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Occurrence, distribution and bibliography of the medicinal leech *Hirudo verbana* Carena, 1820 (Hirudinea, Hirudinidae) in Sicily (Italy)

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ABSTRACT

The occurrence of the medicinal leech *Hirudo verbana* in the inland waters of Sicily has been lately overlooked. In the present note, the occurrence and distribution of this species is reviewed based both on the review of the available literature data and field collecting. Although a noteworthy reduction in the distribution range of the species seems to have taken place in Sicily in the course of the XX century, *Hirudo verbana* was confirmed to be still present in several sites located both within and out of Natura2000 sites. The Sicilian populations of the species should be included in the frame of the monitoring activities established by the Article 17 of the EU Council Directive 92/43/EEC (“Habitats Directive”).

INTRODUCTION

Among the representatives of leech genera and families that have been historically used for medical purposes (Sket & Trontelj 2008, Elliott & Kutschera 2011), the true “medicinal leeches” belong to the Palearctic hirudinid genus *Hirudo* Linnaeus, 1758. This genus

includes the highly divergent *Hirudo nipponia* Whitman, 1886 and a cluster of closely related species until recently lumped under the binomen *Hirudo medicinalis* Linnaeus, 1758, a species whose native range is in fact limited to central and northern Europe (Utevsky et al. 2010). Due to the impact of specimens’ collecting for medical purposes and to a

generalised degradation of the inhabited water bodies, the medicinal leeches are nowadays threatened throughout their distribution range (Utevsky et al. 2010). Following the taxonomical revisions carried out in recent times (e.g. Neubert & Neesemann 1999, Hechtel & Sawyer 2002, Trontelj & Utevsky 2005, 2012, Siddall et al. 2007, Utevsky et al. 2010, Saglam et al. 2016), the West Palearctic populations once known as *H. medicinalis* are currently ascribed to five different species (Table 1). All these taxa are nowadays included in the Annex V of the Habitats Directive (EU Directive 92/43/CEE) and in the Appendix III of the “Bern Convention on the Conservation of European Wildlife and Natural Habitats” sub *Hirudo medicinalis*. Moreover, Utevsky et al. (2010) proposed the global IUCN category “Near Threatened” for *H. medicinalis*, *H. verbana* Carena, 1820, and *H. orientalis* Utevsky & Trontelj, 2005. *Hirudo medicinalis* and *H. verbana* are also included in the Appendix II of the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).

In Italy, the occurrence of medicinal leeches is reported from the whole peninsula and its major islands (Minelli 1978, 1979, Ruffo & Stoch 2006, Minelli et al. 2016). In Sicily, the occurrence of *Hirudo* “*medicinalis*” was first reported between the XIX and the early XX century (Delle Chiaje 1823, Blanchard 1894, Dequal 1911, 1916) and, after a temporal hiatus of about one century when the species was not cited further for the island, findings of *Hirudo verbana* were reported for single sites at the beginning of the XXI century (Utevsky et al. 2010, Sorgi et al. 2011; see Table 2).

Since for some Italian regions only old records are available, and for other ones some recent records were overlooked, the presence of medicinal leeches has not been reported in the Italian guidelines for the monitoring of habitats and species included in the European “Habitats Directive” for Latium, Campania and Sicily, whereas for the rest of Peninsular Italy and

Sardinia the occurrence of *Hirudo verbana* was confirmed (Minelli et al. 2016).

To date, only scarce data are available on the Sicilian leech fauna (Minelli 1978, 1979, Ruffo & Stoch 2005, Sorgi et al. 2011, Arizza et al. 2016, Marrone et al. 2016), and an exhaustive checklist of the taxa occurring on the island is missing. Accordingly, and in order to check the actual presence and distribution in Sicily of *Hirudo verbana*, which should be the object of monitoring for reporting under Article 17 of the “Habitats Directive”, hirudinid leeches were actively searched throughout the territory, and all the available literature has been reviewed.

