

Wild *Rosa* L. taxa of the National Nature Park ‘Podilskyi Tovtry’ (Podolian Hills, Western Ukraine)

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Abstract: The present paper discusses the wild roses of the National Nature Park ‘Podilskyi Tovtry’. The purpose of the work was to compile a full list of the wild *Rosa* taxa growing in the study area and present their distribution. Based on the field studies during the years 2009-2013 and published data, 20 taxa have been recorded, among them: 16 native species (including three hybrids with the rank of species), 2 anthropophytes and 2 hybrids. However, the taxonomical status of *Rosa caryophyllacea* Besser is not clear and species requires taxonomical revision. Three new *Rosa* species for the Park were found during the studies. These are: *Rosa micrantha*, *R. ×subcanina* and *R. ×subcollina*. The list of the roses occurring in this area is still far away from being completed, therefore, further research is needed.

Key words: *Rosa*, Rosaceae, checklist of the roses, National Nature Park ‘Podilskyi Tovtry’, Ukraine

1. Introduction

The occurrence of polymorphism was the reason for the presence of many classification systems within the genus *Rosa* L. Recently, considering the classification based on morphological features and additional cytology and karyological studies, 31 wild growing rose species have been found in the European territory, excluding former USSR countries (Popek 2007). Henker (2000) lists 28 rose species and Zieliński (1985) 17 in the *Caninae* section. The distribution of the genus *Rosa* L. in the East Europe requires thorough revision based upon the current taxonomic nomenclature. For example, 85 wild *Rosa* species are given in the *Vascular Plants of Ukraine* (Mosyakin & Fedoronchuk 1999) and 29 species in the *Atlas of Florae Europae* (Kurtto *et al.* 2004). Also, the ranges of many rose species have not been sufficiently recognized yet.

No thorough searches of *Rosa* species have been conducted in the National Nature Park ‘Podilskyi Tovtry’ (NNPPT) yet. The studies carried out in the Park area so far concentrated on the occurrence of relic, endemic, rare and protected species. Their main aim was the search for plants with special significance for xerother-

mic flora (Moroz 1970; Levanets *et al.* 2004; Lyubinska 2013). The monographies concerning vascular flora of NNPPT provide only the general data presenting mainly the names of species, but not their distribution in the Park (Lyubinska *et al.* 1999; Novosad *et al.* 2009).

The highest number of rose species was reported by Lyubinska *et al.* (1999) and Novosad *et al.* (2009). These scientists classified 37 rose species in total, among them, 21 species functioning synonymously in the current taxonomic nomenclature (among others, Kurtto *et al.* 2004; Popek 1996, 2007; Zieliński 1985, 1987; <http://www.eu-nomen.eu>; <http://www.theplantlist.org>); e.g.: *Rosa andegavensis* Bast. (= *R. canina* L.), *R. andrzejowskii* Staven ex Besser (= *R. sherardii* Dav.), *R. balsamica* Besser (= *R. canina*), *R. biser-rata* Mérat. (= *R. canina*), *R. ×boreykiana* Besser (= *R. canina* s.l.), *R. canina* L., *R. carophyllacea* Besser, *R. ciesielskii* Błocki (= *R. canina*), *R. corymbifera* Borkh. (= *R. canina*), *R. crenatula* Chrshan. (= *R. gallica* L.), *R. czackiana* Besser (= *R. gallica*), *R. dumalis* Bechst., *R. frutetorum* Besser (= *R. canina*), *R. gorenkensis* Besser, *R. inodora* Fr., *R. jundzillii* Besser, *R. lazarenkoi* Chrshan. (= *R. dumalis*), *R. litvinovii* Chrshan. (= *R. canina*), *R. livicensis* Besser (= *R. jundzillii*), *R. nitidula*

Besser (= *R. canina*), *R. parviuscula* Chrshan. & Laseb (= *R. gallica*), *R. pimpinellifolia* (= *R. spinosissima* L.), *R. podolica* Tratt. (= *R. dumalis*), *R. porrectidens* Chrshan. Et Laseb., *R. rubiginosa* L., *R. rubrifolia* Vill. (= *R. glauca* Vill.), *R. schmalhauseni* Chrshan. (= *R. canina*), *R. scherardii* Dav., *R. spinosissima* L., *R. subafzeliana* Chrshan. (= *R. dumalis*), *R. subglabra* Borbás (= *R. canina* s.l.), *R. tomentosa* Sm., *R. unicella* Besser (= *R. canina*), *R. villosa* L., *R. volhynensis* Chrshan. (= *R. rubiginosa*) and anthropophytes *R. glauca* Vill. and *R. rugosa* Thunb.

Rosa × *subcanina* (H. Christ) R. Keller – a new species for the flora of the NNPPT was found during the studies in 2009 (Soltys-Lelek 2013). *Rosa* × *subcanina*, regarded as a taxon of hybrid origin (*R. dumalis* Bechst. × *R. canina* L.), is currently classified by some researchers as a separate species (Henker 2000).

