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Notes and contributions to the vascular flora of Oukaïmeden (Central High Atlas, Morocco)

Angel Romo & Adam Boratyński

Abstract

ROMO, A. & A. BORATYŃSKI (2007). Notes and contributions to the vascular flora of Oukaïmeden (Central High Atlas, Morocco). *Candollea* 62: 69-89. In English, English and French abstracts.

Thirty-six taxa rare for the flora of the High Atlas were found in the Oukaïmeden valley (High Atlas, Morocco) and its surrounding mountains. The previous records of several of them are amplified and taxonomic and chorological comments are given. *Juncus capitatus* is reported for the first time for the High Atlas. *Arenaria serpyllifolia* and *Lotus corniculatus* subsp. *alpinus* are reconfirmed in the High Atlas. A new combination is proposed: *Carex ovalis* var. *atlasica* (H. Lindb.) Borat. & Romo.

Key-words

Morocco – High Atlas – Flora – Vascular-Plants – Threatened plants – Phytogeography

Résumé

ROMO, A. & A. BORATYŃSKI (2007). Notes et contributions à la flore vasculaire de l'Oukaïmeden (Grand Atlas, Maroc). *Candollea* 62: 69-89. En anglais, résumés anglais et français.

Trente-six taxa rares ont été observés dans la vallée de l'Oukaïmeden (Grand Atlas, Maroc) et les montagnes environnantes. Les observations précédentes relativement à ces taxons ont été augmentées et des commentaires taxonomiques et chorologiques ont été ajoutés. *Juncus capitatus* est reporté pour la première fois comme étant présent dans le Grand Atlas. *Arenaria serpyllifolia* et *Lotus corniculatus* subsp. *alpinus* ont été retrouvés dans le Grand Atlas. Une nouvelle combinaison est proposée: *Carex ovalis* var. *atlasica* (H. Lindb.) Borat. & Romo.

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Introduction

Oukaïmeden is located in the central part of the High Atlas, in the valley of the Assif Aït Leqaq river. The valley is surrounded by high mountains; to the south, higher than 3000 m, and from the north closed by a gorge at an altitude of about 2500 m (Fig. 1).

The region has been a focus of botanical attention for decades. MAIRE (1924) was the first botanist to provide considerable data from the headwaters of the Ourika valley. More recently, a considerable amount of data was obtained by FERNÁNDEZ CASAS & al. (1987), DOBIGNARD & JORDAN

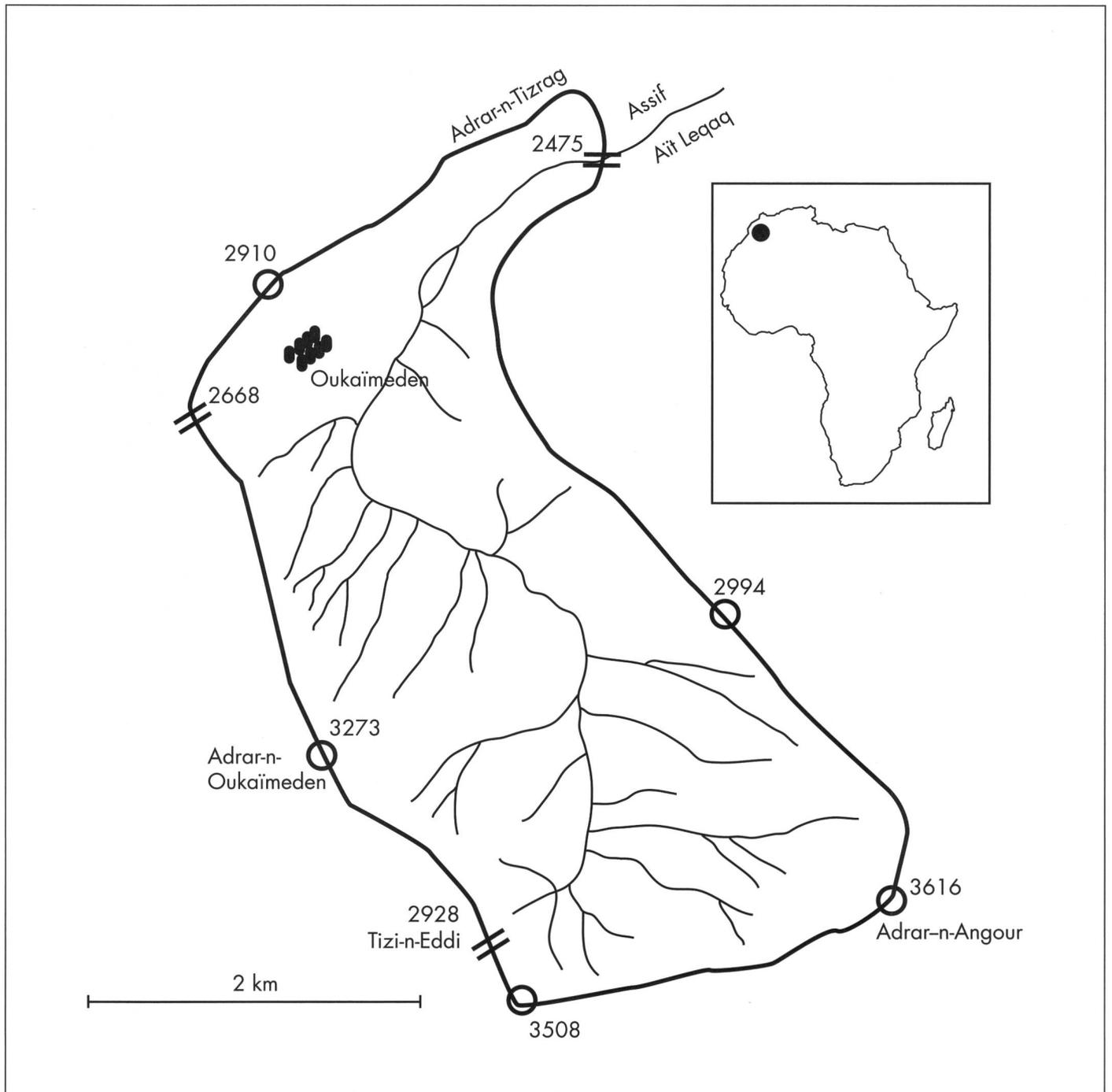


Fig. 1. – Area of investigation.

(1987), ROMO (1988) and OUHAMMOU (1991). The checklist of the Oukaïmeden flora (EL ATECHI, 2006) was the result of plant collections by numerous botanists, especially by Jury (Reading), Ait Lafki (Rabat), Aparicio (Sevilla), Fernández Casas (Madrid), Güemes (Valencia), Gardner (Edinburgh), López (Madrid), Podlech (München) and the Reading University/British Museum Expedition. All these data were compiled by T. El Atechi under the supervision of S. L. Jury (EL ATECHI, 2006), who provided us with a first approach to the knowledge of the complete floristic biodiversity of the valley.

We have collected more than thirty plant species in the region, these not mentioned in El Atechi's catalogue, also mostly not reported previously, and we also give some nomenclatural comments to several of them.

The specimen sheets that confirm our records are deposited in the Barcelona Botanical Institute (BC) and in the Institute of Dendrology, Kórnik (KOR). Except where otherwise mentioned, the taxa below have not been included in the checklist of the Oukaïmeden flora (EL ATECHI, 2006).

List of the taxa

Nomenclature follows JURY & al. (2006) and EL ATACHI (2006).

1. *Alyssum minutum* DC.

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, in therophyte grasslands, 26.VII.2002, *Boratyński & Romo R. 10602* (BC).

A Mediterranean plant, known from southern Europe, southwestern Asia and northwestern Africa, rare in Morocco (FENNANE & IBN TATTOU, 1998: 82). In the Atlas, it is dispersed over several localities and reaches its southernmost localities in the Anti Atlas (DOBIGNARD & al., 1992). It is known from a few localities in the Central High Atlas (IBN TATTOU, 1999a: 410) and was also given at Oukaïmeden by DOBIGNARD & JORDAN (1987: 81), but not included in Jury's Checklist (EL ATECHI, 2006). This is probably the most elevated locality of *A. minutum*.

This taxon is under-collected and under-observed from thin siliceous grasslands. It is rare on Touchka, Test, Amizmiz and Reraya from the High Atlas and J. Siroua and Kest in the Anti Atlas.

2. *Arenaria grandiflora* L. subsp. *grandiflora*

- **Marrakech:** Oukaïmeden, 29R PQ 15, 2600–2700 m, solo siliceo et petroso, 28.V.1985, *Romo 280585* (BC).

Arenaria grandiflora is a West Mediterranean species, known from Europe and northwestern Africa (GREUTER & al., 1984), mostly from the medium and high mountain zones. In the High Atlas (Fig. 2), it is known from Jbel Rhate and Tizi-n-Inouzan and in the Middle Atlas at Bou Naceur, Tichchoukt (OUYAHYA, 1999a: 208) and Bou Iblane (Dobignard, *pers. comm.*). It has already been cited from Oukaïmeden (ROMO, 1988), but was not referred to by EL ATECHI (2006).

Our material belongs to subsp. *grandiflora*, a taxon endemic to the Atlas, which differs clearly from the subsp. *gomarica* L. Sáez, J. M. Monts & Rosselló recently described from the Rif mountains (SÁEZ & al., 2002).

Revised material. – **Middle Atlas:** in atlantis Medii, monte Tichchoukt: Lalla Oum-el-Bent, in rupibus calcareis, 2700–2800 m, 2.VII.1927, *Maire s.n.*, Iter Maroc. XIV (MPU); in atlantis Medii, monte Tichchoukt: Lalla Oum-el-Bent, in rupibus calcareis, 2400 m, 1.VII.1927 *Maire s.n.*, Iter Maroc. XIV (MPU). **High Atlas:** in lapidosis Granditicis et calcareis, Atlantis Majoris prope Tizi-n-Imouzer, 2600 m, 28.VI.1939, *Weiller s.n.*, Iter Maroc. XXIX (MPU).

In the High Atlas it is frequent from eastern Glaoua, on the high altitude limestone cliffs (Dobignard, *pers. comm.*).

3. *Arenaria pungens* Lag.

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, scrub on sandstone rocks, 26.VII.2002, *Boratyński & Romo R. 10595* (BC).

Arenaria pungens has a West-Mediterranean, mountain character and occurs mostly in the middle and high mountain vegetation belts. It is known in the High Atlas from Mount Ayachi (Ahrbout, 2400–2950 m, Taorbat, 2780 m) and M'Goum (GALLAND, 1990) and from the Middle Atlas on the Bou Iblane, Moussa ou Salah, Chegg el Ard and Bou Naceur (OUYAHYA, 1999a: 208) (Fig. 3).

Arenaria pungens var. *glabrescens* Ball was recognized from Morocco, as a part of the variation found in this species, based on material collected: “regione subalpina Atlantis Majoris, Ait Mesan, versus 2500 m” (BALL, 1878: 364).

Revised material. – **Middle Atlas:** in Atlas Medii montibus Guelb-er-Rahal, in rupestr. calcareis, 2700 m, 25.VI.1927, *Maire s.n.*, Iter Maroc. XIV (MPU); Gaberreal, Mont Bou Naceur, pier-railles à 3000 m, grès calcifères, 21.VII.1929, *Emberger s.n.* (MPU); in Atlantis Medii montibus Moussa-ou-Salah, in lapidosis calcareis, 3000–3200 m, 22.VI.1927, *Maire s.n.*, Iter Maroc. XIV (MPU). **High Atlas:** in lapidosis calcareis supra lacum Tislit, Atlantis Majoris, 2350 m, 20.VI.1936, *Maire s.n.*, Iter Maroc. XXVII (MPU); in rupestribus calcareis Atlantis Majoris orientalis, inter Imilchil et Anougal, 2400 m, 20.VI.1936, *Maire s.n.*, Iter Maroc. XXVII (MPU); in pascuis Atlantis Majoris orientalis inter Tagoudit et Anemzi, solo margaceo, 2200 m, 19.VI.

