Achillea ochroleuca (*Asteraceae*): a new species for the Bulgarian flora

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Abstract. The native species *Achillea ochroleuca* is added to the Bulgarian flora. A new geographical distribution has enlarged its area to the south. The paper provides new chorological data, a morphological description (incl. pollen) and illustrations.

Key words: *Achillea ochroleuca*, Bulgaria, distribution, morphology, native species, pollen

Introduction

Genus *Achillea* L. is one of the most polymorphic and difficult for interpretation in the family *Asteraceae*, object of recent taxonomical comments on the basis of multidisciplinary studies (Ehrendorfer & Guo 2005). Biosystematic studies of *Achillea* have a tradition of long standing in Bulgarian botany (Kuzmanov 1984; Nedelcheva 1998; Saukel & al. 2003). According to the latest data, the genus comprises about 19 (3+16) species of perennial herbs distributed in Bulgaria, belonging to two sections: sect. *Anthemoideae* (DC.) Heimerl s.l. and sect. *Achillea* s.l. [= sect. *Millefolium* (Adanson) Koch s.l., incl. Sect. *Filipendulinae* (DC.) Afan.] (Saukel & al. 2003).

Field work in Northwestern Bulgaria, in the floristic region of the Danubian Plain was the reason to find a species new for the Bulgarian flora: *Achillea ochroleuca* Ehrh. The species is included in the main floras and monographs for different parts of Europe as *A. pectinata* Willd. (Boissier 1875; Brandza 1898) as well as with its presently accepted name *A. ochroleuca* Ehrh. (Hayek 1931; Prodan 1931; Prodan & Nyárády 1964; Richardson 1976) in some biosystematic studies (Dąbrowska 1982, 1992; Sitnik 1984) and databases (Greuter 2005–2006).

Material and methods

Collected plant materials were used for the morphological description. The botanical descriptive terminology, interpretation (explanation) and translation of the Latin term for the species vernacular name followed Stearn (2004).

The pollen morphology was examined with LM (Amplival, Carl-Zeiss Yena), after an applied staining technology for pollen fertility (Alexander 1969; Nedelcheva 1998).

The locality and chorological data are presented on a UTM grid map of Bulgaria (Fig. 5), following the recommendations of Kožuharov & al. (1983).

Voucher specimens are deposited in the Herbarium of the Sofia University (SO).