The so far mentioned rose species coming from the Podolia area were found either in single localities or reported as occurring 'everywhere' or 'frequently'. Also, some of the mentioned species have synonymous names, e.g., *R. canina* has 12 different names.

Therefore, the search focused on the preparation of a very detailed list of rose species based on the current taxonomic nomenclature (Zieliński 1987; Popek 1996) and species localities in the NNPPT.

2. Study area

The NNPPT, 2,613.16 km² in area, was established in 1996 and signed under the Decree No. 476-96 by the President of Ukraine on the 27th of June 1996. NNPPT has been registered in the Podilskyi Region of National Ecological Network of Ukraine since 2000 (according to the Law of Ukraine of 21.09.2000, No. 1989-III). The park is situated in the Khmelnytskyi Oblast (province) in southern part of western Ukraine (Fig. 1). NNPPT is the biggest protected area in Ukraine.

Tovtry is situated on a low mountainous ridge with the maximum height of 350-400 m a.s.l. within the Park limits and an average height of 60-65 m a.s.l. for the surrounding plateau. Its geological structure is formed from the Miocene barrier coral reef consisting of different types of limestone, elevated due to tectonic movements (Fig. 2). A large number of similar rock structures occurs only in the United Kingdom and USA (<http://www.tovtry.com/en/info/geo/index.html>).

The diversified land forms, formed as a result of karst processes, caused the differentiation of biological sites in the park, which consequently influenced its vegetation. 2977 plant species requiring different ecological conditions (60 of them listed in the Ukrainian Red Book) occur in the NNPPT area (<http://www.tovtry.com>).

Agricultural area covers ca 75% of the Park, forests and non-forest vegetation – nearly 15%; non-forest

wetlands – only 4%. The vegetation cover is formed by oak, mixed hornbeam-oak-ash and beach forests and patches of xerothermic grasslands and meadows (Lyubinska 2013).

3. Material and methods

Plant material was collected in 2009-2013. It included fragments of short and long shoots of roses. The localities of common and easy to identify in the field taxa, such as *Rosa canina* L., were only sporadically recorded. All herbarium materials are deposited in the Herbarium of the Ojców National Park (Ojców, Poland).

Data were collected from 44 localities. The names of places were based on www.google.pl/maps (Fig. 1, Appendix 1). The locality names (encoded as numbers) in the presented species list were supplemented with the author's name abbreviation and the year when the field observations were made or specimens collected. Data from literature were also included.

Taxonomic approach and nomenclature were based on the works of Popek (1996, 2007), Zieliński (1985, 1987), Henker (2000), Kurtto *et al.* (2004) and on the websites: <http://www.ville-ge>, <http://www2.bgbm.org/>, EuroPlusMed and <http://www.gbif.org/species>.

The geographical elements for each species follow Popek (2007) and Zając & Zając (2009). For anthropophytes their native ranges are given.

Abbreviations and symbols used in the list of species: HO – Halyna Oliiar, SL – Anna Soltys-Lelek; * – anthropophyte, leg. – legit, obs. – observation; geographical elements, A – Asian element, CE – European-temperate sub-element, CE: a-ce – Alpine-Central-European distributional type, CE: a-ne – Alpine-northern-European distributional type, M – Mediterranean element, ES – Euro-Siberian sub-element, IR – Irano-Turanian element; e – eastern, n – northern, s – southern, w – western; sa – extension in the beginning of diagnosis to the Atlantic region of Europe.

4. Results

The list contains 20 taxa of the genus *Rosa* L., belonging to the sections: *Pimpinellifoliae* DC. (1 species), *Cinnamomeae* D.C. (2 species), *Caninae* DC. em. H. Christ (15 taxa) and *Rosa* (1 species). Among them, there are 16 native species (including 2 native hybrid forms at the rank of species), 2 anthropophytes and 2 hybrid forms.

Sect. *Pimpinellifoliae* DC

Rosa spinosissima L. (= *R. pimpinellifolia* L.) – ES. The species occurs in the Park area (Lyubinska *et*