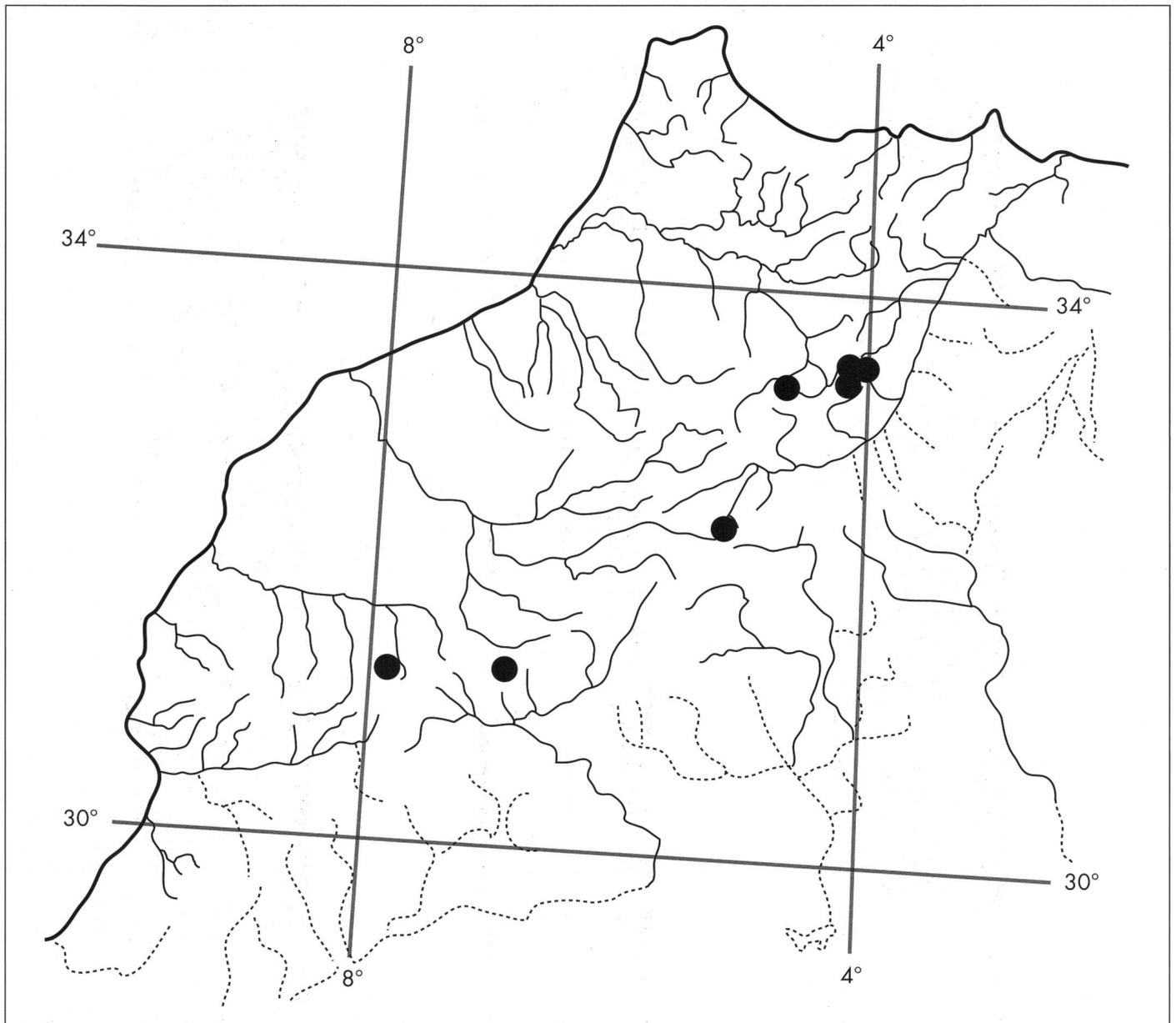


Fig. 2. – Distribution of *Arenaria grandiflora* L. subsp. *grandiflora*.

1936, *Maire s.n.*, Iter Maroc. XXVII (MPU); Ourika, rochers Granditiques, près Abessen, 2400 m, 12.VII.1921, *Maire s.n.* (MPU); Semris, 1900 m, *Sauvage s.n.* (MPU); Grand Atlas Oriental (plateau des lacs), pâturages écorchés du calc., 2300 m, 10.VII.1934, *Emberger s.n.* (MPU); Grand Atlas Central, vallée d'Arrauyd, rochers au bord de l'oued de Sidi Chamharouch, vers 2300 m, poils glanduleux, 1.VIII.1938, *Faurel s.n.* (MPU); in Atlantis Majoris, monte Gourza supra oppidum Amismi, in lapidosis schistaceis 2800-3300 m, pili glandulosi, 29.VI.1925, *Maire s.n.*, Iter Maroc. X (MPU); Grand Atlas, Dj. Gourza, 2800 m, 1920, *Watier 1920* (MPU); Grand Atlas, Goundufa, Tizi-n-Miri,

2650 m, *Douffe s.n.* (MPU); in Atlantis Majoris ditioe Glaoua: in rupestribus arenaceis mont Agouti, supra Tizi-n-Telouet, 2700-2800 m, 7.VII.1924, *Maire s.n.*, Iter Maroc. VIII (MPU); Grand Atlas Central, Reraya, vallée de l'Acif Iminerie, rochers vers 2000 m, 18.VI.1936, *Jallu s.n.* (MPU); in Atlantis Majoris monte Anremer: in pascuis rupestr. calcareis ad lacum, 2700 m, 27.VII.1926, *Maire s.n.*, Iter Maroc. XII (MPU); in lapidosis calcareis Atlantis Majoris ad Tizi-n-Tighoughizin, 2600-2700 m, 26.VI.1939, *Weiller 607*, Iter Maroc. XXIX (MPU); in pascuis Atlantis Majoris orientalis, prope Tagoudit, solo margaceo, 2300 m, *Maire s.n.*, Iter Maroc. XXVII (MPU); in

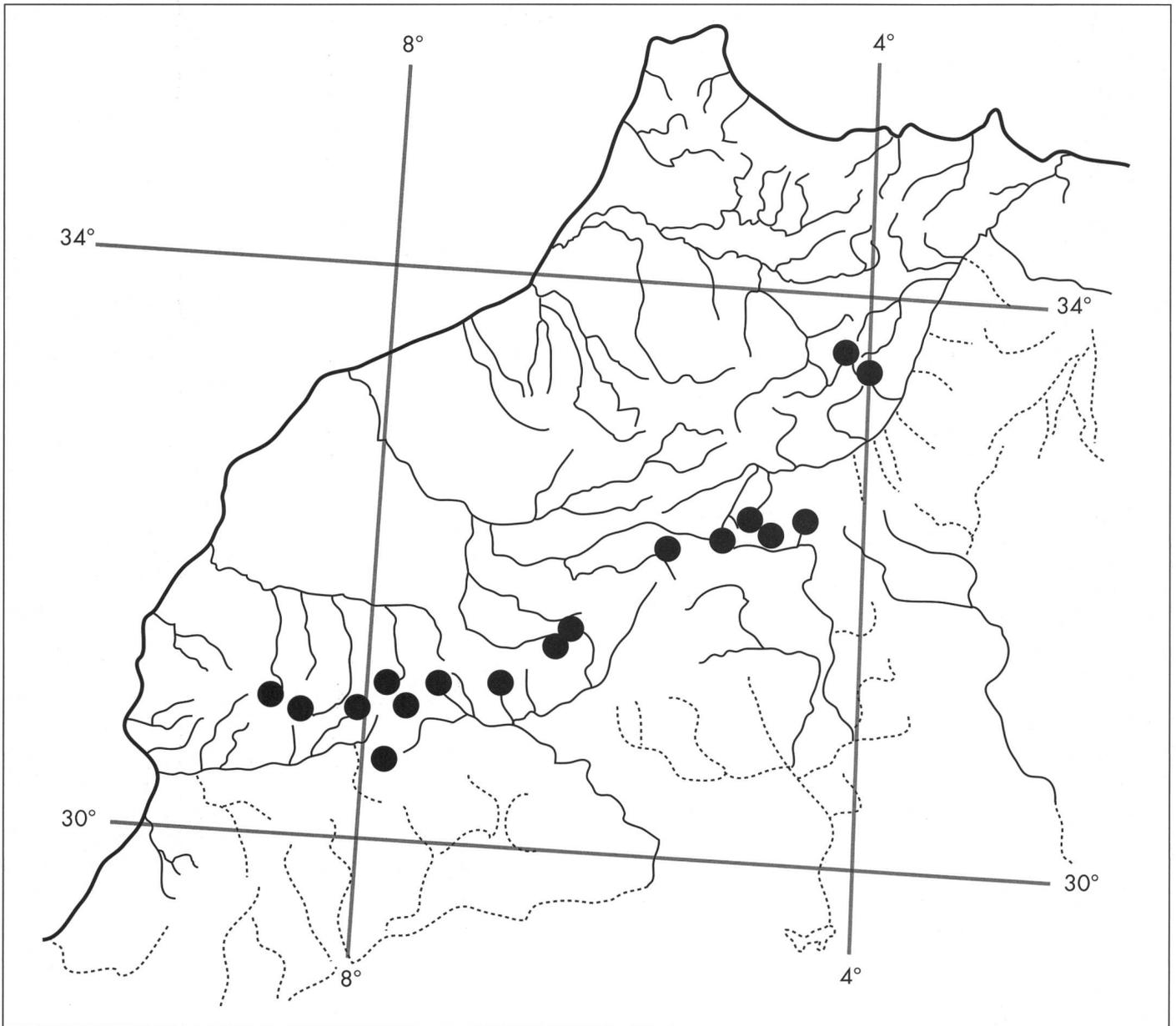


Fig. 3. – Distribution of *Arenaria pungens* Lag.

lapis calcareis, montis Tagounsa, Atlantis Majoris, 2400 m, 25.VI.1939, *Weiller 523*, Iter Maroc. XXIX (MPU); pentes rocaillieuses près d'Anemzi vers 2200 m, Grand Atlas Oriental, region d'Agardin, 23.VII.1938, *Faurel s.n.* (MPU); Grand Atlas Oriental, Dj. Maaghal (Massif du Mgoum) 3600 m, calc., 9.VIII.1931, *Emberger s.n.* (MPU); in Atlantis Majoris, valle Reraya: in rupibus porphyr. pr. Sidi Chamarouch, 2400-2500 m, 20.VII.1924, *Maire s.n.*, Iter Maroc. VIII (as *Arenaria pungens* Clem.) (MPU); in Atlantis Majoris, valle Reraya: in rupibus porphyr. clivi septentr. mont. Toubkal, in convalle Immouzer, 2900 m, 22.VII.1924, *Maire s.n.*, Iter Maroc. VIII (as *Arenaria pungens* var.

glabrescens Ball) (MPU); Grand Atlas: Ourika, rocailles porphyriques du Tizi-n-Tachdirt, 3200 m, 12.VII.1921, *Maire s.n.* (MPU); Crete du Jbel Ayachi, à 2300 m, près du Tizi-n-Taserdout, r. calcaire, 29.VII.1923, *Humbert s.n.* (MPU); Ari Ayachi, rocailles calcaires fentes N-W, 2500-3000 m, 29.VII.1923, *Humbert s.n.* (MPU); Tizi-n-Ilissi, 2612 m, 4.IX.2005, *Boratyński, Didukh & Romo s.n.* (field observ.). **Anti Atlas:** Sommet du Siroua, 3200 m, Gentil, 26.IX.1923, *Maire s.n.* (MPU); Maroc Austro-Oriental: Bou Redine au N de Gourrama, VI.1926, *Humbert s.n.* (MPU); Mont des Ait-Mesroah, 2500-2700 m, rocailles calcaires, VI.1926, *Humbert s.n.* (MPU).

This taxon includes a gradient of forms from the western to the eastern Atlas, that have been described as different taxa (subsp. *parviflora* Quézel and subsp. *boissieri* Emb.). The eastern plants, with glandulous stems, and petals smaller than sepals have been referred to subsp. *boissieri* Emb. The western High Atlas plants must be referred to var. *glabrescens* Ball.

This is a polymorphic taxon, divided into three subspecies, which need, however, further study because of numerous intermediate variants. For this reason, we have not distinguished taxa below the species rank, following GALLAND (1990).

4. *Arenaria serpyllifolia* L.

- **Marrakech:** Oukaïmeden, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, scrub on sandstone rocks, 26.VII.2002, *Boratyński & Romo R. 10602* (BC).

Arenaria serpyllifolia is taxonomically a complicated aggregation of *A. serpyllifolia* L., *A. leptoclados* (Rchb.) Guss. and *A. minutiflora* Loscos, which overlap several taxa of not always definite systematic status. The area of distribution of the species covers almost all of Europe, southwestern Asia and northern Africa (GREUTER & al., 1984). The species was not mentioned for the High Atlas by OUYAHYA (1999a: 203), in spite of data present at least in one herbarium specimen (Cédraies des fentes nord du Tizi'n Ighil, vers 2600 m. Dj. Nasker, Grand Atlas Oriental, 11.VI.1938, *Faurel s.n.* (MPU) [as *A. serpyllifolia* var. *scabra* Fenzl]).