MATERIALS AND METHODS

A database of the available information about Sicilian Hirudinea was compiled based on an extensive literature search paying particular attention to the citations of species ascribed to the genus *Hirudo*. The services provided by Google Scholar (<https://scholar.google.com/>), PubMed (www.ncbi.nlm.nih.gov/pubmed/), and the “Biodiversity Heritage Library” (www.biodiversitylibrary.org/) were extensively used.

Lentic and lotic natural water bodies, both characterised by permanent and temporary hydroperiod, were surveyed throughout the Sicilian territory. Artificial water bodies such as agricultural ponds, dam reservoirs, and drinking trough for the cattle have also been included in the survey. Overall, more than 735 sites were sampled both on Sicilian mainland and in the circum-Sicilian archipelagos (F. Marrone, unpublished data). In each visited site, *Hirudo* specimens were actively searched for both visually and using a hand net. Moreover, in the larger water bodies, the possible presence of specimens was ascertained through the implementation of the methods described by Minelli et al. (2016).

Table 1. Composition and gross distribution of the genus *Hirudo* Linnaeus, 1758.

Species	Known distribution
<i>Hirudo medicinalis</i> Linnaeus, 1758	Central and northern Europe
<i>Hirudo troctina</i> Johnson, 1816	Maghreb, Iberian peninsula
<i>Hirudo verbana</i> Carena, 1820	Italy, Balkan peninsula, Turkey, Ciscaucasia
<i>Hirudo orientalis</i> Utevsky & Trontelj, 2005	Transcaucasia
<i>Hirudo sulukii</i> Saglam, Saunders, Lang & Shain, 2016	South-eastern Anatolia
<i>Hirudo nipponia</i> Whitman, 1866	East Asia

Table 2. List of the published and novel occurrence localities of *Hirudo verbana* in Sicily. Geographical decimal coordinates are reported according to the WGS-84 map datum. N.a.: not available. \$: The site lies just out of the SAC ITA070019 “Lago Gurruda e Sciare di S. Venera. *: Possibly a misspelling for “Gorgo di Tusa”, Tusa is a town located on the Nebrodi mountains.

Code	Locality	Municipality	Latitude N	Longitude E	Elevation (m a.s.l.)	Natura2000 site (SAC)	Reference
1	Gorgo di Fusa*	n.a. (ME)	n.a.	n.a.	n.a.	n.a.	Blanchard (1894)
2	“Siracusa”	Siracusa (SR)	n.a.	n.a.	n.a.	n.a.	Dequal (1911)
3	“Catania”	Catania (CT)	n.a.	n.a.	n.a.	n.a.	Dequal (1916)
4	Contrada Bazitta	Bronte (CT)	37.852650	14.831280	788	NO\$	Utevsky et al. (2010)
5	Portella Calacudera	San Fratello (ME)	n.a.	n.a.	1520	ITA030038	Sorgi et al. (2011)
6	Stagno di Serra della Testa	Caronia (ME)	37.920545	14.461728	1098	ITA030014	Present study
7	Stagno di Pizzo Luminaria	Caronia (ME)	37.956226	14.498342	1104	ITA030014	Present study
8	Urio Quattrocchi	Mistretta (ME)	37.901245	14.395885	1000	ITA030017	Present study
9	Gorgo di S. Andrea	Castronovo di Sicilia (PA)	37.670966	13.569222	585	ITA020011	Present study
10	Lago Bomes	Sclafani Bagni (PA)	37.823823	13.820875	865	ITA020032	Present study
11	Portella di Granza	Sclafani Bagni (PA)	37.821948	13.809168	800	NO	Present study

When present, leeches were photographed and voucher specimens were collected and stored in 90% ethanol in the collection of FM at the University of Palermo, Italy. The identification of the collected leeches was based on Neubert & Neesemann (1999), Trontelj & Utevsky (2005) and Kutschera (2012).