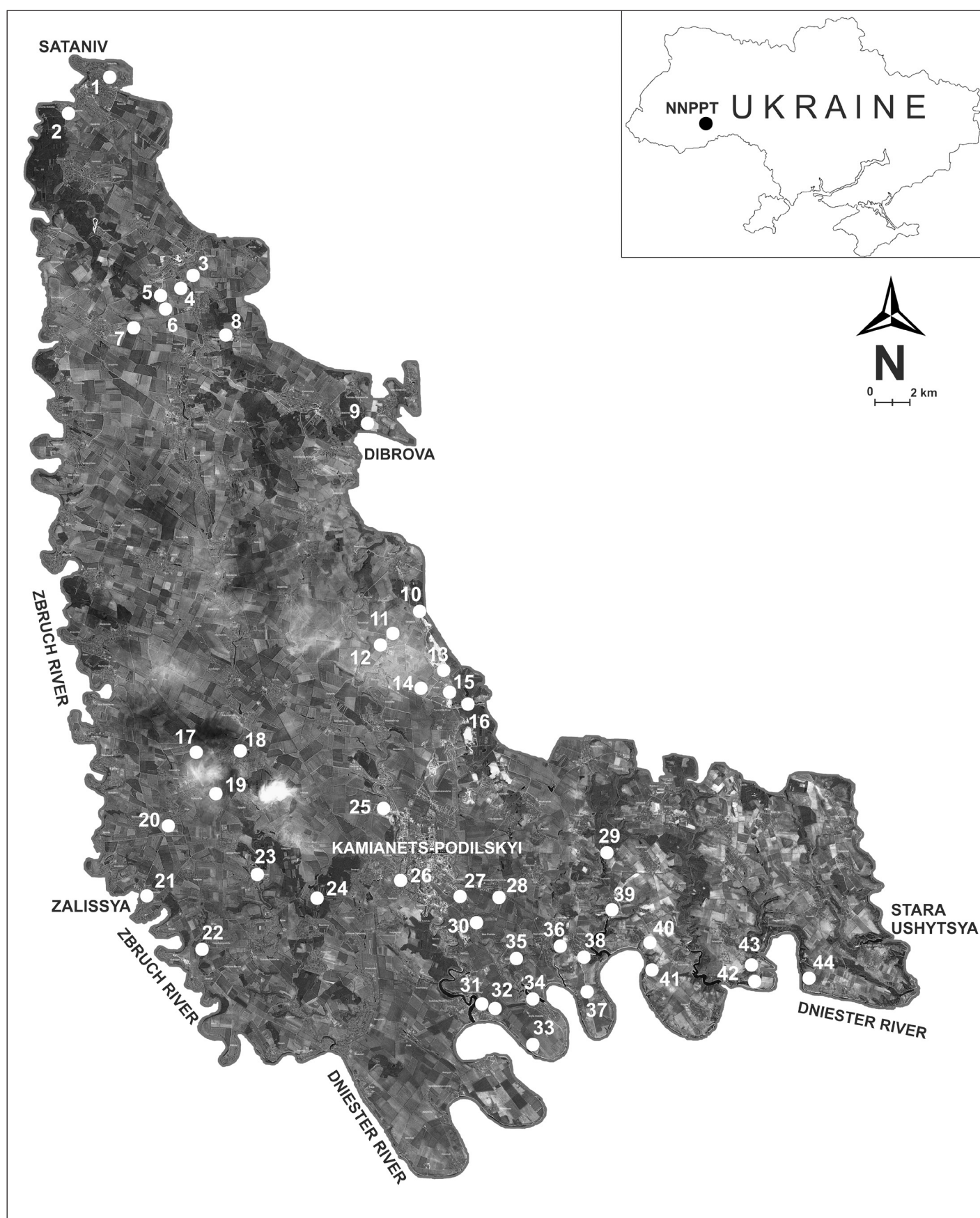


Fig. 1. Distribution of localities in the study area
 Explanation: list of localities cf. Appendix 1



Fig. 2. National Nature Park 'Podilskyi Tovtry' near Subich village (photograph by A. Soltys-Lelek, 2013)

al. 1999; Novosad *et al.* 2009) and in the 'Podilskyi Tovtry' range (Moroz 1970). 1 locality stated by the authors: 30 (leg. SL, 2010).

Sect. *Cinnamomeae* DC

Rosa gorenkensis Besser – ES. Generally reported from the Park area (Novosad *et al.* 2009). Not found during this research.

**Rosa rugosa* Thunb. – A(e). Generally reported from in the Park area (Lyubinska *et al.* 1999). Not found during this study.

Sect. *Caninae* DC. emend. H. Christ

**Rosa glauca* Pourr. (= *Rosa rubrifolia* Vill.) – CE: a-ce. Generally reported from the Park area (Lyubinska *et al.* 1999; Novosad *et al.* 2009). Not found during this study.

R. dumalis Bechst. (= *R. glauca* Vill., *R. caesia* Sm., *R. coriifolia* Fr., *R. lazarenkoi* Chrshan., *R. podolica* Tratt., *R. subafzeliana* Chrshan.) – CE-M(n). The species reported as *R. lazarenkoi* Chrshan. Generally reported from the Park area (Lyubinska *et al.* 1999; Novosad *et al.* 2009). Found in four varieties:

- *R. d.* var. *afzeliana* (Fr.) Boulenger (= *R. subafzeliana* Chrshan.). The variety reported as *R. subafzeliana* Chrshan. Generally reported from the Park area (Novosad *et al.* 2009). 4 localities stated by the authors: 12, 20, 22, 33 (leg. SL, 2013).

- *R. d.* var. *dumalis* – 9 localities stated by the authors: 25 (leg. SL, 2010); 4, 5, 8, 10, 11, 15, 18, 31 (leg. SL, 2013).

- *R. d.* var. *coriifolia* (Fr.) Boulenger – 6 localities stated by the authors: 27, 30 (leg. SL, 2010); 8, 9, 37, 41 (leg. SL, 2013).

- *R. d.* var. *caesia* (Sm.) Boulenger – The variety generally reported as *R. lazarenkoi* Chrshan from the Park area (Lyubinska *et al.* 1999).