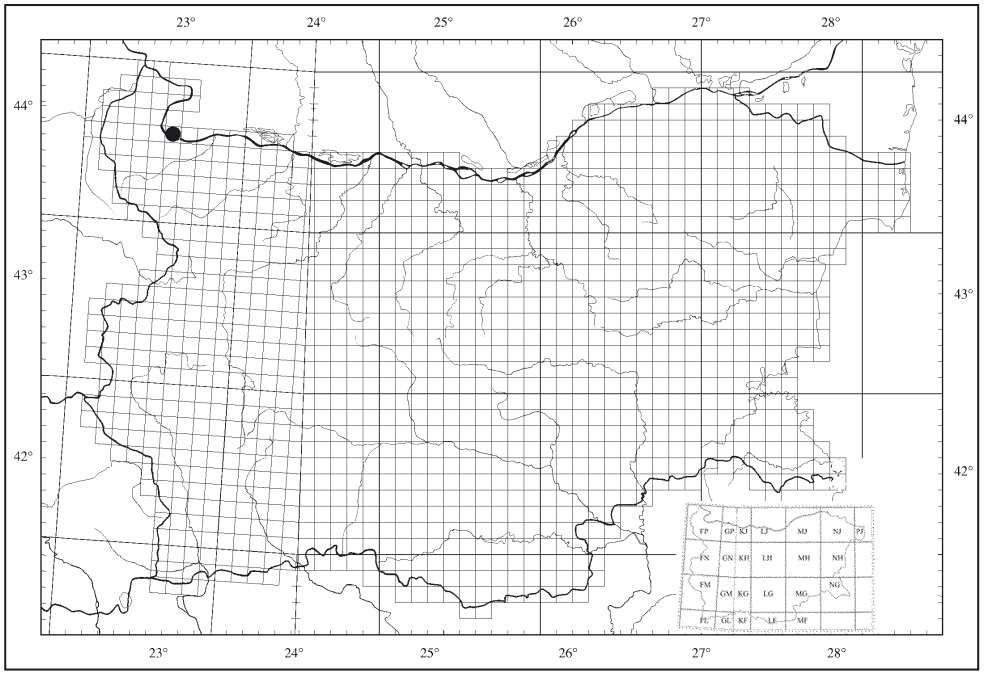


Fig. 5. Distribution map of *A. ochroleuca* in Bulgaria.

Results and discussion

So far only *Achillea pseudopectinata* Janka (=*A. depressa* Janka) has represented the *A. ochroleuca* group in Bulgaria. The group links the basic sect. *Santolinoideae* (DC.) Heimerl and sect. *Achillea*. Morphological and the phytochemical peculiarities of the species are well distinguished (Thornton-Wood 1993). The same group was interpreted as a separate section by Klokov & Kritzka (1984). Some authors have considered possible differentiation as separate species of the northern and southern populations of the *A. ochroleuca* group (Thorntoon-Wood 1993; Nedelcheva 1998). The northern *A. ochroleuca* is morphologically quite separate. The southern *A. pseudopectinata* and *A. depressa* are closely related and are presently united and accepted with a rank of variety (Saukel & al. 2003).

Achillea ochroleuca Ehrh., Beitr. Naturk. 7: 166 (1792) non Willd. Sp. Pl. 3(3): 2210 (1804) (Figs 1-4; Plate I)

Vernacular name: pale-yellow yarrow. (in Bulgarian: bledozhult ravnets). On the basis of the original epithet "*ochro–leuca*" = "*pale-yellowish*" (Stearn 2004).

Synonyms:

Achillea pectinata Willd., Sp. Pl. 3(3): 2197 (1804) non Lam.

A. kitaibeliana Soy, Acta Geobot. Hung. 4(1): 193 (1941).

Original dagnosis. A. caulibus tomentosis floriferis sterilibusque, foliis pinnatifido-pinnatis, pinnis subincisis basin versus plerumque nullis, corollas ochroleucis [Ehr., Beitr. Naturk. **7**: 166 (1792)].

Perennial herb with short ligneous rhizome (Fig. 2). Height 10–40 (50) cm, erect, stems usually simple or seldom branched, foliate, grey-greenish tomentose, with tiny appressed hairs, woody at the base. Forms flowering shoots and foliate non-flowering shoots (Figs 1, 2). Leaves alternate, linear or narrowly lanceolate in outline, plane, 1-pinnatifid to pinnatisect, usually sessile, glandular punctate, 2–4 cm in length, narrow; rachis entire up to 3 mm in width, narrowing to the apex, occasionally without primary segments in the lower part of the leaf. Non-flowering shoots divided only in the distal ±2/3 half, the lower part linear, entire (Figs 3a, 3b). Hair density variable. Primary segments subulate, linear or lanceolate, cartilagineus mucronate. The lowest primary segments at the leaf base can be longer than the other and form auricles. Inflorescence a dense corymb,

2.5–4 (6) cm in width, peduncles densely hairy (Plate I, Figs 1, 2). Numerous capitula 30–50 (80). Involucre 2 mm in diameter. Involucral bracts triangular-ovate to oblong, hairy, straw-coloured, light-brown at the apex, membranous margined (Plate I, Fig. 3). Receptacle ± terete-conical. Florets ligulate, yellowish, ocasionally white, (4) 5, ligules twice shorter than the involucre, varying in shape (Plate I, Figs 4, 5). Florets tubulate, yellow or whitish, numerous (Plate I, Fig. 6). Fruit achene, ±compressed, 1–1,25 mm in length, brown-grayish, with a narrow whitish margin.

