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A NEW NICKEL-ACCUMULATING SPECIES OF *ALYSSUM* (*CRUCIFERAE*) FROM WESTERN TURKEY

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A new species of *Alyssum* L. (*Cruciferae*) from Western Turkey is described and illustrated: *Alyssum dudleyi* N. Adıgüzel & R.D. Reeves.

Keywords. Anatolia, *Brassicaceae*, new species, nickel-accumulator.

INTRODUCTION

In the course of a collecting journey in Western Turkey by R.D. Reeves and U. Krämer in May 1996, focusing on plants of metalliferous soils, including serpentinitic soils in particular, an interesting *Alyssum* species was collected near the Dursunbey–Tavşanlı highway, about 40km east of Dursunbey, near the intersection of Balıkesir, Bursa and Kütahya provinces. Many of the soils of this area are developed over ultramafic rocks and are characterized by elevated nickel concentrations, generally in the range 400–2000mg/kg. Several other *Alyssum* species, including known nickel-accumulators such as *A. murale* Waldst. & Kit., *A. floribundum* Boiss. & Bal. and *A. corsicum* Duby, are found in the Dursunbey–Tavşanlı region, often growing on the edges of roadside fields and colonizing disturbed ground such as new highway cuttings. About 48 taxa in *Alyssum*, all from sect. *Odontarrhena* (C.A. Mey.) W.D.J. Koch, are known to be nickel-hyperaccumulators, with >0.1% Ni in dry leaf tissue (Brooks *et al.*, 1979).

Although identification of *Alyssum* species in the early flowering stages is often difficult, the new plant was immediately noticeable in the field for its distinctive fine linear leaves, and was clearly a nickel-accumulator as shown by its reaction with a test paper containing the nickel-specific reagent dimethylglyoxime. A leaf sample of the specimen collected (*Reeves* 1665 and *Krämer*, 18 v 1996) was later analysed and found to contain 2350mg/kg Ni.

During a further collecting journey made by the authors in the area from Tavşanlı to Harmancık with Professor A.R. Kruckeberg in late July 1998, the plant was noted again and collected at three more locations: near Tunçbilek, Tavşanlı–Harmancık, and Harmancık–Orhaneli. In each case it was found in association with *A. corsicum*, *A. sibiricum* Willd. and *A. murale* subsp. *murale* var. *murale*.

The collections include *Reeves, Kruckeberg & Adıgüzel* 2042, 2045 and 2054, 29–30

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vii 1998. Analysis of the soils showed their serpentinitic character in all cases, with 660–2750mg/kg Ni, and the leaves of these specimens contained 5600–22100mg/kg Ni. More detailed accounts of the 1998 collecting journey can be found in Kruckeberg *et al.* (1999) and Reeves *et al.* (2001).

Alyssum dudleyi N. Adıgüzel & R.D. Reeves, **sp. nov. Figs 1 and 2.**
Affinis *A. huber-morathii* Dudley sed foliis bicoloribus, fructus glabris et majoribus, seminibus majoribus et latioribus alatis divergit.
Type: Turkey B2 Kütahya: Tunçbilek, 1040m, ultramafic overburden near NW edge of opencast coalmine, 29 vii 1998, *R.D. Reeves, A.R. Kruckeberg & N. Adıgüzel* [*Reeves* 2045] (holo. GAZI; iso. ANK, E, MPN).