Rosa villosa L. – CE-M. Generally reported from the Park area and frequent in the central area of the 'Podilskyi Tovtry' range (Moroz 1970). Not found during the research.

Rosa sherardii Dav. var. *sherardii* (= *R. andrzejkowskii* Steven ex Besser.) – CE: a-ne. Generally reported from the Park area (Lyubinska *et al.* 1999; Novosad *et al.* 2009). 3 localities stated by the authors: 5, 6, 8 (leg. SL, 2013).

Rosa tomentosa Sm. var. *tomentosa* – sa-CE-M(n). Generally reported from the Park area (Lyubinska

et al. 1999; Novosad *et al.* 2009). 4 localities stated by the authors: 16 (leg. SL, 2010); 6, 13, 15 (leg. SL, 2013).

Rosa rubiginosa L. (= *Rosa eglanteria* L.) – sa-CE-M(n). Generally reported from the Park area (Lyubinska *et al.* 1999, Novosad *et al.* 2009) and from 4 localities: 26 (Levanets *et al.* 2004), 39 (Khrzhanovsky 1954), 38 (Moroz 1970), Sataniv (Khrzhanovsky 1954). The species found in three varieties:

- *R. r.* var. *rubiginosa* – 7 localities stated by the authors: 16, 29, 30 (leg. SL, 2010); 33, 39, 40, 44 (leg. SL, 2013).

- *R. r.* var. *umbellata* (Leers) Dumort. – 18 localities stated by the authors: 3, 4, 5, 9, 11, 13, 14, 15, 22, 23, 31, 34, 35, 36, 37, 39, 41, 43 (leg. SL, 2013).

- *R. r.* var. *jenensis* (M. Schulze) H. Christ. – 2 localities stated by the authors: 5, 42 (leg. SL, 2013).

Rosa micrantha Borrer ex Sm. var. *micrantha* – sa-CE(s)-M. A new *Rosa* species for the flora of NNPPT, not previously reported from the study area. 1 locality stated by the authors: 32 (leg. SL, 2013).

Rosa inodora Fr. var. *popekii* (Klášt.) Popek – CE(w). Generally reported from the Park area (Novosad *et al.* 2009). 1 locality stated by the authors: 30 (leg. SL, 2010).

Rosa canina L. (= *R. andegavensis* Bast., *R. balsamica* Besser, *R. biserrata* Mérat., *R. × boreykiana* Besser, *R. ciesielskii* Blocki, *R. corymbifera* Borkh., *R. frutetorum* Besser, *R. klukii* Besser, *R. litvinovii* Chrshan., *R. nitidula* Besser, *R. schmalhauseniiana* Chrshan., *R. subglabra* Borbás, *R. unicella* Besser.) – sa-CE-M-IR. The species generally reported from the Park area (Lyubinska *et al.* 1999, Novosad *et al.* 2009) and as frequent in the southern part of Podole region (Moroz 1970): 26 (Khrzhanovsky 1954; Levanets *et al.* 2004), Sataniv (Khrzhanovsky 1954; Moroz 1970). Found in seven varieties.

- *R. c.* var. *canina* – 9 localities stated by the authors: 2 (leg. SL, 2009); 30, 44 (leg. SL, 2010); 4, 17, 18, 20, 23, 33 (leg. SL, 2013).

- *R. c.* var. *andegavensis* (Bastard) Desp. (= *R. andegavensis* Bast., *R. litvinovii* Chrshan.) – 32 localities stated by the authors: 16, 26, 27, 44 (leg. SL, 2010); 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 20, 21, 22, 23, 28, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43 (leg. SL, 2013).

- *R. c.* var. *dumalis* – 28 localities stated by the authors: 26, 29, 44 (leg. SL, 2010); 3, 4, 5, 6, 8, 10, 13, 14, 15, 17, 19, 20, 22, 23, 28, 31, 32, 33, 35, 36, 37, 39, 40, 41, 42 (leg. SL, 2013).

- *R. c.* var. *blondeana* (Ripart) Crépin – 2 localities stated by the authors: 30 (leg. SL, 2010); 42 (leg. SL, 2013).

- *R. c.* var. *deseglisei* (Boreau) Crépin (= *R. schmalhauseniiana* Chrshan.) – 6 localities stated by the

authors: 2 (leg. SL, 2009); 26 (leg. SL, 2010); 5, 10, 11, 34 (leg. SL, 2013).

- *R. c.* var. *corymbifera* (Borkh.) Boulenger (= *R. corymbifera* Borkh.) – 38 localities stated by the authors: 2 (leg. SL, 2009); 16, 26, 27, 29, 30, 44 (leg. SL, 2010); 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 28, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43 (leg. SL, 2013).

- *R. c.* var. *obtusifolia* Desv. – 1 locality stated by the authors: 41 (leg. SL, 2013).