Fig. 1. *A. ochroleuca*

Phenology. Flowering in May to June, fruiting July to August.

Pollen morphology. Pollen class: 3-colporate. Dimensions: colpus length 18.22±1.33 µm; pore diameter 5.60±0.93 µm; pollen diameter 21.08±1.36 µm. Ornamentation: echinate. Exine: thin intine and echinate exine. Outlines: equatorial view – spherical, polar view – triangular. Pollen fertility 83 %. (Figs 4a, 4b). Karyological investigation is not provided in the current study. Earlier results of the correlations between pollen size and ploidy level (Nedelcheva 1998) point to diploid chromosome number $2n = 18$ (Dąbrowska 1982, 1992; Van Loon 1987).

Distribution in Bulgaria. The species is native for Bulgaria, found in the western and southern vicinities of Archar village, Vidin district (Danubian Plain), FP-55, at 85 m, 43° 48′ 39″ N, 22° 55′ 5″ E, 03.06.2006, coll. *R. Tzonev* & *A. Nedelcheva* (SO 104239, 104240) (Fig. 5).

General distribution: A plant from the central Pannonic calciphile sands, closed sand steppes, dunes and grasslands in the eastern parts of Central Europe, East Romania and South Ukraine (Hu, Mo, Rm, Sk, Sr, Uk (U) (Greuter 2005–2006), as well as Northwest Bulgaria. Pannonian endemic.

Habitat description: In the region of Archar *A. ochroleuca* participates in some very specific xerophytic and psamophytic communities (Fig. 6). They are open and grow on a poorly covered substrate. The substrate is sandy loess of Quaternary origin. These sands form

Fig. 2. *A. ochroleuca* a sample from village Archar population: general view.

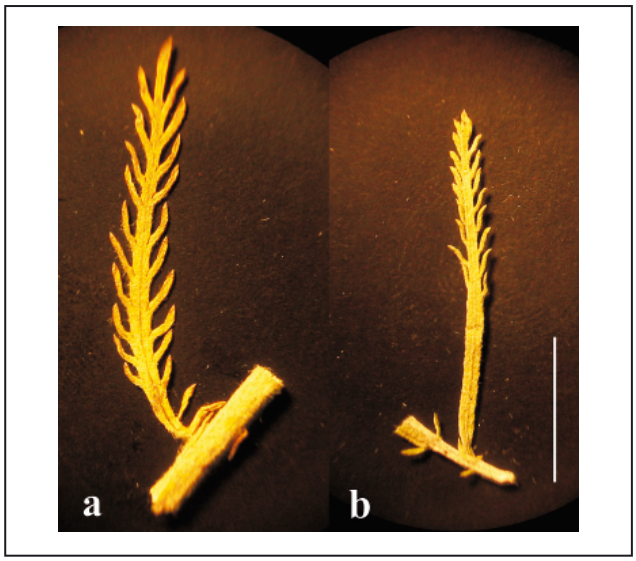


Fig. 3. *A. ochroleuca*, a leaf from: **a** – flowering shoots; **b** – non-flowering shoots. Scale bar = 1 cm.

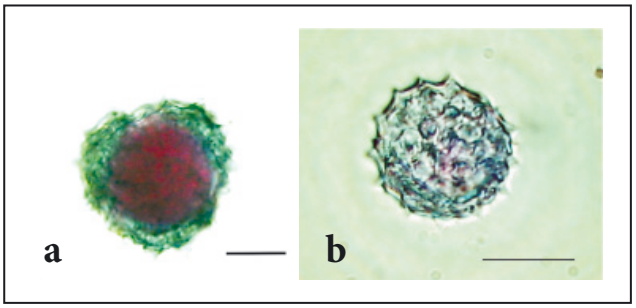


Fig. 4. Pollen grains of *A. ochroleuca*: **a** – non-aborted pollen grain; **b** – aborted pollen grain. Scale bars = 10 μm.