Otherwise it is not rare in places frequented by cattle, such as azibs and reposoirs (livestock). In High Atlas, it is found up to 3000 m above sea level in the Ahansal area (after Dobignard, *pers. comm.*). In the Atlas, it reaches its southernmost limit.

5. *Bunium alpinum* subsp. *atlanticum* Maire

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, scrubland on sandstone, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

The plant is characteristic of the mountains of the western Mediterranean region. In the High Atlas, *B. alpinum* subsp. *atlanticum* is considered to be rare and FENNANE & IBN TATTOU (1998: 178) include it in their list of threatened plants.

This taxon is under represented in the herbaria. It is rare in the Rif, Middle and High Atlas where it reaches 3200 m. It is also found in the Anti Atlas on the Jbel Aklim and the J. Ingerm (PELTIER, 1977).

6. *Bufonia mauritanica* Murb.

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, scrublands on sandstone, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

Bufonia mauritanica is sometimes treated at the subspecies rank, as *B. perennis* subsp. *mauritanica* (Murb.) Pau & Font Quer. This taxon is closely related to *B. tenuifolia* L.

(DOBIGNARD, 2002: 35). It grows only in northwestern Africa, in the mountain regions of Morocco and Algeria, mostly at dispersed localities. It was known from the High Atlas to Oued Draa. The altitudinal limit given by OUYAHYA (1999b: 226) of 2300 m should be extended to about 2500 m.

7. *Campanula filicaulis* Durieu subsp. *filicaulis*

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, mesophilous grasslands, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

This species is endemic to the mountain regions of Morocco, Algeria and Tunisia in northwestern Africa (GREUTER & al., 1984). It is a variable taxon (with two subspecies described), reported from only a few localities in the High Atlas (JAHANDIEZ & MAIRE, 1934: 732).

This taxon is also present in Tizi'n-Test, mountains of Amizmiz and J. Siroua (DOBIGNARD, 2002: 35).

8. *Carex ovalis* var. *atlasica* (H. Lindb.) Borat. & Romo, **comb. nova** ≡ *Carex leporina* subsp. *atlasica* H. Lindb., *Itin. Medit.*: 29. 1932.

- **Marrakech:** Oukaïmeden, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, megaforbic forbs on wet soil, 26.VII.2002, *Boratyński & Romo R. 10588* (BC).

Altitudinal ecomorph with smaller spikes and utricles a bit shorter than the European plants. The varietal status for the Moroccan plants seems to be the more accurate. The nomenclatural status of this taxon has been previously aborbed by LAMBINON (1998) and LUCEÑO (1994).

Carex ovalis var. *atlasica* is endemic to Morocco (Fig. 4) and very rare, known from only a few localities in the Central High Atlas (Ourika valley, Tifnout, Goundafa, jbel Gourza) and from one in the Anti Atlas (mount Siroua) (FENNANE & IBN TATTOU, 1998: 198). The plants cited as *Carex ovalis* from the High Atlas by EL ATECHI (2006) and other authors should be transferred to this taxon.

Revised material. – **High Atlas:** Grand Atlas, Ourika: Tizi-n-Tachdirt, pelouses tourbeuses sur porphyres, 3100-3200 m, 26.VII.1922, *Maire s.n.* (as *Carex leporina* f. *alpina* (Asch. & Graebn.) Briq.) (MPU); Grand Atlas, Ourika: Djebel Timinkar, pâturages humides autour du lac Iferouane, 2090 m, prés humides, 28.VII.1922, *Maire s.n.* (MPU); Reraya: Haute vallée de l'Acif Ouerikrime, pouzzines, 2800-2900 m env., porphyre, 24.VII.1923, *R. de Litardiere s.n.* (MPU); in Atlantis Majoris, monte Gourza, supra oppidum Amismiz: in scaturiginosis, solo schistaceo, 2800 m, 29.VI.1925, *Maire s.n.*, Iter Maroc. X (MPU).

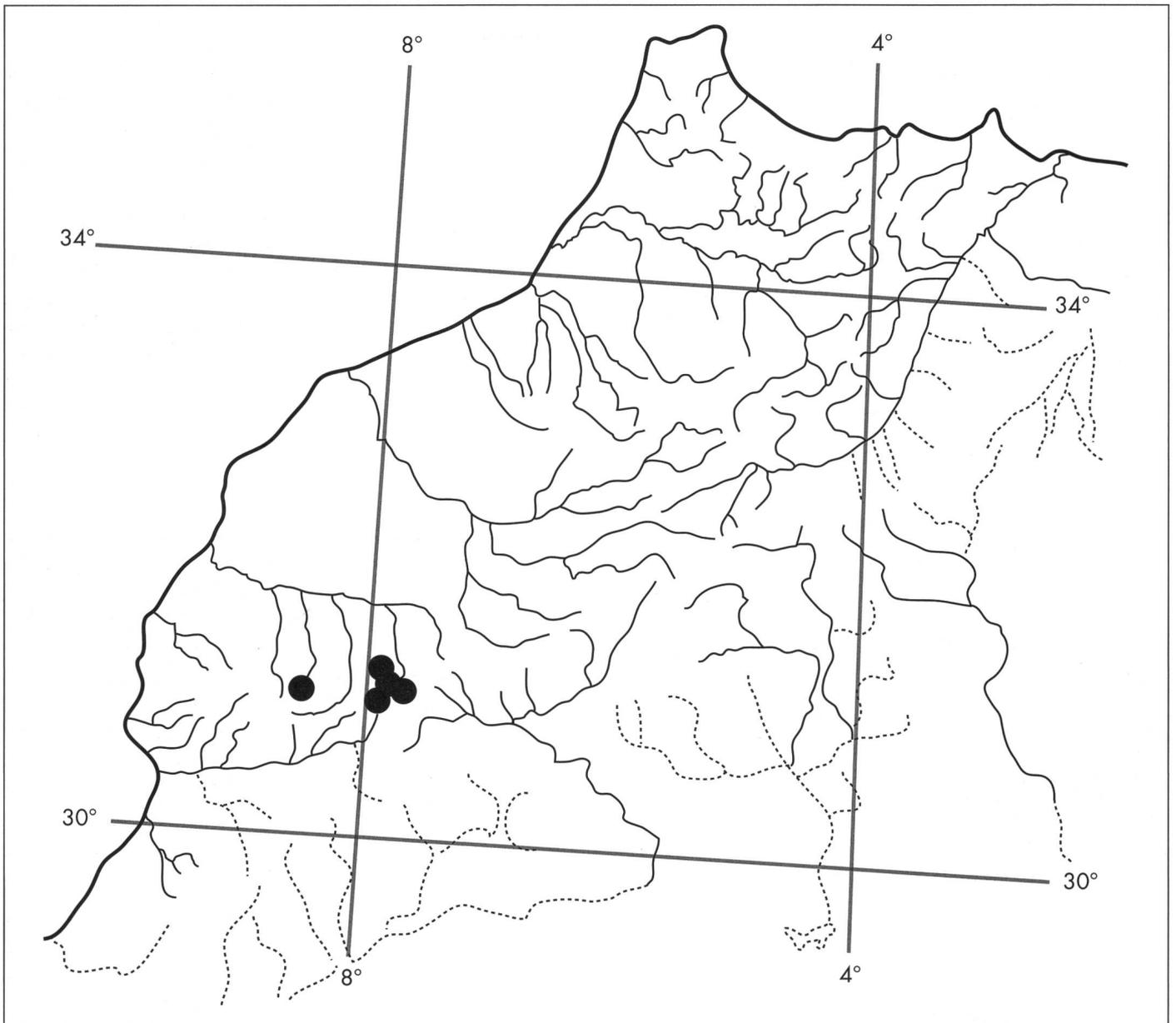


Fig. 4. – Distribution of *Carex ovalis* var. *atlasica* (H. Lindb.) Borat. & Romo.

9. *Crataegus laciniata* Ucria

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, scrublands on sandstone, 26.VII.2002, *Boratyński & Romo R. 10622* (BC); N slopes of Oukaïmeden, 2100 m, 31°13'N 7°15'W, scrub on sandstone rocks, 26.VII.2002, *Boratyński & Romo R 10579* (BC).

The species is very similar to *Crataegus orientalis* Pall. from the East Mediterranean region and sometimes treated as a synonym of the latter (AMARAL FRANCO, 1968; CHRISTENSEN, 1992; FENNANE, 1999a). *Crataegus laciniata* was described

from Sicily and occurs in the West Mediterranean countries (MUÑOZ GARMENDIA & al., 1998; FENNANE, 1999a). It grows in several localities dispersed across the Atlas (FENNANE, 1999a: 486).

It is frequent in different woody formations between 1200 and 2200 m, on basic and acid soils, but rare (not absent) in the Rif and mountains closer to the Algerian border.

10. *Cynoglossum watieri* (Batt. & Maire) Braun-Blanq. & Maire

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N, 7°49'W, scrubland on sandstone, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

This plant is endemic to the Atlas, but rare in the High Atlas (FENNANE & IBN TATTOU, 1998: 55) where it is found in the Western High and the Middle Atlas from Amizmiz and N'Fis valley to Demnate and Azilal, and from Bzou to Khenifra.

11. *Daphne mauritanica* Nieto Fel.

- **Marrakech:** N slopes of Oukaïmeden, 2200 m, 31°13N 7°15'W, scrub on sandstone rocks, 26.VII.2002, *Boratyński & Romo R.10577/bis* (BC).

Daphne mauritanica was lately excluded from *D. gnidium* (NIETO FELINER, 1995). It occurs in northwestern Africa, mostly in Morocco (Fig. 5), in the middle and high altitudes of the mountains with an altitudinal maximum at 2450 m in the Middle Atlas. Our find at Oukaïmeden at an altitude of 2200 m surpasses the previous records from the High Atlas (NIETO FELINER, 1995: 197). From the High Atlas it was also known from the Toubkal range and High Reraya. It is also widely represented in N Morocco, and reaches the mountain of Tlemcen in Algeria.

Revised material. – Massif de Beni Snassen, Le Kas (Ras) Foughal, brousailles, 1400 m, 17.VI.1931, *Faure* (MPU); Massif de Beni Snassen, Martimprey-du-Kiss, a Aghbal, bords des chemins, 8.VI.1932, *Faure s.n.* (MPU); Boufekrane, 20.V.1955, *Sauvage* (G); Taza to Ras el Ma, 745 m, 15.VI.1992, *Jury s.n.* (RNG); Moulay Idriss to Nzaia Beni Ammar, 5.VI.1994, *Jury s.n.* (RNG); 20 km W of Jaafra, 145 m, 24.X.1993, *Jury s.n.* (RNG); Fes, Jbel Trhat, 18.XI.1980, *Alyafi s.n.* (G); Chaoia Kasbah Ben Ahmed, 8.VI.1912, *Pitard s.n.* (G); Jbel Lakraa, 1270 m, 30.VIII.2005, *Boratyński, Didukh & Romo s.n.* (BC). **Middle Atlas:** forêts de chênes verts à Tafechinka, vers 1400 mètres, 25.VI.1938, *Faurel s.n.* (MPU); in rupestribus calcareis, Atlantis Medii infra Ksiba, 900-950 m, 22.VI.1936, *Maire s.n.*, Iter Maroc. XXVII (MPU); in Atlantis Medii montibus supra urbem Taza, 25.VI.1925, *Maire s.n.*, Iter Maroc. X (MPU); Timahdit, Ari Benij, 2450 m, 30.VII.1924, *Jahandiez* (G). **High Atlas:** Mischliften, 1600 m, 14.VII.1987, *Jury & al. s.n.*, (MA); Ksiba road to Imilchil, 1000 m, 5.VII.1997, *Jury s.n.* (RNG); Amizmiz, 2.III.1978, *Desrochers s.n.* (G); Ait Lekak, 2140 m, 21.IX.2000, *Jury s.n.* (RNG); Tdmant, 1760 m, 16.VII.1989, *Jury s.n.* (RNG); Oukaïmeden, 2200 m, 16.VII.1989, *Jury s.n.* (RNG); Toufghine, 1758 m, 4.IX.2005, *Boratyński, Didukh & Romo s.n.* (BC).

12. *Dianthus lusitanus* Brot.

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10N 7°51'W, scrub on sandstone rocks, 26.VII.2002, *Boratyński & Romo R 10610* (BC).

