberculatus</i> Canestrini, 1876 = <i>Trogulus nepaeformis</i> Scopoli, 1763	Present: type material, defined by Chemini (1986)

Acari

The Canestrini Acaroteca consists of 438 microscope slides, most of which originated from Italy (especially from Veneto and Trentino) and to a lesser extent from Europe (i.e. France, Germany, Hungary and Sweden) and extra-European countries (i.e. Brazil, Eritrea). In several cases, the host from which the specimens were collected is also indicated (e.g. domestic and wild animals, humans, foods or plants). Along with the acaroteca, the acarological collection also includes 115 samples in ethanol and glycerine, which were partly reviewed by Valle (1955) and therefore not examined during our curatorial revision. A number of Canestrini's students contributed

to the acaroteca, among them the renowned Italian entomologist Antonio Berlese (slides of “Collezione Berlese”), who continued Canestrini researches and became a leading world scientist in the field of acarology (Ragusa 2002), as well as other personalities such as Canestrini's brother Riccardo Canestrini (1859–1891) and Enrico Sicher (1865–1915); both published several works on mites in cooperation with Canestrini or alone. Conversely, no slide reports the name of Filippo Fanzago, with whom Canestrini started his acarological studies (Canestrini & Fanzago 1876a, 1876b, 1877). Moreover, only a single slide received from a foreign acarologist is available in the collection: the slide from French Édouard Louis Trouessart (1842–1927) with whom Canestrini published a joint note (Trouessart & Canestrini 1895).

Of the over 140 species of Acari described by Canestrini, many are represented in the acaroteca by probable type series. Among them, two slides are labelled as holotypes by an anonymous, recent author (the holotypes of *Rhagidia gigas* Canestrini, 1886 and *Coccorhagidia clavifrons* Canestrini, 1886). The taxonomic review of this prestigious acarological collection is required to evaluate and to clarify the identity of numerous species.

Acknowledgements

We thank Prof. Dietelmo Pievani, delegate of the museums of the Department of Biology, for welcoming and encouraging this project in collaboration with the Esapolis Invertebrate Museum of Padova. Many thanks are due to arachnologists who supported us with useful advice during the curatorial revision of pseudoscorpions (Volker Mahnert), scorpions (Gioele Tropea) and Acari (Enrico De Lillo), as well as to Prof. Sandra Casellato and Prof. Alessandro Minelli, who helped us retrieve information on the collection's history. We are also grateful to Claudio Chemini and Alessandra Franceschini of the Trento Museum of Science (MUSE) who returned the harvestmen collection. Moreover, the MUSE library gave us access to historical documents belonged to Canestrini.