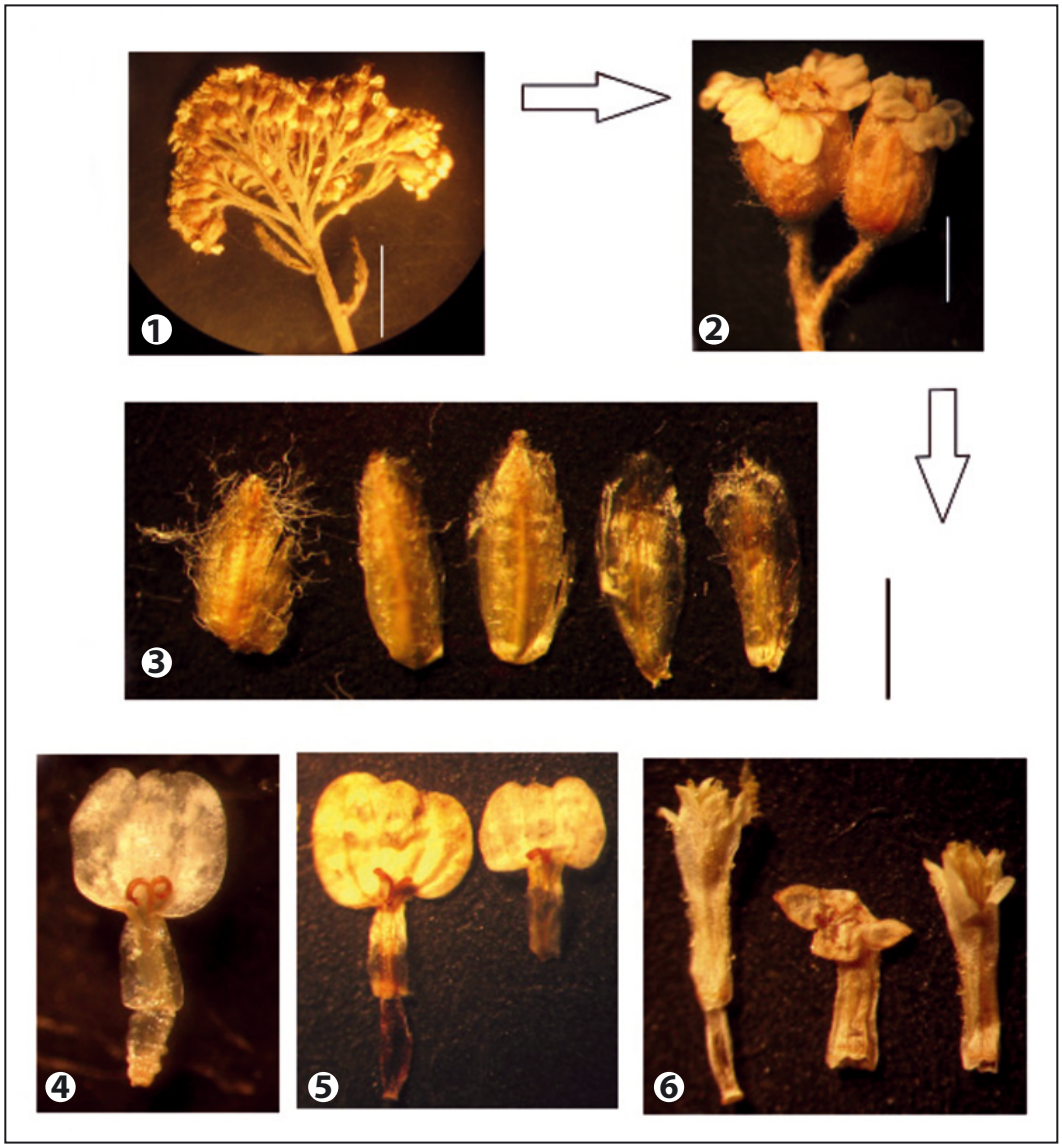
Table 1. Comparision of the diagnostic morphological characteristics between the related species *A. ochroleuca* and *A. pseudopectinata* (data on *A. pseudopectinata* are according to Nedelcheva 1998).