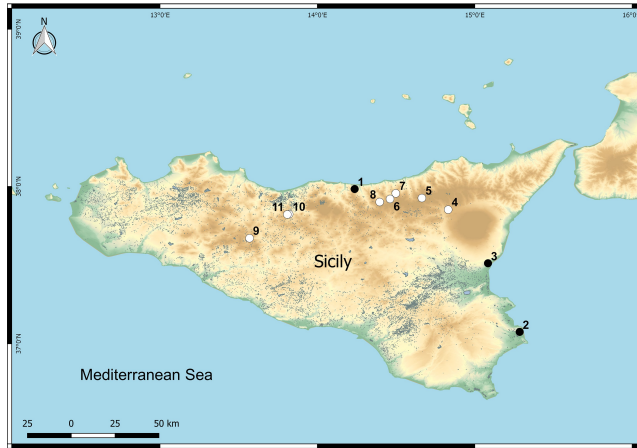


Fig. 1 Location of the *Hirudo verbana* occurrence sites known to date. Black: XIX and XX century records; white: XXI century records, including the novel ones reported in present work. The numbers refer to the codes reported in Table 2.

RESULTS

Based on the field survey, the occurrence of *Hirudo* specimens was observed in six new sites, mostly located on the Nebrodi mountain chain and neighbouring localities. Moreover, isolated populations occur in the Monti Sicani area and in the Monti di Montemaggiore (Fig. 1, Table 2). All the new occurrence sites are natural or semi-natural ponds characterized by clear waters and abundant macrophytes, usually located above 800 m a.s.l. (Table 2). With the single exception of the pond Urio Quattrocchi, where the non-native fishes *Carassius auratus* and *Tinca tinca* are present, no fish were observed in any other of the inhabited ponds. Based on the dorsal and ventral patterns of the observed specimens, and in accordance to Utevsky et al. (2010), all the studied Sicilian

specimens fall within the colour variants described for the polymorphic *Hirudo verbana* (Kutschera 2012) and are thus here ascribed to this species.

DISCUSSION

Whilst Delle Chiaje (1823) reported the widespread presence of the species in Sicily (“*habitat ubique in stagnis et paludibus utriusque Siciliae*”), and Blanchard (1894) studied specimens collected in a natural pond, the early XX century records of “*Hirudo medicinalis*” in Sicily only refer to the neighbourhoods of large towns (Dequal 1911, 1916), suggesting the presence of introduced or translocated “medicinal leeches” used by local human population for medical purposes. Conversely, all the XXI century records of *Hirudo verbana* (including the novel ones reported in present note) are pertaining to scarcely inhabited areas, where pastoralism is still actively performed. It is thus possible that some of the older reports were actually referring to non-native specimens of dubious identity and origin, although no sound evidences supporting this hypothesis are available. Conversely, the current presence of *Hirudo verbana* in sites located in natural areas suggests that these populations may be native to the island.

In spite of the known faunal affinities between the inland water fauna of Sicily and North Africa (e.g. Marrone et al. 2009, Stöck et al. 2015), no evidences of the presence of the closely related Ibero-Maghrebian *Hirudo troctina* in Sicily could be found. This species, although allegedly reported to occur in Sardinia (see discussion in: Minelli 1978), is not currently considered part of the Italian fauna (Ruffo & Stoch 2006).

Unfortunately, no quantitative data are available on the consistency of the *Hirudo* populations reported here, and the absence of previous data prevents us from carrying out an estimate of the distribution trends of the species

on the island. However, in contrast with the widespread local diffusion of the species mentioned in the XIX century, all the currently known Sicilian *Hirudo verbana* populations occur within protected areas. This suggests a general disappearance of the species from the more urbanized and agriculturally managed areas, and its survival in “natural refuges” where both well-structured water bodies and traditional rearing of livestock are still present.

One of the novel sites of occurrence of *H. verbana* lies just out of the Special Area of Conservation, SAC (Zona Speciale di Conservazione, ZSC, in Italian) “Lago Gurruda e Sciare di S. Venera” (SAC ITA070019), and an update in the perimeter delimitation of the SAC itself should thus be considered (see Table 2). In order to prevent the further decline of the species, it is also desirable that, in good accordance with the Article 17 of the EU Council Directive 92/43/EEC (“Habitats Directive”), the status and trends of the existing Sicilian populations of the species are monitored on regular bases.

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