Rosa jundzillii Bessrer (= *R. livescens* Bess.) – CE(s). Generally reported from the Park area (Lyubinska *et al.* 1999, Novosad *et al.* 2009) and as frequent in the range of ‘Podilskyi Tovtry’ (Moroz 1970). 2 localities: 26, Vyhvatnivtsi (Khrzhanovsky 1954). Not found during this research.

Rosa porrectidens Chrshan. et Laseb. [*R. canina* L. × *R. jundzillii* Bessrer] – CE(s). Generally reported from the Park area (Lyubinska *et al.* 1999; Novosad *et al.* 2009). Not found during this research.

- *R. × subcanina* (H. Christ) R. Keller [*R. canina* L. × *R. dumalis* Bechst.] – sa-CE-M. The hybrid form not previously reported from the study area. 11 localities stated by the authors: 3, 5, 8, 13, 14, 18, 31, 35, 36, 37, 41 (leg. SL, 2013).

- *R. × subcollina* (H. Christ) R. Keller [*R. canina* L. × *R. dumalis* Bechst. var. *coriifolia* (Fr.) Boulenger] – sa-CE-M. 10 localities stated by the authors: 3, 4, 5, 12, 13, 18, 31, 36, 37, 39 (leg. SL, 2013).

Sect. *Rosa*

Rosa gallica L. (= *R. crenatula* Chrshan., *R. czackiana* Besser, *Rosa parviuscula* Chrshan. & Laseb) – CE(s)-M(n). The species generally reported from the Park area (Lyubinska *et al.* 1999; Novosad *et al.* 2009). 3 localities: 44 (obs. HO, 2009), 24 (Khrzhanovsky 1954), 26 (Khrzhanovsky 1954; Levanets *et al.* 2004).

Hybrid forms:

Rosa canina L. × *R. rubiginosa* L. – Hybrid of two species of the section *Caninae* DC. emend. H. Christ. 1 locality stated by the authors: 2 (leg. SL, 2009).

Rosa gallica L. × *R. rubiginosa* L. – Hybrid of two species from two separate sections – *Rosa* and *Caninae* DC. emend. H. Christ. 1 locality stated by the authors: 30 (leg. SL, 2010).

Species of not clear taxonomical position

Rosa caryophyllacea Besser – generally reported from the Park area (Lyubinska *et al.* 1999; Novosad *et al.* 2009). This species requires taxonomical revision.

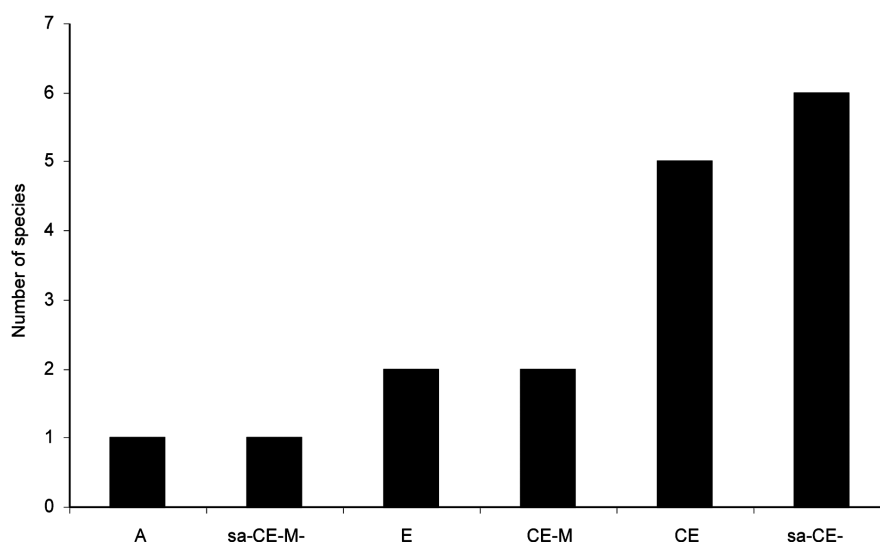


Fig. 3. Geographical elements and sub-elements of roses occurring in the National Nature Park 'Podilskyi Tovtry' (according to: Popek 2007; Zajac & Zajac 2001)

Explanations: Asia – Asiatic element, CE – European-temperate sub-element, CE-M – European-temperate-Mediterranean element, sa-CE-M – European-temperate-Mediterranean element, sa-CE-M-IR – European-temperate-Mediterranean-Irano-Turanian element, ES – Euro-Siberian sub-element, sa – extension in the beginning of diagnosis to the Atlantic region of Europe

It is distinguished as a separate species (for example: Kurtto *et al.* 2004, <http://www.theplantlist.org>, <http://www.gbif.org/species>) or as a synonym of *R. dumalis* Bechst (Zieliński 1985; Popek 1996) or *R. canina* s. l. (Mirek *et al.* 2002).

5. Discussion

The genus *Rosa* L. in the 'Podilskyi Tovtry' National Nature Park comprises over 60% of rose species that were reported from the territory of Europe (Popek 2007). However, the taxonomical status of *R. caryophyllacea* Besser is not clear, so further studies should be taken to solve nomenclatural problems. Three new species for the flora of the National Nature Park were found during this study: *R. micrantha*, *Rosa* × *subcanina* and *R. ×subcollina*. Among them, *R. ×subcanina* and *R. ×subcollina* are thought to be of hybrid origin (*R. dumalis* × *R. canina*) and currently are treated as separate species (Henker 2000).

