

Rediscovery of a rare gall on *Rosa sempervirens* induced by *Diplolepis eglanteriae* (Hartig, 1840) (Hymenoptera, Cynipidae) in Malta

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ABSTRACT. *Diplolepis eglanteriae* is a cynipid wasp inducing characteristic smooth pea-like galls on *Rosa sempervirens*. The gall was first reported as occurring in Malta in 1926 at Buskett. During the present study, the presence of this gall was confirmed and although it was not found again in Buskett it was found in three other localities on Malta. Three chalcid parasitoids were found associated with these galls, namely *Eupelmus (Macroneura) muellneri* Ruschka, 1921 (Eupelmidae), *Stepanovia eurytomae* (Nees, 1834) (Eulophidae) and *Pteromalus* sp. near *bedeguaris* (Pteromalidae); the latter two are here recorded for the first time from the Maltese Islands.

KEYWORDS. Mediterranean, Cynipidae, Eupelmidae, Eulophidae, Pteromalidae.

INTRODUCTION

The genus *Rosa* is represented by about 50 described species in Europe (KLAUTERSKY, 1968). Only three species were recorded from Malta, that is *R. sempervirens* L., *R. gallica* L. s.l., and *R. canina* L. var. *dumetorum* Thuill. (Gulia, 1872; Sommier & Caruana Gatto, 1915; Borg, 1927) - now a synonym of *Rosa corymbifera* Borkh. The former species is native while *R. gallica* s.l. (including its hybrids) is an old introduction which still persist in few locations in Malta. *R. canina* was recorded as *Rosa dumetorum* Thuill. by GULIA (1872) from ta' Cenc, Gozo, but this record was not confirmed and doubted as extinct already by SOMMIER & CARUANA GATTO (1915). Since most of the present study focused on *R. sempervirens*, some additional information on this species follows.

Rosa sempervirens (Fig. 1a, b) is a rather rare evergreen rose, scrambling on rocky valley sides and boulder scree in the Maltese Islands. It was first recorded from Malta by DUTHIE (1872) from Wied Ghar Dalam and was subsequently found in the following localities: Buskett, Wied Incita, Wied il-Ghasel, Wied Anglu, Wied Hazrun, Ta' Baldu, Santa Katarina, scree around Inquisitor's Palace, Laferla Cross (overlooking Wied Fulija), Wied Ghomor (St. Julians/San Gwann) (SOMMIER & CARUANA GATTO, 1915; BORG, 1927; LANFRANCO, 1989; TABONE, 2008) and Mgarr in Gozo (GULIA, 1872). A cynipid wasp, inducing characteristic smooth pea-like galls (Figs. 1 c-g) on *R. sempervirens* is often present throughout the distribution range of this rose. The presence of this gall was first reported from Malta by CARUANA GATTO (1926) from Buskett during the months of April till June. He recorded the cynipid wasp under the name of *Rhodites eglanteriae* Hartig, 1840.

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MATERIAL AND METHODS

During the present study, native *Rosa* populations were searched throughout the Maltese Islands from localities where roses were previously recorded or unpublished localities known or indicated to the author. Whenever found, they were carefully searched for the presence of galls (during the months of May till July) induced by *Diplolepis eglanteriae*. When found, observations on these galls were recorded and representative samples of these galls were taken to the laboratory where they were placed in plastic containers for the possible emergence of insects. Emerged insects were dry mounted and chalcid parasitoids were identified by Dr Richard Askew and deposited in his private collection.

RESULTS AND DISCUSSION

Populations of *Rosa sempervirens* were studied from Wied Inċita (Attard), Wied il-Buskett (Dingli), Wied Anġlu (Għargħur), at Public Park in Skorba Temples (Mġarr), Wied l-Ispanza (Mosta) and Wied il-Kbir (Qormi); the latter two locations are new for this wild rose. Galls induced by *Diplolepis eglanteriae* were only found at Wied Inċita (May-July 2008/9), Wied l-Ispanza (May, 2016), Wied il-Kbir (May, 2016) and Wied Anġlu (May, 2016).