Dianthus lusitanus occurs in the mountain regions of the Iberian Peninsula in Europe and northwestern Africa (GREUTER & al., 1984). In the latter area it grows in arid and subarid conditions on high mountains and reaches altitudes of 3000 m (IBN TATTOU, 1999b). In the High Atlas it is also known from a few other dispersed localities (IBN TATTOU, 1999b).

Polymorphic taxon that grows on siliceous and basal substrata in the High and Middle Atlas. At the low altitudes from the Western High Atlas there are some ecomorphs reminiscent of the subsp. *sidi-tuali* (Font Quer) Dobignard, taxon from the sublittoral Western High Atlas and Anti Atlas (see DOBIGNARD, 2002: 39).

13. *Dianthus sylvestris* subsp. *boissieri* (Willk.) Dobignard

- **Marrakech:** N slopes of Oukaïmeden, 2100 m, 31°13N 7°15'W, scrub on sandstone rocks, 26.VII.2002, *Boratyński & Romo R-1058* (BC); road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, scrubland on sandstone, 26.VII.2002, *Boratyński & Romo R-10633* (BC).

The subsp. *longibracteatus* (Maire) Greuter & Burdet is endemic to the hills and low slopes of the oceanic mountains of Morocco. The higher altitude plants from the High Atlas are assimilated into the south Iberian plants and they must be referred to this taxon (DOBIGNARD, 2002: 35-38).

14. *Draba lutescens* Coss.

- **Marrakech:** Oukaïmeden, in pratis siccis apricis, 29R PQ, 2600-2700 m, therophytes on solo siliceo et petroso, 28.VI.1985, *Romo 280585/17* (BC).

Draba lutescens occurs in the mountains of southwestern Europe, mostly in the Iberian Peninsula and in Morocco (BLANCA, 1993; MONTERRAT, 2002). Although already indicated by ROMO (1988), this plant is mentioned from various parts of the High Atlas (J. Lalla Aziza, J. Guedrouz, Tizi-n-Tichka, Sidi Chamharouch) (IBN TATTOU, 1999c: 415), but not from Adrar Oukaïmeden. Owing to its rarity (Fig. 6), it should be included within the catalogue of threatened vascular plants of Morocco.

Taxon under-collected and probably under-represented in Herbaria.

It is a therophyte with a quick cycle, which is not found during dry years. It is relatively frequent during rainy years in the High and Middle Atlas (after Dobignard, *pers. comm.*).

Revised material. – **Middle Atlas:** In Atlantis Medii montibus supra oppidum Azrou, in pascuis humosis, solo calcareo

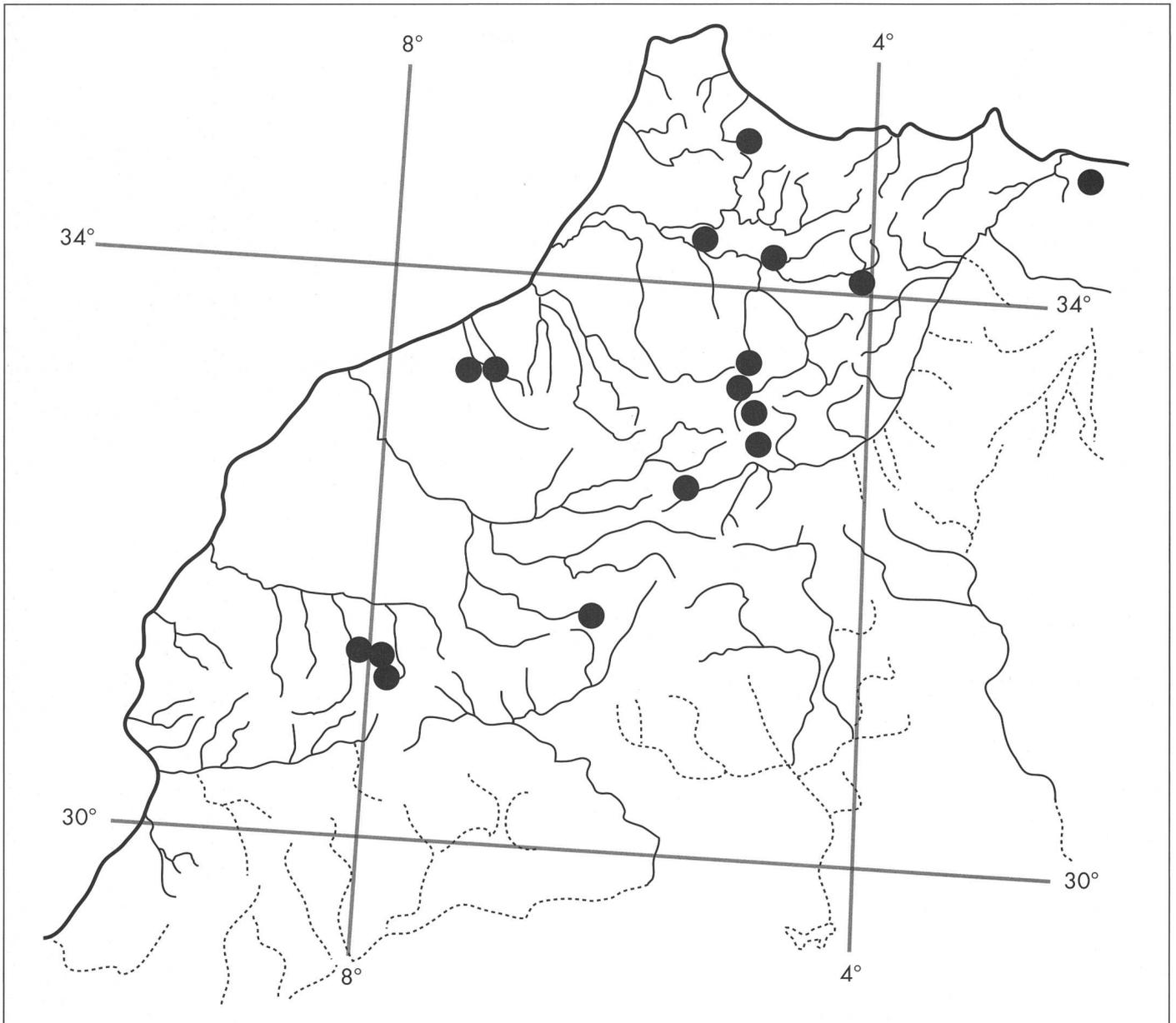


Fig. 5. – Distribution of *Daphne mauritanica* Nieto Fel.

1700 m, 19.IV.1926, *Maire s.n.*, Iter Maroc. XI (MPU); Itzer, source vers l'oued Zad, 1900 m, 8.V.1925, *Jahandiez 196* (MPU); in pascuis Atlantis Medii, supra Ras-el-Ma, prope Azrou, solo arenoso, substrato calcareo, ad alt. 1700 m, 29.III.1923, *Maire s.n.* (MPU); Ain-Kahla, prairies sèches, 1850 m, 16.V.1924, *Jahandiez 311* (MPU); Ain-Leuh, pelouses des plateaux calcaires, 1700 m, fleurs jaune clair, 28.III.1923, *Maire s.n.* (MPU); fissures des blocs de lave, flanc Sud du Dj. Bou-Iblane, vers 2400 m, Moyen Atlas Oriental, 5.VII.1938, *Faurel s.n.* (MPU); prairies fraîches sur calcaire, à Ras-el-Ma, 1600 m, 19.VI.1923, *Maire s.n.* (MPU). **High Atlas:** In Atlante Majore:

Tizi-n-Tichka, in pascuis, solo schistaceo, 2100 m, 8.V.1932, *Maire s.n.*, Iter Marocc. XXII (MPU); in Atlantis Majoris ditione Glaoua: in pascuis montis Guedrouz, supra Zerekten, solo arenaceo, 2000-2200 m, 9.IV.1926, *Maire s.n.*, Iter Maroc. XI (MPU); Grand Atlas Central: prairies humides près du refuge d'Isangane, Dj. Ouagamil, 31.VII.1938, *Faurel s.n.* (MPU); Grand Atlas, Ourika: lac Iferouane, sur le Djebel Timmkar, grès, 2060 m, 13.VII.1921, *Maire s.n.* (MPU). **Anti Atlas:** Jb. Siroua, 2900 m, VI.1954, *Quézel s.n.* (MPU); in pascuis montis Amezdour, ditonis Siroua, solo vulcanico, 2600 m, corolla lutea, 9.V.1932, *Maire s.n.*, Iter Marocc. XXII (MPU).

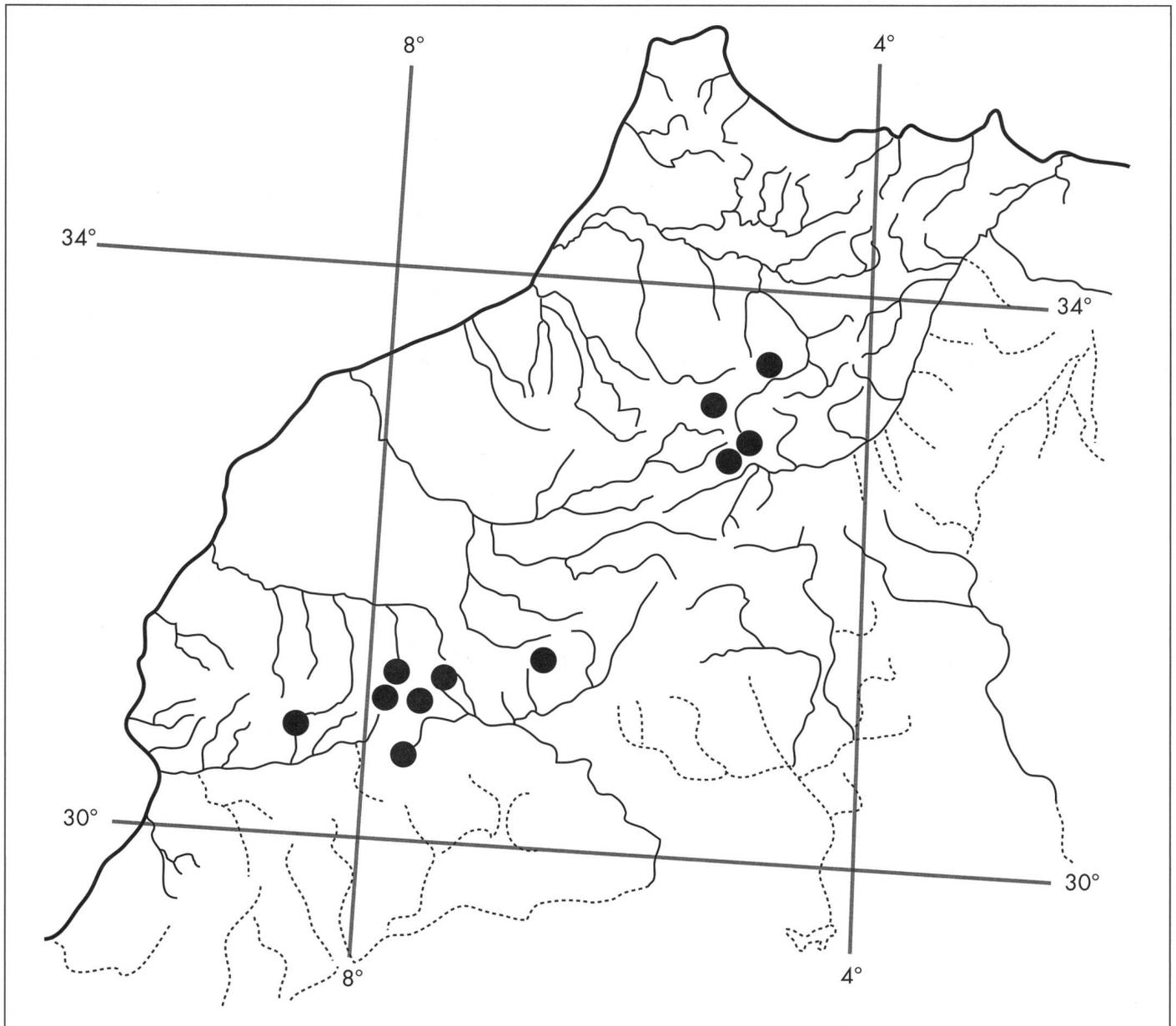


Fig. 6. – Distribution of *Draba lutescens* Coss.

15. *Jasione crispa* subsp. *lanuginella* (Litard. & Maire) Lambinon & Lewalle

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, mesophilous grasslands, 26.VII.2002, *Boratyński & Romo R. 10615* (BC).