R. spinosissima, *R. inodora* and *R. micrantha*, found in single localities, are the rarest among the roses occurring in the studied area. The most frequently appearing species were: *R. canina* (40 localities) and *R. rubiginosa* (30 localities). The largest intraspecific diversity was found in *R. canina* (7 varieties) and *R. dumalis* (4 varieties).

Considering geographical elements and geographical distribution, the abundance of individual rose species is differentiated in the flora of the explored area. The rose species belonging to the European-temperate

sub-element and European-temperate-Mediterranean element dominate in NNPPT (Fig. 3). Hybrid *R. gallica* L. × *R. rubiginosa* L. (Fig. 4) seems to be one of more interesting taxa in the studied area. It is a hybrid of the species from two different sections – *Rosa* and *Caninae*. There are known hybrid forms between *R. rubiginosa* L. and *R. agrestis*, as well as *R. sherardii* and *R. dumalis* within the *Caninae* section (Zieliński 1987), but a hybrid between *R. rubiginosa* and a species from another sections (like *R. gallica* from the section *Rosa*, as in this case) was not documented yet. However, there are known hybrids of *R. gallica* with the species from the sections *Caninae* and *Synstylae* DC. (Kerényi-Nagy 2012).

Among the recorded species – *R. micrantha* and *R. inodora* are very rare in Ukraine. In Ukraine, the species distribution is limited only to South-West and South-East of Ukraine, so in Ukraine, it occurs within the northern range of its occurrence. *R. inodora* is a species endemic to Europe. *R. inodora* localities were found only in numerous dispersed localities in western part of Ukraine. *R. micrantha* is also a very rare species in Europe (Zieliński 1985; Popek 2007; Kurtto *et al.* 2004).

R. rubiginosa var. *jenensis* – characterized by glandless sepals and pedicels (Popek 1996), is a very rare species in South and Middle Europe (Kláštorský 1932, 1968) and, thus, draws more attention. Also, two types of *R. canina*: (glandular pedicels) – *R. c.* var. *andegavensis* (leaves glandless on the underside) and *R. c.* var. *blondeana* (leaves glandular on the underside) (Fig. 5)