Fruticose, many-stemmed perennial, 35–45cm, red-purple towards the base, with sparse, deciduous indumentum. *Sterile shoots* erect, densely foliate, 8–23cm. *Leaves of sterile shoots* linear, acute, 12–20 × 0.8–1.2mm, conduplicate, glabrescent above, with minute lepidote hairs beneath, thus bicoloured. *Cauline leaves* linear, acute, 13–25 × 0.6–1mm, conduplicate, increasing in size upwards, deciduous, with sparse indumentum. *Corymbs* erect, congested, 10–15cm. *Pedicels* erect-spreading, 4–5mm, with sparse indumentum. *Sepals* 1.5–1.7mm, with membranous margins. *Petals* bright yellow, obovate, emarginate, 2.5 × 0.8–1mm, with very sparse indumentum on limbs. *Long filaments* c.2mm, appendages connate for about half of their length, acute or bidentate. *Short filaments* 1.5mm, appendages free, bidentate; glands conspicuous; anthers apiculate, 0.5mm. *Ovaries* elliptic, 1–1.2mm, glabrous. *Fruits* broadly elliptic or rarely ± orbicular, (4–)4.5–5.5(–6.5) × (3–)3.5–4(–4.3)mm, glabrous; valves slightly inflated. *Styles* glabrous, 1.2–1.6mm. *Seeds* usually 1, ± orbicular, 3.3–3.5 × 3mm, widely winged; wings 0.6–0.7mm wide.

Distribution. Western Anatolia. Endemic. Fl. May–June, fr. July–August.

Etymology. It is a pleasure to name this distinctive species in honour of the late Dr T.R. Dudley (1936–94), who contributed much to our knowledge of *Alyssum*.

Recommended IUCN Threat Category Listing. Vulnerable (VU) (IUCN Species Survival Commission, 1994).

Alyssum L. was revised by T.R. Dudley (1965) for the *Flora of Turkey*. The new species belongs to sect. *Odontarrhena*. However, *A. dudleyi* does not appear to be closely allied to any other known species in this section. In its narrow linear leaves, *A. dudleyi* resembles *A. huber-morathii* Dudley and *A. pinifolium* (Nyár.) Dudley. It differs from *A. huber-morathii* in the bicoloured leaves (not very silvery), the much larger, glabrous and slightly inflated fruits, and larger seeds and seed wings, and from *A. pinifolium* by the bicoloured leaves, erect-spreading and sturdy pedicels, entire petal claws (without appendages), smaller dehiscent fruits and longer styles.

Some affinity is expressed with *A. syriacum* Nyár. and *A. masmenaeum* Boiss. which have glabrous and broadly elliptic fruits; however, both of these have broadly spathulate sterile shoot leaves and narrower seed wings. In addition, the new species