Jasione crispa is a variable west Mediterranean species, represented by several subspecies in the mountain regions of the Iberian Peninsula and northwestern Africa (GREUTER & al., 1984). The subsp. *lanuginella*, previously referred to *J. sessiliflora* Boiss. & Reut. (MAIRE, 1924: 40; DOBIGNARD, 1997:

140), was recently cited by FÖRTHNER & PODLECH (2002: 56) from the Ourika valley, near Oukaïmeden. Because of its rarity (Fig. 7), it should be included in the catalogue of threatened vascular plants of Morocco.

It is the only representative of *J. crispa* in the Western High Atlas, from where it is known from the mountains above Imi-n'Tanout to Glaoua in the Demnate region. It lives in the Oukaïmeden and Toubkal ranges at altitudes of between 1200 to 2700 m (after Dobignard, *pers. comm.*).

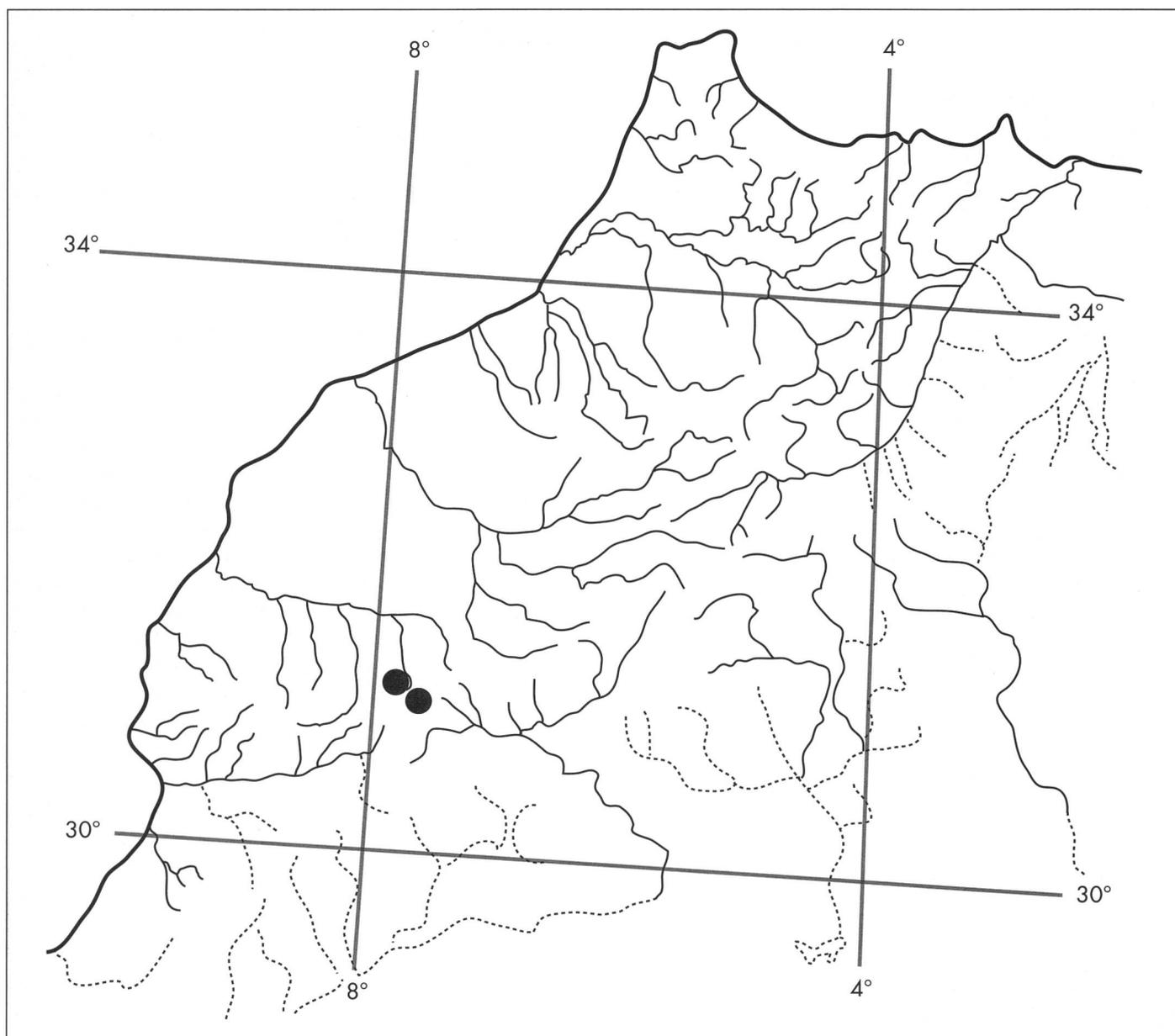


Fig. 7. – Distribution of *Jasione crisper* subsp. *lanuginella* (Litard. & Maire) Lambinon & Lewalle.

16. *Juncus capitatus* Weigel

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, therophyte grasslands, 26.VII.2002, *Boratyński & Romo R. 10623* (BC).

A cosmopolitan species known from several regions of the world (MEUSEL & al., 1965) and also reported from north-western Africa, where it occurs in the north and in the Middle Atlas. Our find considerably extends this range to the High Atlas.

In the High Atlas it reaches 2900 m above sea level, and it is relatively frequent in the pouzzines of the Toubkal range and other western ranges. Also present in the limestones of the High Atlas and around springs and decalcified sources.

17. *Lotus corniculatus* subsp. *alpinus* (DC.) Rothm.

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, mesophyllous grasslands, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

This taxon is common in Europe, and it occurs also in northwestern Africa and in the mountains of eastern Africa (MEUSEL & al., 1965; VALDÉS, 2002). It was previously reported only from the Middle Atlas (QUÉZEL & SANTA, 1962), not from the High Atlas.

Plants from siliceous high mountains above 2200 m to 2800 m must be assimilated within the subsp. *alpinus* (DC.) Rothm. (DOBIGNARD, 2004: 53).

18. *Loncomelos pyrenaicus* (L.) Holub

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, scrubland on sandstone, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

This South European species is known also from southwestern Asia and as rare from northwestern Africa. It is not rare in the Middle and High Atlas, on basophilous (Ahansal and Plateau des Lacs) and acidophilous grasslands (Glaouana).

19. *Minuartia funkii* Graebn.

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, scrub on stony soils, 26.VII.2002, *Boratyński & Romo R. 10602* (BC).

A West Mediterranean mountain species known mostly from the Iberian Peninsula (FAVAGER & MONTSERRAT, 1990) and from the African Atlas mountains (OUYHAYA, 1999c: 220). In the High Atlas only reported from dispersed localities by MAIRE (1934) and QUÉZEL (1957), with an altitudinal maximum of 3000 m. It is frequent in the High Atlas (Dobignard, *pers. comm.*).

20. *Minuartia hybrida* (Vill.) Schischk. subsp. *hybrida*

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, therophyte grasslands, 26.VII.2002, *Boratyński & Romo R. 10616* (BC).

The species is common in Europe and southwestern Asia, also in northwestern Africa. Already known from a few localities in the High Atlas (OUYHAYA, 1999c: 220), it has not been previously reported from Oukaïmeden.

It is not rare in the High Atlas (Dobignard, *pers. comm.*), where it was observed by MAIRE (1934) and QUÉZEL (1957) in other localities.

21. *Minuartia verna* subsp. *kabylica* (Pomel) Maire & Weiller

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, stony soils, 26.VII.2002, *Boratyński & Romo R. 10602* (BC).

The species has a circum-boreal range with several more or less isolated areas of distribution at its southern limit (MEUSEL & al., 1965). In Africa the species is represented by the subsp. *kabylica*, endemic and reported from the High Atlas (OUYAHYA, 1999c: 220).

It was known from the Toubkal range to 3400 m above sea level, and from the calcareous region of Ahansal, in the High Atlas (J. Azourki, M'Goun, J. Waougoulzat, *pers. comm.*).

22. *Molinia caerulea* (L.) Moench subsp. *caerulea*

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, wet clay soils, 26.VII.2002, *Boratyński & Romo R. 10628* (BC).

This taxon has also been observed below Tizi-n-Eddi, 2700 m, but not collected.

A variable Euro-Siberian species, reported from several dispersed localities in northwestern Africa, mostly in Algeria (QUÉZEL & SANTA, 1962; HULTÉN & FRIES, 1986). In Morocco, it is represented by the subsp. *altissima* (Link) Domin in the Rif (DEVESA, 2002) and the subsp. *caerulea* from the High Atlas; this is apparently the only taxon of *Molinia* present there. The subsp. *caerulea* has also been mentioned as occurring in the Rif, but not confirmed since (DEVESA, 2002: 843). In Morocco it is very rare (Fig. 8), reported only from the Oued Afra valley in the High Atlas (FENNANE & IBN TATTOU, 1998: 225).

The presence of this taxon has been considered as doubtful by MAIRE (1931), later confirmed by SAUVAGE & VINDT (1955) for the High Atlas and by DAHLGREN & LASSEN (1972) for the Rif. The species is rare in Morocco. The high altitude plants must not be referred to the subsp. *altissima*. These plants (referred to the subsp. *caerulea*) seem more closely related to *M. rivolum* Pomel from the Algerian mountains.

23. *Polycarpon polycarpoides* subsp. *herniarioides* (Ball) Maire & Weiller

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, stony soils and rocks, 26.VII.2002, *Boratyński & Romo R. 10616* (BC).

The distribution of this taxon is poorly known (FENNANE, 1999b: 194). In the High Atlas it is rare at dispersed localities.

It is found growing in the siliceous and porphyric mountains of the western High Central Atlas and reaches the Anti Atlas (Sahro and Siroua). The subsp. *polycarpoides* is present in the Eastern High Atlas and Middle Atlas.

24. *Rosa micrantha* Sm. & Sowerby

- **Marrakech:** N slopes of Oukaïmeden, 2100 m, 31°13'N 7°15'W, scrub on sandstone rocks, 26.VII.2002, *Boratyński & Romo R. 10584* (BC).

A Central European species, which occurs also in northwestern Africa. In the High Atlas it is rare (FENNANE & al., 1999: 500).

This taxon occurs from 400-500 m to more than 2000 m. This rose is represented in Morocco by different varieties, this population belonging to the var. *atlantica* Ball.

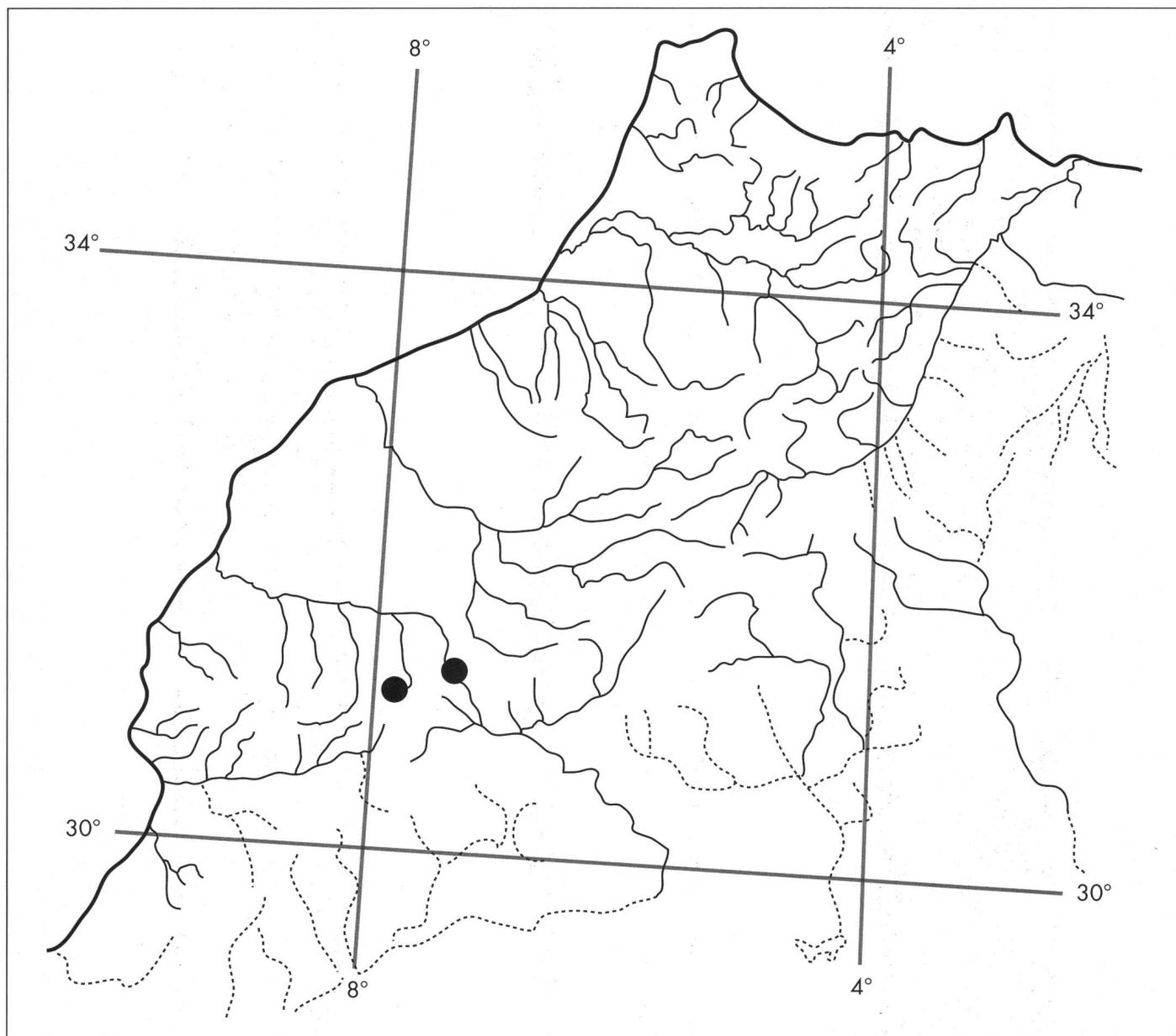


Fig. 8. – Distribution of *Molinia coerulea* (L.) Moench subsp. *caerulea*.