Species morphology	*A. ochroleuca*	*A. pseudopectinata*
Stems	10–40 (50) cm high usually simple	10–25 (30) cm high usually branched
Leaves	linear to narrowly lanceolate 1– pinnatifid to pinnatisect	triangular lanceolatae to linear lanceolate pectinate-pinnatifid
Leaves of non-flowering shoots	divided only in the distal ±2/3 half	wholly divided
Corymbs	2,5–4 (6) cm in width	2–2,5 (3) cm in width
Ligules	yellowish to white 1/2 shorter than involucre	yellow 1/3 shorter than involucre

Fig. 6. Natural habitat with *A. ochroleuca*.

80–90 m high hills, which enclose the village of Archar, mostly in the west and south. Besides *A. ochroleuca*, the dominant species of great frequency are *Apera spica-venti* (L.) P. Beauv., *Polygonum arenastrum* Boreau, *Rumex tenuifolius* (Wallr.) Á. Löve, *Festuca vaginata* Waldst.& Kit., *Psilurus incurvus* (Gouan) Schinz & Thell., *Galium verum* L., *Anchusa hybrida* Ten., *Koeleria lobata* (M. Bieb.) Roem. & Schult., *Logfia minima* (Sm.) Dumort., *Potentilla neglecta* Baumg., *Jasione heldreichii* Boiss. & Orph., *Anthemis ruthenica* M. Bieb. *Achillea ochroleuca* forms the largest community on the steep western slopes of the sand

Plate I.



Figs 1–6. Morphology of *A. ochroleuca*:

1, inflorescence. Scale bar = 1 cm;

2, capitules;
3, involucral bracts;
4-5, florets ligulate;
6, florets tubulate.
Scale bars = 1 mm

hills. The habitat type of the locality is one of the rarest in Bulgaria: sand steppes included in the Annex I of Directive 92/43/EEC as **6260 Pannonic sand steppes** (priority). This habitat type is unique in Bulgaria only for the region of Archar. However, it is now threatened, because the native Roma population digs up the sand and sells it to builders in Sofia and Vidin. The area of Archar needs strict protection to preserve this unique habitat type, with such rare plants as *A. ochroleuca* and *Festuca vaginata* (entered in the *Red Data Book of Bulgaria* as rare species). Habitats of the same type and *A. ochroleuca* are under protection in the other parts of this species' range of distribution (Sârbu & al. 2004). The Bulgarian locality of *A. ochroleuca* has been described by Ganchev & Kochev (1963) as a *Psilurus aristatus* (L.) Duv. Jouve community, but the species was erroneously determined as *A. depressa*.

We suggest for *A. ochroleuca* to be included in the new edition of the *Red Data Book of Bulgaria*. We also suggest for the species to be evaluated according to the IUCN criteria: ***Achillea ochroleuca* Ehrh. Critically endangered [B1ab(ii iii)+2ab(ii)].**

The species is well distinguished morphologically from another member of *A. ochroleuca* species group, *A. pseudopectinata*, which is rare and has a scattered spread in the country (Table 1).

The present record enlarges the species area in southward direction and the locality marks the southernmost reach of the species range of distribution. The specificities of the habitat put under question the

finding of *A. ochroleuca* in other parts on the territory of Bulgaria.

Nomenclature of the discussed species is confused, as well as of the other species of the *A. ochroleuca* group. The present record has raised many questions about the species range, variability, hybridization, and the center of speciation. Correct interpretation of the taxonomy and phylogeny of the group would need further biosystematic investigations with classical and modern multidisciplinary approaches.

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