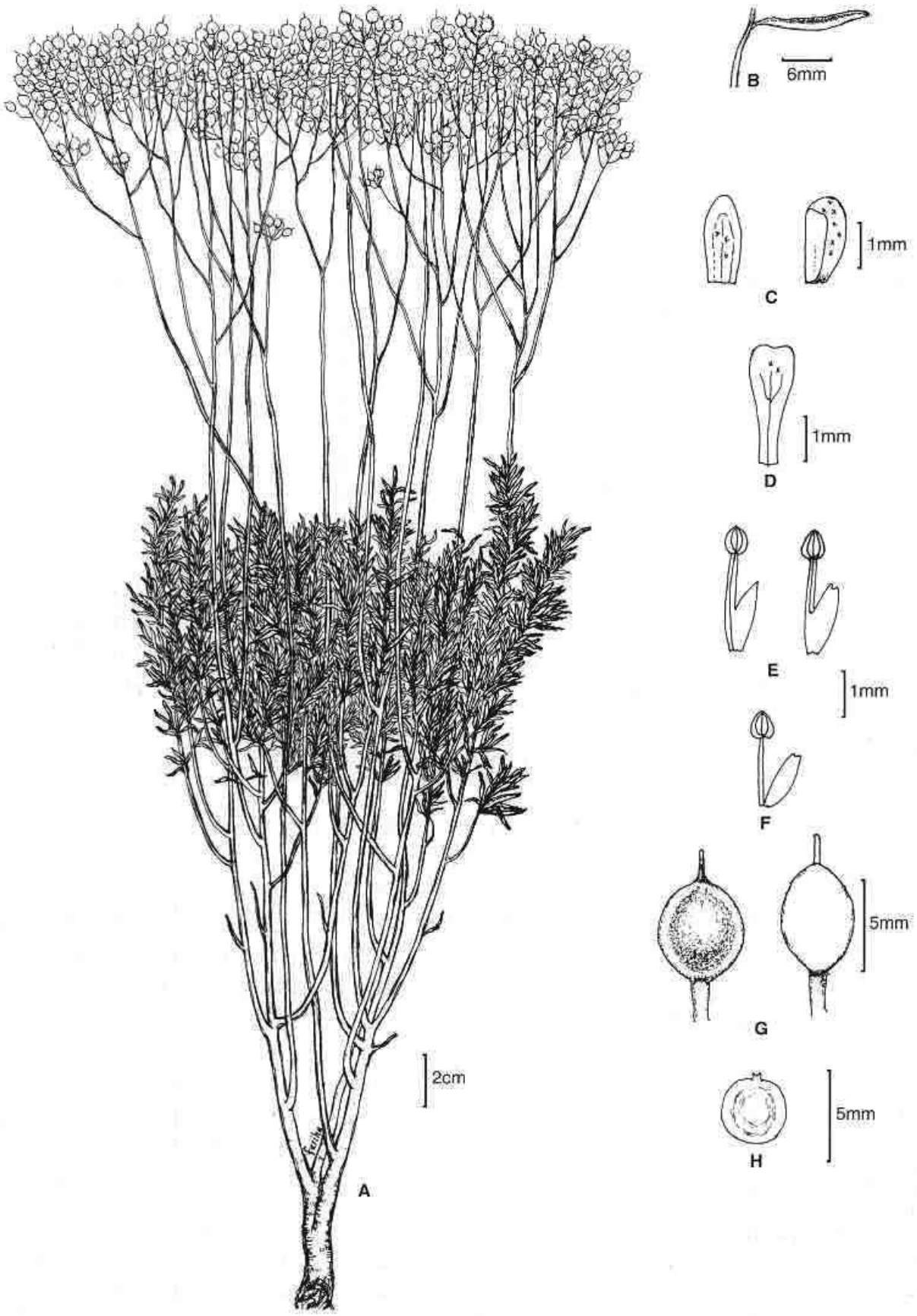

FIG. 1. *Alyssum dudleyi* N. Adıgüzel & R.D. Reeves. A, habit; B, leaf; C, sepals; D, petal; E, long filaments; F, short filament; G, silicles; H, seed.