Random examination on various cultivated roses yielded no observation of such galls. Figure 2 shows the mapped distribution of populations of *Rosa sempervirens* as found during the present study and the localities where rose galls were also found. A sample of 59 galls were studied and their location on *Rosa sempervirens* (Fig. 3), size and colour were recorded *in situ* (Table 1). The gall diameter ranged between 1.5 and 5.5 mm with a mean of 3.5 mm.

They were found on the leaflets, leaf rachis, pedicels, hypanthium and sepals, but they were most frequent on leaflets. Most of the galls were found at or close to the margin of leaflets (Figs. 1d, f and g), with a rather random distribution between the upper, central or basal part of the leaflet. They were more frequently found on the upper face of the leaf, but there was no particular preference on which leaflet of the compound leaf the galls were present, although there was a slight tendency to be less common on the basal leaflets (Figs. 1 c-g). It was evident that sun-facing parts of the gall turned red. Galls on the margins or sitting on the upper surface of leaflets were always red or rosy-pink (Fig. 1d), while those at the lower surface were pale pink or often completely greenish-white (Fig. 1e) when examined in May 2016.

Galls were only found on flowering areas of the plants, rather than having a random distribution throughout dense mats of this rambling species. In fact, rose populations that did not flower during the present study (Mġarr and Wied il-Buskett), had no galls. When the rose population at Wied Inċita was flowering profusely during visits in 2008 and 2009, many galls were observed, but when the rose was not in flower during visit between May and June 2016, no galls were found. The rose at Wied il-Buskett is located under the shade of conifer trees and it was never found in flower during several visits between 2007 and 2016, and likewise, no galls were ever observed on this plant.

During the present study chalcid parasitoids were reared from galls of *Diplolepis eglanteriae*. DORCHIN *et al.* (2014) reported the presence of *Eupelmus (Macroneura) muellneri* Ruschka, 1921 (Eupelmidae) from Wied Inċita (Malta) which was reared from galls on *Rosa sempervirens* induced by *Diplolepis eglanteriae*. During the present study, one female of *E. muellneri* emerged also from a rose gall from Wied il-Kbir (4.vii.2016 emergence date). *Eupelmus muellneri* is a polyphagous



Figure 1 a–g: *Rosa sempervirens*; **a–b:** Inflorescences and detail of flower; **c:** Galls from Wied Anglu (May, 2016); **d:** Gall from Wied Incita (May, 2008); **e:** Gall from Wied il-Kbir (May, 2016); **f–g:** Gall from Wied l-Isperanza (May, 2016).