25. *Rhamnus lycioides* subsp. *atlantica* (Murb.) Jahand. & Maire

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, scrubland on sandstone, 26.VII.2002, *Boratyński & Romo R. 10621* (BC).

Rhamnus lycioides L. is frequent and polymorphic in Morocco. Until a complete revision of the aggregate *R. lycioides* is carried out, the subspecific status seems to be the more appropriate. Two subspecies are recognized for the Moroccan flora.

Some populations have characteristics part-way between subsp. *oleoides* (L.) Jahand. & Maire and subsp. *atlantica*.

Rhamnus lycioides subsp. *atlantica* seems to be endemic to Morocco (Fig. 9), where it grows in the middle and high mountain vegetation belts, at altitudes of between 1000 and 2500 m, mostly on calcareous rocks.

Revised material. – **Middle Atlas:** lieux schisteux près de Aït Ineloug, *Oliver 11945* (MPU); in rupibus calcareis Atlantis Medii, prope lacum Tislit, 2400 m, 27.VI.1939, *Weiller 647*,

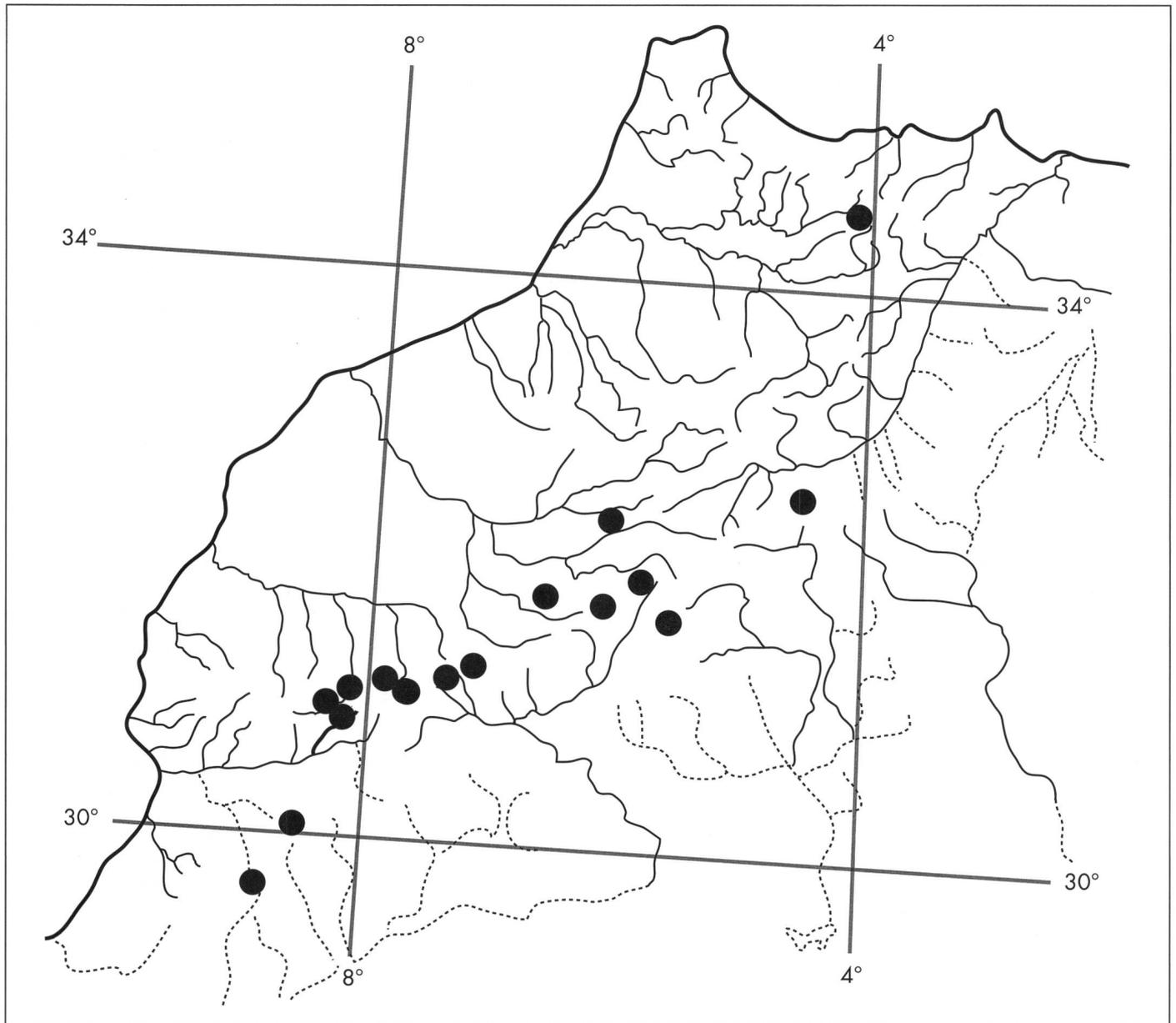


Fig. 9. – Distribution of *Rhamnus lycioides* subsp. *atlantica* [Murb.] Jahand. & Maire.

Iter Maroc. XXIX (MPU); in Atlantis Medii montibus supra urbem Taza: in rupibus calcareis ad Mahamram, 1250 m, 17.VI.1925, Iter Maroc. X (MPU) (as *Rh. lycioides* subsp. *oleoides* var. *atlantica* Jahand. & Pau). **High Atlas:** Grand Atlas Oriental, pentes rocheuses sous le col de Tizi-n-Issariat, vers 2000 mètres, 23.VII.1938, *Faurel s.n.* (MPU); Ourika: rochers gréseux de la basse vallée, 900-1000 m, 7.VII.1921, *Maire s.n.* (MPU); Azilal, rochers calcaires à Ifrane, 1250 m, 7.IV.1923, *Jahandiez 104* (MPU); in dumetis: Atlantis Majoris: in valle Reraya, prope Asni, 1200 m, 9.IV.1936, *Maire s.n.*, Iter Maroc. XXVI (MPU); in rupibus calcareis Atlantis Majoris orientalis

prope Agoudal, 2300-2400 m, 20.VI.1936, *Maire s.n.*, Iter Maroc. XXVII. (MPU); in rupibus calcareis Atlantis Majoris prope Nzala inter Rich et Midelt, 1600 m, 20.IV.1930, *Wilczek s.n.*, Iter Maroc. XXII (MPU); in Atlantis Majoris ditione Goundafa: inter Asni et Tagadirt-n-Bour, in dumetis, 1100 m, 17.IV.1925, *Maire s.n.*, Iter Maroc. IX (MPU); in Atlantis Majoris ditione Glaoua: in dumetis, prope Enzel, solo arenaceo, 830 m, 4.VII.1924, *Maire s.n.*, Iter Maroc. VIII (MPU); in Atlantis Majoris ditione Glaouana: in rupibus calcar. mont. Tamralt, supra castellum Telouet, 2150 m, 8.VII.1924, *Maire s.n.*, Iter Maroc. VIII (MPU); in Atlantis Majoris, Valle Reraya: in

rupibus calcareis inter Asni et Tinite, 1350 m, 18.VII.1924, *Maire s.n.*, Iter Maroc. VIII (MPU); Grand Atlas Oriental, pentes rocheuses sous le col de Tizi-n-Issaoul vers 2500 mètres, 23.VII.1938, *Faurel s.n.* (MPU). **Anti Atlas:** Soulaz, près Tanant, coteaux gréseux, 650-700 m, avec *Euphorbia resinifera*, 3.IV.1921, *Maire s.n.* (MPU); in Anti-Atlante: Igherm, in rupibus siliceis, 1600-1700 m, 19.IV.1931, *Maire s.n.*, Iter Maroc. XXI (MPU); Sagho: rocheurs siliceux du P.C. Catruff, 1970 m, 13.V.1953, *Emberger* (MPU). **Maroc austro-oriental:** Mont des Aït-Mesrouh au N de Gourrama, VI.1926, *Hubert s.n.* (MPU).

The following specimens are intermediate between *R. lycioides* subsp. *atlantica* and *R. lycioides* subsp. *oleoides*:

MOROCCO: Prope opp. Mogador, in fruticeto, 11 km ad W versus ad oppido 13.V.1926, *H. Lindberg 2135*, Iter Maroc. 1926 (MPU); in alveis torrentium prope Sidi Mezal in ditone Ida-ou-Gnidif, Anti Atlantis, 1300 m, 26.III.1937, Iter Maroc. XXVIII (see LINDBERG, 1932: 101).

26. *Sagina apetala* Ard.

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, therophytes on stony soils, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

Sagina apetala is a common plant in southwestern Europe. It is also well represented in all the Moroccan territories (OUYAHYA, 1999d: 220), but localities in the High Atlas are scarce.

In the Toubkal range it reaches 2700 m, and in the Siroua 2500 m. It is locally abundant around the springs on sandy soils and siliceous rocks (*Dobignard, pers. comm.*).

27. *Sagina procumbens* subsp. *atlasica* Dobignard

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, stony soils, 26.VII.2002, *Boratyński & Romo R. 10600* (BC).

Sagina procumbens is a variable, circum-boreal plant with its epicentres in Europe and western Siberia. The subsp. *atlasica*, according to DOBIGNARD (1997), is restricted to the siliceous areas of the High Atlas and Anti Atlas. From the High Atlas it is recorded from Imlil and Arremd and from Siroua in the Anti Atlas. It does not reach the Middle Atlas, and has not been reported from Oukaïmeden before. It is a rare taxon, endemic to Morocco (Fig. 10), and should be protected. It is not very common on the spring and wet grasslands of the Central High Atlas and Siroua range in the Anti Atlas.

28. *Scrophularia laevigata* var. *simplicifolia* Batt.

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, scrubland on sandstone, 26.VII.2002, *Boratyński & Romo R. 10629bis* (BC).

Scrophularia laevigata is a variable, West-Mediterranean species (RICHARDSON, 1972; ORTEGA-OLIVENCIA & DEVESA, 2002). The Oukaïmeden records (EL ATECHI, 2006) should apparently be referred to var. *simplicifolia*, rare in the High Atlas.

While the identity of the different taxa described is undergoing study, and their distribution is being estimated, our materials at present belong to this variety.

29. *Silene boryi* Boiss.

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, siliceous rocks, 26.VII.2002, *Boratyński & Romo R. 10613* (BC).

Silene boryi is a variable mountain plant of the Iberian Peninsula and Morocco (TALAVERA, 1990; IBN TATTOU, 1999d), already known from the High Atlas (IBN TATTOU, 1999d: 231). It has been collected in Jbel Angour (2900 m) as shown by one specimen (1.VII.1983, *A. Dobignard 2352b* (G)).

It is found growing up to 3100 m on southern slopes of Toubkal and descends to 1800 m on northern slopes of Jbel Masker and J. Ayachi.

30. *Silene heterodonta* F. N. Williams subsp. *heterodonta*

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, stony ground on sandstone rocks, 26.VII.2002, *Boratyński & Romo R. 10613* (BC).

Silene heterodonta is endemic to Morocco, in the Middle, High and Anti Atlas (IBN TATTOU, 1999d: 231). The typical subsp. *heterodonta* is known only from the High Atlas and Anti Atlas (FENNANE & IBN TATTOU, 1998), where it is present on Jbel Siroua and Jbel Sarho.