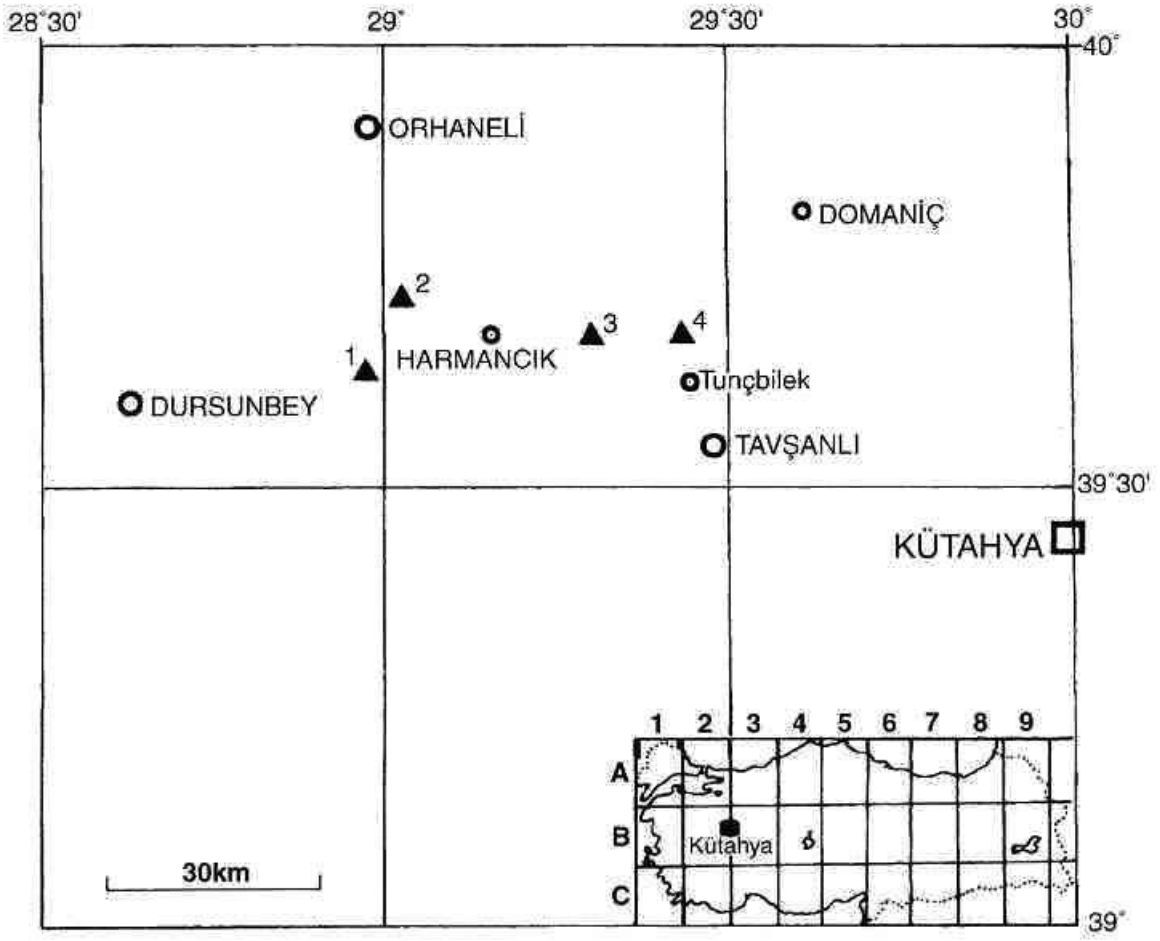

FIG. 2. Distribution of *Alyssum dudleyi*. Collection numbers: 1: 1665; 2: observation only; 3: 2054, 3521, 3646, 3657; 4: 2042, 2045.

resembles *A. murale* in having marked seed wings but may be differentiated from the latter by its narrow linear and lepidote hairy leaves, longer and congested-fruited corymb, glabrous and slightly inflated fruits, and by its much woodier habit.

Alyssum dudleyi occurs at 870–1040m, growing in ultramafic overburden from mining, on extensively disturbed ground, and on serpentine soils beside the highway through forest of *Pinus nigra* J.F. Arnold.

Climatic data from the stations closest to the locations, as taken from the State Meteorological Service (1974), are: Kütahya (969m above sea level): mean annual precipitation 579mm, mean annual temperature 10.5°C; Tavşanlı (860m above sea level): 487mm, 11.4°C.

Additional specimens examined. TURKEY. B2 Balıkesir: Dursunbey–Tavşanlı, 40km E of Dursunbey, 1000m, serpentine soil, 18 v 1996, *R.D. Reeves & U. Krämer* [*Reeves* 1665] (E, GAZI, MPN); B2 Kütahya: Tunçbilek, 1000m, ultramafic overburden near NW edge of open-cast coalmine, 29 vii 1998, *R.D. Reeves, A.R. Kruckeberg & N. Adıgüzel* [*Reeves* 2042] (GAZI); Kütahya: Tavşanlı–Harmancık, about 23km W of Tavşanlı, 870m, beside the highway through *Pinus nigra* forest on serpentine, 30 vii 1998, *R.D. Reeves, A.R. Kruckeberg & N. Adıgüzel* [*Reeves* 2054] (GAZI); ibid., 17km W of Tavşanlı, 880m, 29 vi 2000, *N. Adıgüzel* 3521 (GAZI);

ibid., 19km W of Tavşanlı, 900m, 30 vii 2000, *N. Adıgüzel* 3646 (GAZI); ibid., 23 viii 2000, *N. Adıgüzel* 3657 (GAZI).

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