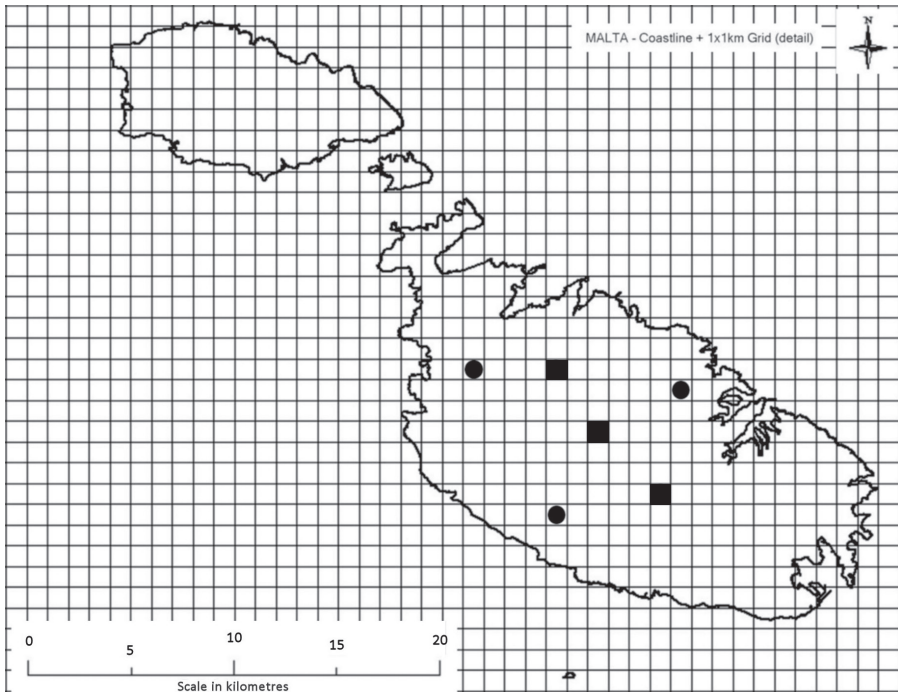


Figure 2: Distribution map of *Rosa sempervirens* populations found during the present study without galls (●) and populations found with galls (■).

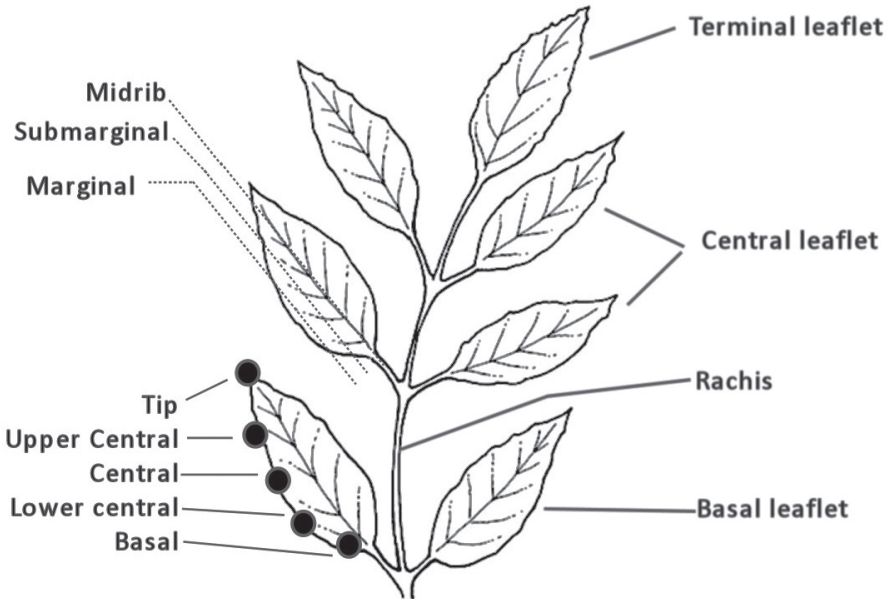


Figure 3: Annotated diagram of a typical compound leaf of *Rosa sempervirens* with terminology used for gall location in Table 1.

species but is strongly associated with gall-inducing hosts on herbaceous plants and shrubs. Host species in Lepidoptera (Pyrallidae), Diptera (Cecidomyiidae, Tephritidae), Hymenoptera (Cynipidae, Eurytomidae) and, improbably, Hemiptera (Aphidoidea) are cited in NOYES (2016).

Moreover, two other chalcid parasitoids, previously unknown from Malta were found associated with galls on *Rosa sempervirens* induced by *Diplolepis eglanteriae*. Data on these parasitoids follow hereunder:

***Stepanovia eurytomae* (Nees, 1834)**
(Chalcidoidea, Eulophidae)

Material examined: Malta, Wied il-Kbir, 10.v.2016, 2 ♂♂ and 6 ♀♀ emerged from galls on *Rosa sempervirens* induced by *Diplolepis eglanteriae* on 7-13.vi.2016.

Notes: *Stepanovia eurytomae* is a new record for the Maltese Islands. It was recorded from several European countries, as well as Iran, Morocco and Turkey. It was always found associated with cynipid galls on *Rosa* spp. (NOYES, 2016).

***Pteromalus* sp. near *bedeguaris* (Thomson, 1878)**
(Chalcidoidea, Pteromalidae)

Material examined: Malta, Wied il-Kbir, 1.vii.2016, ex *Diplolepis eglanteriae* galls on *Rosa sempervirens*, 1 ♀, same data but 15.vi.2016, 1 ♂.