References

- Bagella S & Pantaleoni RA 2011 Filippo Fanzago, docente della Regia Università di Sassari. In: Atti del XXIII Congresso nazionale italiano di Entomologia, Genova, 13-16 giugno 2011. p. 377
- Balzan L 1890 Revisione dei Pseudoscorpioni del bacino dei fiumi Parana e Paraguay nell'America meridionale. – Annali del Museo Civico di Storia Naturale di Genova 2(9): 401-454
- Balzan L 1892 Voyage de M. E. Simon au Venezuela (Décembre 1887–Avril 1888). Arachnides, Chernetes (Pseudoscorpiones). – Annales de la Société entomologique de France 60: 497-454
- Brignoli P M 1983 Ragni d'Italia XXXIV. Le specie descritte da G. Canestrini (Araneae). In: Atti del XIII Congresso nazionale italiano di Entomologia, Torino. pp. 561-567
- Callaini G 1985 Pseudoscorpioni dell'Italia settentrionale nel Museo Civico di Storia naturale di Verona (Arachnida), Notulae Chernetologicae XIX. – Bollettino del Museo civico di Storia naturale di Verona 12: 229-255
- Canestrini G 1868a Nuovi aracnidi italiani. – Annuario della Società dei naturalisti in Modena 3: 190-206
- Canestrini G 1868b Nuove specie italiane di animali. II. Nuovi aracnidi. – Commentario della Fauna, Flora e Gea del Veneto e del Trentino 4: 223-224
- Canestrini G & Pavesi P 1868 Araneidi italiani. – Atti della Società italiana di Scienze naturali 11(3): 738-872
- Canestrini G & Pavesi P 1870 Catalogo sistematico degli Araneidi italiano. – Archivi per la Zoologia Anatomia e Fisiologia Bologna 2(1): 60-64 (separate, pp. 1-44)
- Canestrini G. 1871 Nuove specie di Opilioni Italiani. – Annuario della Società dei Naturalisti di Modena 6 (5/6): 221-225
- Canestrini G 1872a Nuove specie di Opilioni Italiani. – Bollettino della Società entomologica italiana 3(4): 381-385
- Canestrini G 1872b Nuova specie di Opilioneide. – Annuario della Società dei Naturalisti di Modena 6(7-9): 305-306
- Canestrini G 1872c Gli Opilioni Italiani. – Annali del Museo civico di Storia naturale di Genova 2: 1-48
- Canestrini G 1873 Nuove specie italiane di aracnidi. – Atti della Società veneto-trentina di Scienze naturali di Padova 2(1): 45-52
- Canestrini G 1874 Sopra una nuova specie di *Liodes*. – Atti della Società veneto-trentina di Scienze naturali di Padova 3(1): 163-164
- Canestrini G 1875a Intorno ai Chernetidi ed Opilioni della Calabria. – Atti della Società veneto-trentina di Scienze naturali di Padova 4: 1-12
- Canestrini G 1875b Intorno alla fauna del Trentino. – Atti della Società veneto-trentina di Scienze naturali di Padova 4: 27-35
- Canestrini G 1876 Osservazioni aracnologiche. – Atti della Società veneto-trentina di Scienze naturali di Padova 3(2): 206-232
- Canestrini G & Fanzago F 1876a Nuovi acari italiani. – Atti della Società veneto-trentina di Scienze naturali di Padova (Ia serie) 5(1): 99-111
- Canestrini G & Fanzago F 1876b Nuovi acari italiani. – Atti della Società veneto-trentina di Scienze naturali di Padova (IIa serie) 5(1): 131-132
- Canestrini G & Fanzago F 1877 Intorno agli acari italiani – Atti del regio Istituto veneto di Scienze, Lettere ed Arti (5)4: 1-140
- Canestrini G 1883 Chernetides Italici. In: Berlese A (ed.) Acari, Myriapoda et Scorpiones hucusque in Italia reperta, fascicolo VII. Salmin, Padova. pp. 1-10
- Canestrini G 1884 Chernetides Italici. In: Berlese A (ed.) Acari, Myriapoda et Scorpiones hucusque in Italia reperta, fascicolo X. Salmin, Padova. pp. 1-10
- Canestrini G 1885 Chernetides Italici. In: Berlese A (ed.) Acari, Myriapoda et Scorpiones hucusque in Italia reperta, fascicolo XIX. Sacchetto, Padova. pp. 1-10
- Canestrini G 1888 Intorno ad alcuni Acari ed Opilioni dell'America. – Atti della Società veneto-trentina di Scienze naturali di Padova 11(1): 100-111
- Chemini C 1986 La collezione Canestrini di Opilioni (Arachnida) presso il Museo zoologico dell'Università di Padova: Revisione e designazione di lectotipi. – Lavori della Società veneziana di Scienze naturali 11: 121-134
- Fanzago F 1872 Sugli scorpioni italiani. – Atti della Società veneto-trentina di Scienze naturali di Padova 1: 75-89
- Guariento LA, Casellato S, Devincenzo U, Gardini G, Moretto E, Pantini P & Nicolosi P 2016a L'aracnologia a Padova nelle collezioni del Museo di Zoologia dell'Università. In: Atti del XXV Congresso nazionale italiano di Entomologia, Padova, 20-24 giugno 2016. p. 85
- Guariento LA, Devincenzo U, Gardini G & Nicolosi P 2016b Luigi Balzan naturalista e aracnologo italiano della scuola di Canestrini. In: Atti del XXV Congresso nazionale italiano di Entomologia, Padova, 20-24 giugno 2016. p. 90
- Hansen H 1885 *Marpissa canestrinii* Ninni, 1868. Ein Beitrag zur Systematik. – Bollettino del Museo civico di Storia naturale di Venezia 34: 205-211
- Hansen H 1886 Die Salticidae der Coll. Canestrini (Arachnidae: Araneae). – Lavori della Società veneziana di Scienze naturali 11: 97-120
- Kovarik F 1997 A check-list of scorpions (Arachnida) in the collection of the Hungarian Natural History Museum, Budapest. – Annales Historico-Naturales Musei Nationalis Hungarici 89: 177-185
- Mahnert V 2016 Redescription of eight species described by Luigi Balzan from South America (Argentina, Brazil, Paraguay) (Pseudoscorpiones: Chernetidae). – Opuscula Zoologica (Budapest) 47: 73-85
- Marcuzzi G 1966 Il Museo Zoologico dell'Università di Padova. Università degli Studi di Padova. 19 pp.
- Minelli A & Pasqual C 1982 Documenti del Sec. XIX concernenti il Museo zoologico dell'Università di Padova. – Lavori della Società veneziana di Scienze naturali 7(2): 227-247