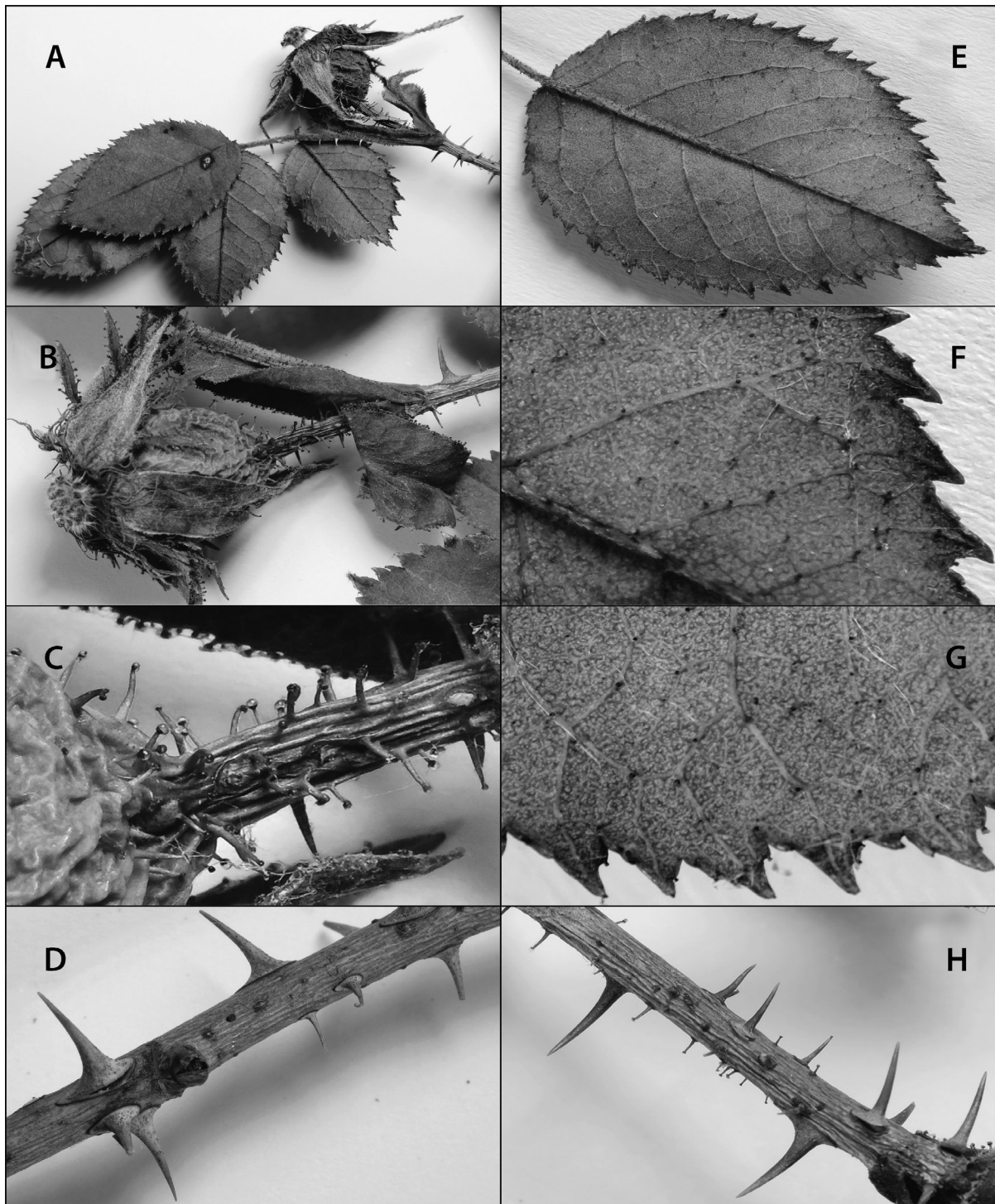


Fig. 4. Examples of morphological characteristics of the intercross hybrid *Rosa gallica* L. × *R. rubiginosa* L.

Explanations: A – top of short shoot, B – hypanthium, C – pedicel, D – part of long shoot, E – leaf (underside), F – part of leaf (underside), G – leaf margin, H – part of short shoot

are very interesting taxa. Their distribution has not been sufficiently investigated yet and requires further studies. *R. canina* var. *deseglisei* is often treated synonymously in Ukraine as *R. schmalhauseni* Chrshan. It also belongs to rare taxa in Europe (Kláštorský 1968). Hairy glandless leaves and glandular pedicels (Popek 1996) are characteristic features of this variety (Popek 1996).

R. gallica, recognized in Ukraine as *R. czackiana* Besser, was found in the off road locality in Bakota, and included in 'Red Book of Ukraine' in 2009. The threats to the species include the collecting of specimens due to their esthetic values and the secondary succession of non-forest ecosystems and thermophilous bushes to the species primary localities (Didukh 2009).