Notes: This species is a new record for the Maltese Islands. The material from Malta differs from *P. bedeguaris* in having a shorter female gaster and forewing. It is possibly just a form of *P. bedeguaris*, but more material needs to be studied to clarify its position. *Pteromalus bedeguaris* is a polyphagous parasitoid in galls of *Diplolepis* species on *Rosa*, attacking a range of Cynipidae and other Chalcidoidea inhabiting the galls (NOYES, 2016).

Table 1: Size, colour and location of galls on host plant (*Rosa sempervirens*) from three localities (Wied l-Ispananza, Wied il-Kbir and Wied Anġlu)

Gall #	Size (mm)	Colour of Gall	Gall attachment on plant	Location of gall on leaflet	Longitudinal placement on leaflet	Leaflet surface
Galls collected from <i>Rosa sempervirens</i> at Wied l-Ispananza (9-May-2016)						
1	4.5	Red	Basal leaflet	Central portion	Marginal	Upper
2	3.5	Pink & Red	Terminal leaflet	Leaflet tip	Marginal	Upper
3	4	Red	Central leaflet	Central portion	Marginal	Upper
4	3	Pink	Central leaflet	Upper-central portion	Marginal	Upper
5	3	Red	Rachis	n/a	n/a	Upper
6	3	White & Pink	Terminal leaflet	Central portion	Marginal	Lower
7	2	White & Pink	Basal leaflet	Lower-central portion	Marginal	Lower
8	2	White	Basal leaflet	Central portion	Submarginal	Lower
9	2.5	Pink & Red	Rachis	n/a	n/a	Upper
10	1.5	White & Pink	Basal leaflet	Upper-central portion	Marginal	Lower
11	2.5	White	Central leaflet	Central portion	Submarginal	Lower

12	2.5	Red	Basal leaflet	Central portion	Marginal	Upper
13	3	White & pink	Terminal leaflet	Central portion	Submarginal	Lower
14	5	Pink & Red	Central leaflet	Basal portion	Marginal	Upper
15	2	Red	Basal leaflet	Upper-central portion	Marginal	Upper
16	2.5	Red	Basal leaflet	Upper-central portion	Marginal	Upper
17	2.5	Pink and white	Rachis	n/a	n/a	Upper
Gall #	Size (mm)	Colour of Gall	Gall attachment on plant	Location of gall on leaflet	Longitudinal placement on leaflet	Leaflet surface
Galls collected from <i>Rosa sempervirens</i> at Wied il-Kbir (10-May-2016)						
18	4	White & Pink	Basal leaflet	Basal portion	Marginal	Lower
19	4.5	White & Pink	Terminal leaflet	Basal portion	Marginal	Lower
20	2	Red	Terminal leaflet	Central portion	Submarginal	Upper
21	3	White & Pink	Central leaflet	Basal portion	Marginal	Lower
22	4	Red	Central leaflet	Upper-central portion	Submarginal	Upper
23	4	White & Pink	Terminal leaflet	Basal portion	Near midrib	Lower
24	5	White & Pink	Terminal leaflet	Basal portion	Near midrib	Lower
25	5.5	White & Pink	Terminal leaflet	Basal portion	Submarginal	Lower
26	3	Red	Central leaflet	Central portion	Submarginal	Upper
27	4	Pink & Red	Terminal leaflet	Tip	Marginal	Lower
28	1.5	White & Pink	Rachis	n/a	n/a	n/a
29	2.5	White	Terminal leaflet	Central portion	Marginal	Lower
30	2	White	Central leaflet	Basal portion	Marginal	Lower
31	4	Pink & Red	Central leaflet	Basal portion	Marginal	Lower
32	5	Pink & Red	Central leaflet	Basal portion	Marginal	Lower
33	4.5	Red	Central leaflet	Central portion	Submarginal	Upper
34	5	White & Pink	Pedicel	n/a	n/a	n/a
35	2.5	White & Pink	Hypanthium	n/a	n/a	n/a
36	3.5	Red	Sepal	n/a	n/a	n/a
37	4.5	Pink & Red	Terminal leaflet	Basal portion	Marginal	Upper
38	2	Red	Terminal leaflet	Tip	Marginal	Upper
39	5	Red	Central leaflet	Basal portion	Marginal	Upper
40	4.5	Red	Central leaflet	Basal portion	Marginal	Upper
41	5.5	White	Terminal leaflet	Basal portion	Marginal	Lower
42	1.5	Red	Central leaflet	Basal portion	Submarginal	Upper
43	2	Pink & Red	Terminal leaflet	Central portion	Submarginal	Upper
44	5	White & Pink	Central leaflet	Basal portion	Marginal	Lower
45	4.5	White	Central leaflet	Basal portion	Near midrib	Lower
46	2.5	Pink	Terminal leaflet	Central portion	Marginal	Upper
47	4	Pink & Red	Terminal leaflet	Basal portion	Marginal	Upper
48	4	Red	Terminal leaflet	Basal portion	Submarginal	Upper
Gall #	Size (mm)	Colour of Gall	Gall attachment on plant	Location of gall on leaflet	Longitudinal placement on leaflet	Leaflet surface
Galls collected from <i>Rosa sempervirens</i> at Wied Anġlu (21-May-2016)						
49	5	Pink & Red	Basal leaflet	Basal portion	Marginal	Upper
50	4	Red	Terminal leaflet	Basal portion	Marginal	Upper
51	3.5	White & Pink	Terminal leaflet	Central portion	Submarginal	Lower