- Minelli A 1998 L'opera zoologica di Giovanni Canestrini e della sua Scuola. In: Atti VI seminario di Storia delle Scienze e delle Tecniche nell'ottocento veneto. pp 119-135
- Minelli A & Casellato S 2001 Giovanni Canestrini, Zoologist and Darwinist. In: Proceedings of the International Meeting celebrating the first centenary of the death of Giovanni Canestrini (1835-1900), Padova-Venezia-Trento, 14-17 february 2000. Istituto veneto di Scienze, Lettere ed Arti, Padova. 605 pp.
- Nicolosi P 2016 The Zoology Museum of Padua University: a re-discovered historical heritage. – *Museologia scientifica* (nuova serie) 10: 88-93
- Ragusa S 2002 As time goes by: a profile of Italian acarology. In: Bernini F, Nannelli R, Nuzzaci G, de Lillo E (eds.) *Acarid phylogeny and evolution: adaptation in mites and ticks*. Springer, Dordrecht. pp. 1-20
- Thorell T 1872 Remarks on synonyms of European spiders. Part III. Lundström, Uppsala. pp. 229-374 – doi: [10.5962/bhl.title.69282](https://doi.org/10.5962/bhl.title.69282)
- Thorell T 1875 Diagnoses araneorum europaeorum aliquot novarum. – *Tijdschrift voor Entomologie* 18: 81-108
- Trouessart E & Canestrini G 1895 Diagnose d'une espèce nouvelle de Sarcopside pilicole. – *Bulletin des Séances de la Société entomologique de France* 3: 38
- Vachon M 1978 Remarques sur *Euscorpis carpathicus* (Linné, 1767) *canestrinii* (Fanzago, 1872) (Scorpionida, Chactidae). – *Annales Historico-naturales Musei Nationalis Hungarici* 70: 321-330
- Valle A 1955 Revisione della Acaroteca Canestrini. – *Atti e Memorie dell'Accademia patavina di Scienze, Lettere ed Arti* 67: 3-37
- Wieczorek J, Bloom D, Guralnick R, Blum S, Döring M, Giovanni R, Robertson T & Vieglais D 2012 Darwin Core: an evolving community-developed biodiversity data standard. – *PloS One* 7(1, e29715): 1-8 – doi: [10.1371/journal.pone.0029715](https://doi.org/10.1371/journal.pone.0029715)
- World Spider Catalog 2018 World Spider Catalog, version 18.5. Natural History Museum Bern. – Internet: <http://wsc.nmbe.ch> (January 8, 2018) – doi: [10.24436/2](https://doi.org/10.24436/2)