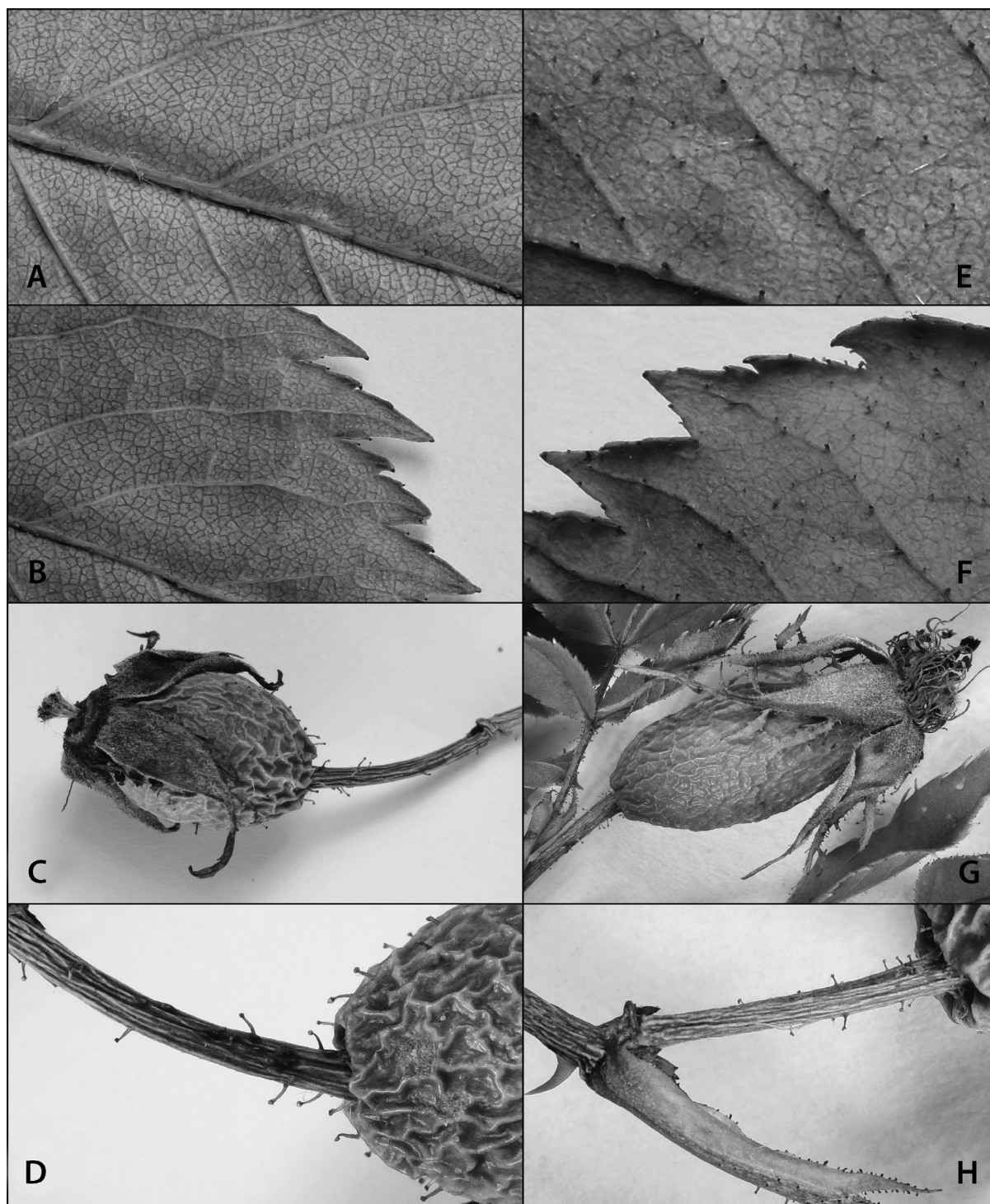


Fig. 5. Examples of morphological characteristics of the *Rosa canina* L. varieties

Explanations: *R. c. var. andegavensis* (Bastard) Desp. A – part of leaf (underside), B – leaf margin, C – hypanthium, D – pedicel; *R. c. var. blondeana* (Ripart) Crépín E – part of leaf (underside), F – leaf margin, G – hypanthium, H – pedicel

Numerous species mentioned in the literature were not found in the studied area. Their localities in NNPPT territory are presented and their current occurrence in the park cannot be excluded.

The results obtained during the field studies complement the information about the distribution of roses in this part of Ukraine and provide the missing data on the

general rose species distribution in Europe. The list of species of roses seems complete. The studies taken so far do not exclude the occurrence of other localities of rare species, therefore, the further exploration of the area, focused on finding most rare species, such as: *R. gorenkensis* or *R. jundzillii*, is needed.

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Appendix 1. List of localities with geographical coordinates

No	Locality	Geographical coordinates
1	Sataniv – part E	N49°15'33" E26°15'24"
2	SE of Sataniv	N49°13'58" E26°14'5"
3	Zakupne – quarry	N49°6'46" E26°21'34"
4	Zakupne	N49°6'17" E26°21'11"
5	Zakupne – quarry 1	N49°6'14" E26°19'44"
6	S of Zakupne	N49°5'41" E26°19'53"
7	E of Vilhivtsi	N49°4'47" E26°17'32"
8	Demkivtsi	N49°4'14" E26°23'44"
9	N of Smotrych	N48°59'46" E26°33'13"
10	S of Smotrych	N48°51'44" E26°36'14"
11	Nihyn – part N	N48°5°47" E26°33'42"
12	Nihyn – tovtry	N48°5°2°" E26°33'4"
13	Verbka – part N	N48°49'9" E26°37'26"
14	Verbeckie Tovtry	N48°48'28" E26°36'5"
15	Verbka – near quarry, rocks	N48°47'54" E26°37'28"
16	Pryvorottia II	N48°47'36" E26°38'57"
17	To W from Orynyn	N48°45'55" E26°2°0°"
18	Orynyn	N48°45'49" E26°22'7"
19	E of Pryvorottia	N48°44'43" E26°21'6"
20	Adamivka	N48°42'55" E26°18'38"
21	Chornokozyntsi	N48°39'56" E26°16'55"
22	W of Kizya Kudrynetska	N48°37'22" E26°19'2°"
23	W of Liskivtsi	N48°4°18" E26°23'1"
24	Surzha	N48°39'41" E26°29'25"
25	Pudlivtsi – quarry	N48°43'23" E26°33'3"
26	Kamianets Podilskyi	N48°4°11" E26°33'52"
27	Zhovtneve	N48°39'25" E26°37'4°"
28	Slobidka-Kulchiievetska	N48°39'21" E26°39'58"
29	Surzhyniecky Ravine	N48°4°55" E26°47'25"
30	Mukshanskyi Reserve	N48°38'1°" E26°38'4°"
31	N of Ustia	N48°34'44" E26°38'37"
32	NE of Ustia	N48°34'22" E26°39'21"
33	SE of Ustia	N48°32'31" E26°41'57"
34	Bay of Muksha river	N48°34'44" E26°42'16"
35	Tarasivka	N48°36'23" E26°4°48"
36	W of Vrublivtsi	N48°37'3" E26°43'53"
37	S of Vrublivtsi	N48°34'48" E26°45'5°"
38	Vrublivtsi	N48°36'27" E26°45'43"
39	Kytaihorod	N48°38'2°" E26°47'2°"
40	Demshyn	N48°37'6" E26°49'54"
41	Subich	N48°35'41" E26°49'47"
42	Kolodiivka – by the Dniester river	N48°35'37" E26°56'56"
43	SE of Kolodiivka	N48°35'44" E26°56'3°"
44	Bakota	N48°35'7" E27°°9"