31. *Silene latifolia* Poir.

- **Marrakech:** road to Oukaïmeden, 2490 m, 31°12'N 7°49'W, mesophilous grasslands, 26.VII.2002, *Boratyński & Romo R. 10633* (BC).

This is a widespread species in Europe and southwestern Asia, known also from northwestern Africa (IBN TATTOU, 1999d: 231). In the High Atlas it is rare in scattered localities (FENNANE & IBN TATTOU, 1998).

This species is present in high-mountain wet grasslands, close to the cattle reposoirs and agdals from the Middle and High Atlas, where it is not rare to 2500 m. It is especially frequent in the years of more abundant rainfall, in the valley bottom soils of the Gorges of Ahansal, where it forms part of the megaforbic communities.

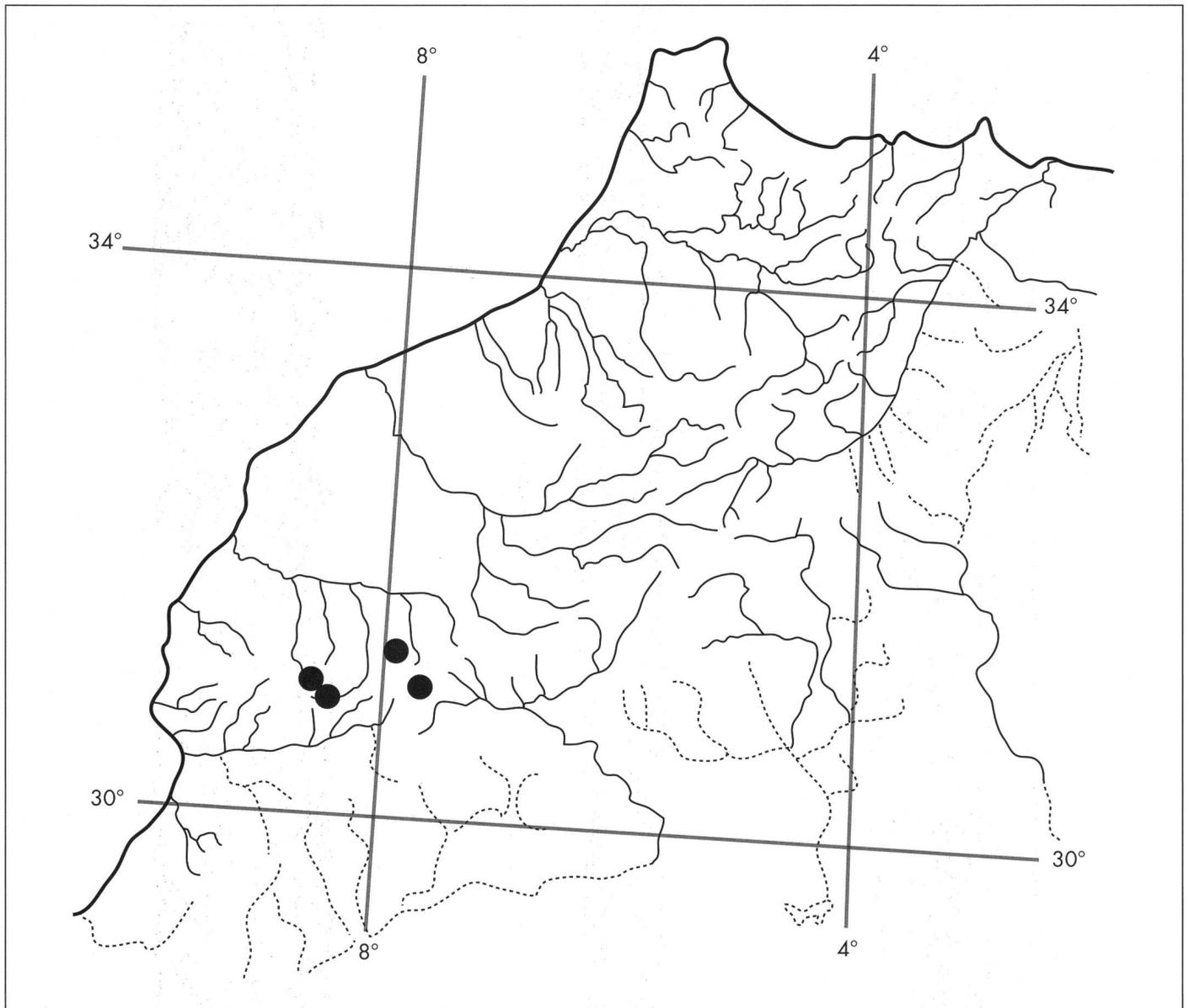


Fig. 10. – Distribution of *Sagina procumbens* subsp. *atlasica* Dobignard.

32. *Stachys saxicola* subsp. *villosissima* (Ball) Maire

- **Marrakech:** N slopes of Oukaïmeden, 2100 m, 31°13'N 7°15'W, scrub on sandstone rocks, 26.VII.2002, Boratyński & Romo, R. 10578 (BC).

Stachys saxicola Coss. is endemic to northwestern Africa. It is extremely variable, with five subspecies described and occurring in scattered localities (FENNANE & IBN TATTOU, 1998). The subsp. *villosissima* is endemic to Morocco and with localities in the High and Middle Atlas and in pre-Rif mountains (FENNANE & IBN TATTOU, 1998; REJDALI & MONTSERRAT, 2002) (Fig. 11).

It is rare in the central High Atlas on schist and slate rocks from the low slopes of Amizmiz (Oued N'Fis) (Dobignard, *pers. comm.*).

Revised material. – **Middle Atlas:** in rupibus calcareis Atlantis Medii, infra Ksiba, 900-950 m, 22.VI.1936, *Maire s.n.*, Iter Maroc. XXVII (MPU); Rochers calcaires entre Oued Amassine et Azigza, 1200 m, corolla purpurea, 22.VI.1923, *Maire s.n.* (MPU); N de Beni Mellal, Foum el Ancem, rochers calcaires, 26.VI.1937, *Gattefosse s.n.* (MPU); in Atlante Medio ad fontis fluminis Oum-er-Rebia, in rupibus calcareis, 1250 m, 8.VIII.1924, *Maire s.n.* (MPU); in rupibus calcareis Atlantis

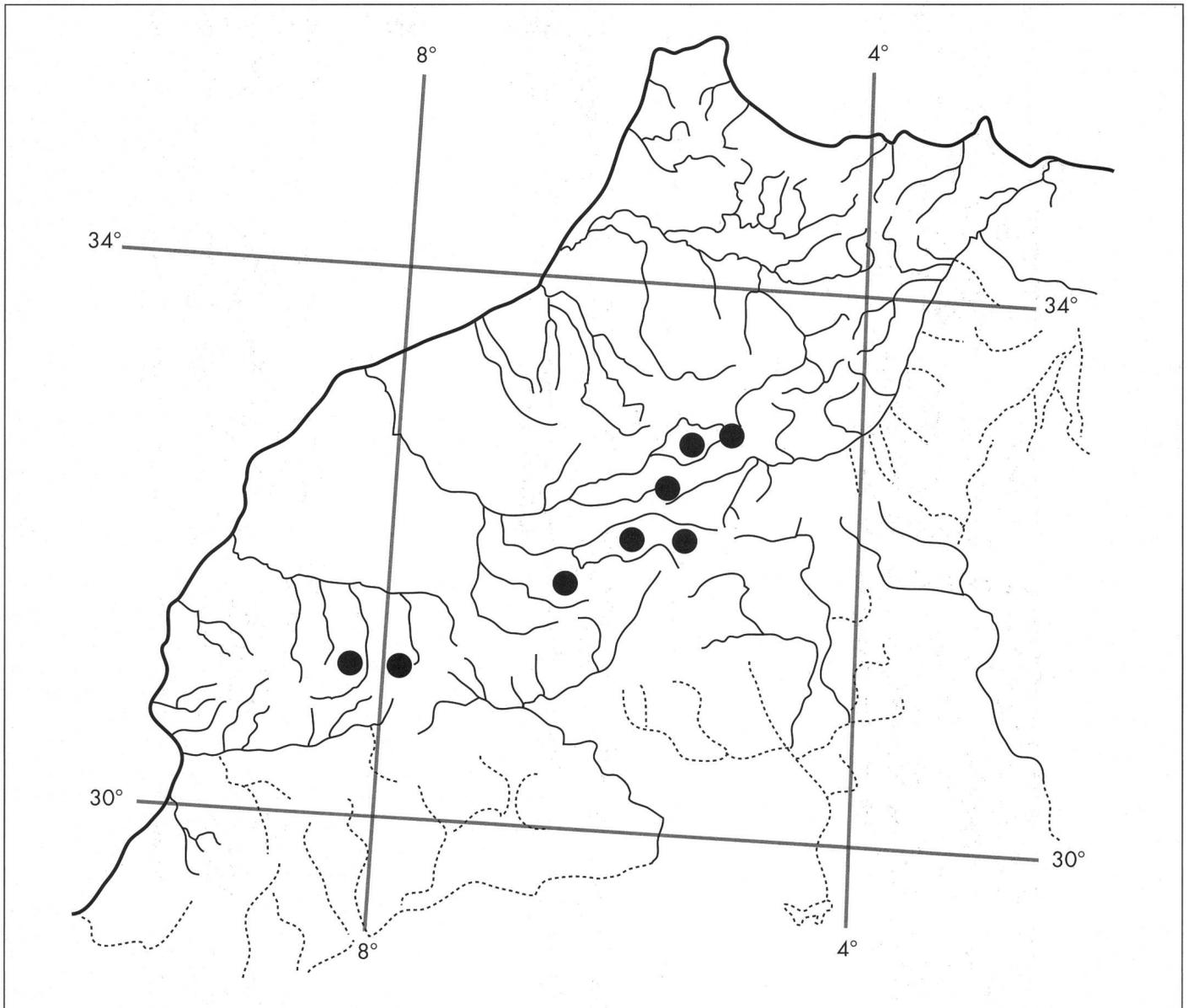


Fig. 11. – Distribution of *Stachys saxicola* subsp. *villosissima* (Ball) Maire.

Medii, supra Tizi-n-Ouria, 1600-1700 m, 11.VI.1936, *Maire s.n.*, Iter Maroc. XXVII (MPU). **High Atlas:** in Atlantis Majoris, ditone Azilal: in rupibus calcareis prope Ifrane, 1050 m, 2.VIII. 1926, *Maire s.n.*, Iter Maroc. XII (MPU); Amismiz, rochers calcaires, 1000 m, 25.IV.1936, *Gattefosse s.n.* (MPU).

33. *Thlaspi perfoliatum* var. *rotundifolia* Ball

- **Marrakech:** Oukaïmeden, in pratis siccis apricis, 29R PQ 15, 2600-2700 m, therophyte grasslands on solo siliceo et petroso, 28.V.1985, *Romo R. 280585* (BC); Oukaïmeden, in pratis siccis apricis, 29R PQ 15, 2600-

2700 m, therophyte grasslands on solo siliceo et petroso, 1988, *Romo s.n.* (BC). *Thlaspi perfoliatum* is a European species, which occurs also in central Asia and enters North Africa (MEUSEL & al., 1965). The var. *rotundifolia* probably grows only in the mountain regions of the Iberian Peninsula (PUJADAS SALVÁ, 1993) and northwestern Africa, where in the High Atlas it reaches its southern limits (FENNANE, 1999c: 405).

Between Seksaoua and Glaoua, in the south it reaches J. Kest and J. Siroua to 2600 m, in the Anti Atlas region.

34. *Veronica rosea* subsp. *atlantica* (Ball) I. Soriano

- **Marrakech:** Oukaïmeden area, N slopes of Tizi'n-Eddi, 2700 m, 31°10'N 7°51'W, stony soils on siliceous rocks, 26.VII.2002, *Boratyński & Romo R 10616* (BC); Oukaïmeden, 29R PQ 15, 2600-2700 m, solo siliceo et petroso, 28.V.1985, *Romo R 280585* (BC).

Veronica rosea is a rare, mountain species of the Iberian Peninsula and northwestern Africa (SORIANO, 2002). The subsp. *atlantica* is endemic to Morocco and Algeria (SORIANO, 2002). The species was reported for Oukaïmeden by EL ATECHI (2006) but without indication of subspecies.

Polymorphic taxon, with ecomorphs associated with substrate ecology and climate. It is frequent in the Atlas except in the Anti Atlas. In the High Atlas it reaches the xerophyte plant communities above 3000 m in J. Ayachi and above 3500 m in the M'Goun and J. Waougoulzat ranges.