52	4.5	Pink & Red	Central leaflet	Basal portion	Marginal	Upper
53	3.5	White	Central leaflet	Upper-central portion	Near midrib	Lower
54	3	White & Pink	Basal leaflet	Basal portion	Submarginal	Lower
55	2.5	Pink & Red	Terminal leaflet	Central portion	Marginal	Upper
56	4.5	White & Pink	Central leaflet	Basal portion	Submarginal	Lower
57	2.5	Pink	Central leaflet	Central portion	Submarginal	Lower
58	2.5	Red	Basal leaflet	Tip	Marginal	Upper
59	3	White & Pink	Terminal leaflet	Central portion	n/a	Upper

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REFERENCES

- BORG, J. (1927). *Descriptive flora of the Maltese Islands: including the ferns and flowering plants*. Malta: Government Printing Office. 806 pp.
- CARUANA GATTO, A. (1926). Primo contributo alla conoscenza dei Zoocecidii delle Isole Maltesi. *Archivum Melitensis*, 7(3): 105–124 + 2 pp. index.
- DORCHIN, N., MIFSUD, D. & ASKEW, R. (2014) Saltbush-associated *Asphondylia* species (Diptera: Cecidomyiidae) in the Mediterranean Basin and their chalcidoid parasitoids (Hymenoptera: Chalcidoidea). *Zootaxa*, 3869 (4): 383–396.
- GULIA G. (1872). *Maltese Botany: Rosaceae*. Il Barth, vol. I: 175–176.
- KLASTERSKY, I. (1968) *Rosa* L. (Pp. 25–32). In: TUTIN, T.G., HEYWOOD, V.H., BURGESS, N.A., VALENTINE, D.H., WALTERS, S.M. & WEBB, D.A. [eds.], *Flora Europea Volume 2 - Rosaceae to Umbelliferae*. Cambridge University Press, Cambridge, UK. 486 pp.
- LANFRANCO, E. (1989). The Flora (Pp. 5–70). In: SCHEMBRI, P.J. & SULTANA, J. [eds.], *Red Data Book for the Maltese Islands*. Department of Information, Malta. viii + 142 pp.
- NOYES, J.S. (2016) Universal Chalcidoidea Database. World Wide Web electronic publication <http://www.nhm.ac.uk/chalcidoids> [accessed July, 2016]
- SOMMIER, S. & CARUANA GATTO, A. (1915). *Flora Melitensis nova*. Stabilimenta Pellas, Firenze, Italy. 502 pp.
- TABONE, T.J. (2008). A list of records of some rare vascular flowering plants occurring in the Maltese Islands (Central Mediterranean). *Central Mediterranean Naturalist*, 4(4): 311–337.

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