35. *Veronica verna* L.

- **Marrakech:** Oukaïmeden, in pratis siccis apricis, 29R PQ 15, 2600-2700 m, solo siliceo et petroso, 28.V.1985, *Romo R 280585* (BC).

An euro-siberian species with scattered localities in northwestern Africa (MEUSEL & al., 1978), mostly in the mountains (Rif, Middle and High Atlas, see Fig. 12). In Morocco, it is very rare (FENNANE & IBN TATTOU, 1998: 174), reported from Oukaïmeden by ROMO (1988), but not reported by EL ATECHI (2006).

It is a rare taxon, probably under-observed in Morocco. It is present in the Middle Atlas (J. Tazzeke, Assaka N'Ouan) and High Atlas (J. Guedrouz).

36. *Viola kitaibeliana* Roem. & Schult.

- **Marrakech:** Oukaïmeden, in pratis siccis apricis, 29R PQ 15, 2600-2700 m, solo siliceo et petroso, 28.V.1985, *Romo R 280585* (BC).

A species of sub-Mediterranean, mostly European, range (MEUSEL & al., 1978), rare in Morocco, and known only from the mountains of the High Atlas, Saharan Atlas and Rif (IBN TATTOU, 1999e: 327; JURY & RUTHERFORD, 2002). It is previously mentioned by ROMO (1988) from a nearby locality.

The taxon, which is rare and disseminated in the High Atlas, has been rarely observed. *Viola parvula* Tineo, from the same aggregate, is also present on the altitudinal grasslands of the Oukaïmeden, Toubkal, Tizi-n'Test, Tichka and also in the Jbel Siroua and J. Aklim in the Anti Atlas.

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References

- AMARAL FRANCO, J. DO (1968). *Crataegus* L. In: TUTIN, T. G. & al. (ed.), *Fl. Eur.* 2: 73-77.
- BALL, J. (1878). *Spicilegium florum Maroccanarum*. *J. Linn. Soc., Bot.* 16: 281-772.
- BLANCA, G. (1993). *Draba* L. In: CASTROVIEJO, S. & al. (ed.), *Fl. Iber.* 4: 203-221.
- CHRISTENSEN, K. I. (1992). Revision of *Crataegus* sect. *Crataegus* and nothosect. *Crataeginae* (Rosaceae – Maloidae) in the Old World. *Syst. Bot. Monogr.* 35: 1-199.
- DAHLGREN, R. & P. LASSEN (1972). Studies in the flora of Northern Morocco. I. Some poor fen communities and notes on a number of Northern and Atlantic plant. *Bot. Not.* 125: 439-464.
- DEVESA, J. A. (2002). *Molinia* L. In: VALDÉS, B., M. REJDALI, A. ACHHAL EL KADMIRI, J. L. JURY, J. M. MONTSERRAT (ed.), *Checklist of vascular plants of N Morocco with identification keys* 2: 843. Consejo Superior de Investigaciones Científicas.
- DOBIGNARD, A. (1997). Nouvelles observations sur la flore du Maroc 3. *Candollea* 52: 119-157.
- DOBIGNARD, A. (2002). Contributions à la connaissance de la flore du Maroc et de l'Afrique du Nord, nouvelle série I. *J. Bot. Soc. Bot. France* 20: 5-43.
- DOBIGNARD, A. (2004). Journées d'études au 11-25 mai 2003. Compte rendu des herborisations et principaux résultats. *J. Bot. Soc. Bot. France* 28: 1-104.
- DOBIGNARD, A., F. JACQUEMOUD & D. JORDAN (1992). Matériaux pour la connaissance floristique du Sahara occidental et de l'Anti-Atlas méridional. I. Pteridophyta à Rosaceae. *Candollea* 47: 113-179.
- DOBIGNARD, A. & D. JORDAN (1987). Nouvelles observations sur la flore du Maroc 1. Contribution à l'étude de la flore du Haut Atlas. *Saussurea* 18: 67-104.
- EL ATECHI (2006). Annotated checklist of Oukaïmeden, High Atlas [http://www.herbarium.rdg.ac.uk/moroccan_plants/oukaïmeden/checklist.asp].
- JURY, S. L., M. REJDALI, R. W. RUTHERFORD, T. EL ATECHI & H. RANKOU (2006). The Darwin Checklist of Moroccan Vascular Plants [http://www.herbarium.rdg.ac.uk/moroccan_plants/moroccan%20plants/base.asp].

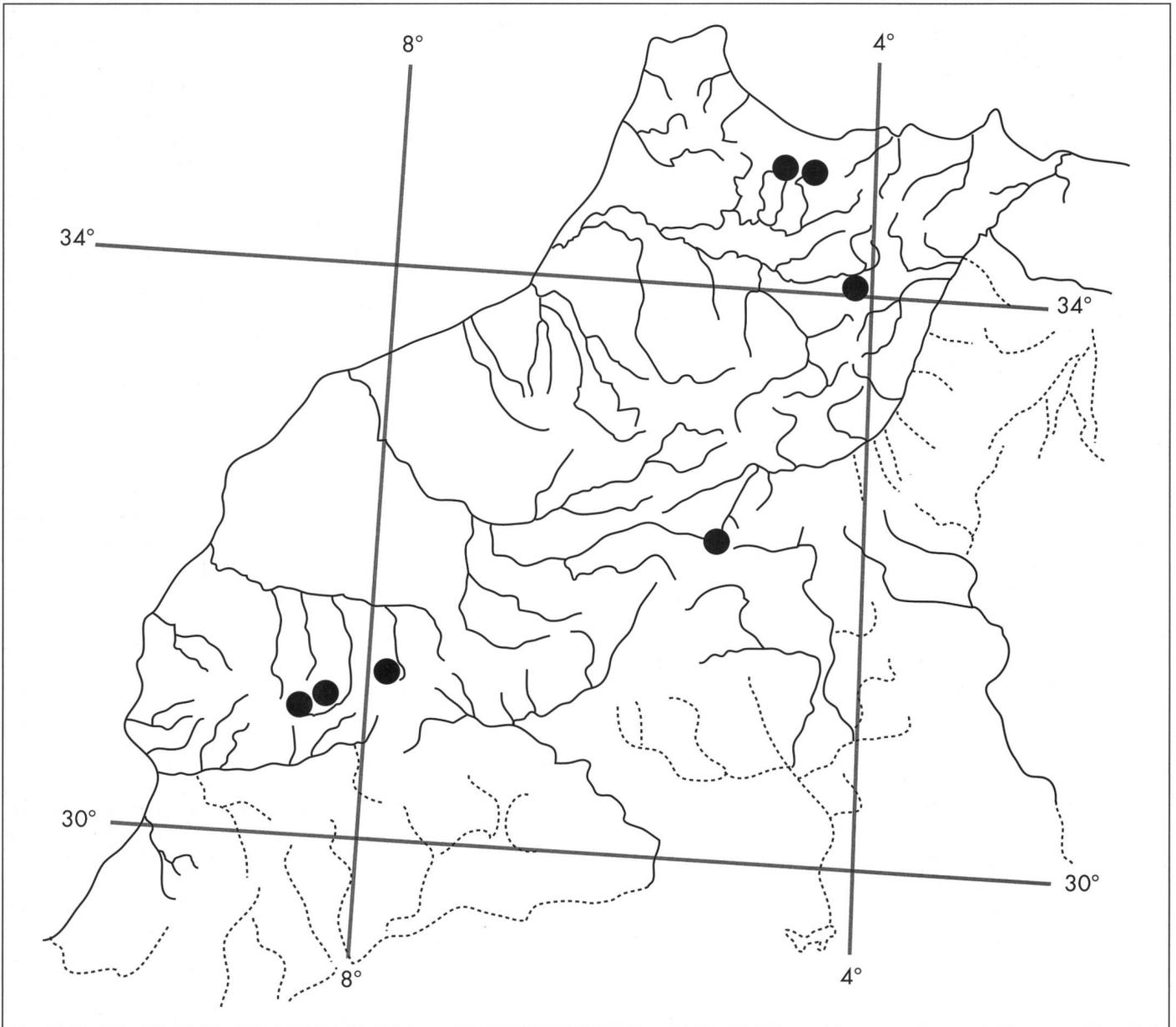


Fig. 12. – Distribution of *Veronica verna* L.

FAVAGER, C. & P. MONTSERRAT (1990). *Minuartia* Loeffl. ex L. In: CASTROVIEJO, S. & al. (ed.), *Fl. Iber.* 2: 233-252.

FENNANE, M. & M. IBN TATTOU (1998). Catalogue des plantes vasculaires rares, menacées ou endémiques du Maroc. *Bocconeia* 8.

FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (1999). *Flore pratique du Maroc*. Volume 1. Institut Scientifique, Université Mohammed V, Rabat.

FENNANE, M. (1999a). *Crataegus* L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 486-487. Institut Scientifique, Université Mohammed V, Rabat.

FENNANE, M. (1999b). *Polycarpon* L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 194. Institut Scientifique, Université Mohammed V, Rabat.

FENNANE, M. (1999c). *Thlaspi* L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 404-405. Institut Scientifique, Université Mohammed V, Rabat.

FERNÁNDEZ-CASAS, J., J. MOLERO, J. M. MONTSERRAT & A. M. ROMO (1987). Iter Maroccanum anno 1985, Ieunii tempore perfectum. *Treb. Inst. Bot. Barcelona* 11: 1-44.

- FÖRTHNER, H. & D. PODLECH (2002). Contributions to the flora of Northern Africa II. New and noteworthy taxa from Morocco. *Sendtnera* 8: 45-58.
- GALLAND, N. (1990). Recherche sur l'origine de la flore orophile du Maroc. Etude caryologique et cytogéographique *Trav. Inst. Sci. Univ. Mohammed V, Sér. Bot.* 35.
- GREUTER, W., H. M. BURDET & G. LONG (1984). *Med-Checklist*. Volume 1. OPTIMA & Conservatoire et Jardin Botaniques de la Ville de Genève.
- HULTÉN, E. & M. FRIES (1986). *Atlas of North European Vascular Plants*. Koeltz Scientific Books.
- IBN TATTOU, M. (1999a). Alyssum L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 409-413. Institut Scientifique, Université Mohammed V, Rabat.
- IBN TATTOU, M. (1999b). Dianthus L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 250-254. Institut Scientifique, Université Mohammed V, Rabat.
- IBN TATTOU, M. (1999c). Draba L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 414-417. Institut Scientifique, Université Mohammed V, Rabat.
- IBN TATTOU, M. (1999d). Silene L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 227-248. Institut Scientifique, Université Mohammed V, Rabat.
- IBN TATTOU, M. (1999e). Viola L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 326-329. Institut Scientifique, Université Mohammed V, Rabat.
- JAHANDIEZ, E. & R. MAIRE (1934). *Catalogue des plantes du Maroc*. Volume 3. Imprimerie Minerva, Alger.
- JURY, S. L. & R. W. RUTHERFORD (2002). Violaceae. In: VALDÉS, B., M. REJDALI, A. ACHHAL EL KADMIRI, J. L. JURY & J. M. MONTSERRAT (ed.), *Checklist of vascular plants of N Morocco with identification keys* 1: 212-214. Consejo Superior de Investigaciones Científicas.
- LAMBINON, J. (1998). Notes brèves. *Bull. Soc. Echange Pl. Vasc. Eur. Occid. Bassin Médit.* 27: 92-93.
- LINDBERG, H. (1932). *Itinera Mediterranea*. Helsingfors.
- LUCEÑO, M. (1994). Monografía del género Carex en la Península Ibérica e Islas Baleares. *Ruizia* 14.
- MAIRE, R. (1924). Etudes sur la végétation et la flore du Grand Atlas et du Moyen Atlas Marocains. *Mém. Soc. Sci. Nat. Maroc* 7.
- MAIRE, R. (1931). Contributions à la flore de l'Afrique du Nord. *Bull. Soc. Hist. Nat. Afrique N.* 22: 275-330.
- MAIRE, R. (1934) Contributions à la flore de l'Afrique du Nord. *Bull. Soc. Hist. Nat. Afrique N.* 25: 286-296.
- MEUSEL, H., E. JÄGER & E. WEINERT (1965). *Vergleichende Chorologie der Zentraleuropäische Flora*. Band 1. Fischer.
- MEUSEL, H., E. JÄGER, S. RAUSCHERT & E. WEINERT (1978). *Vergleichende Chorologie der Zentraleuropäische Flora*. Band 2. Fischer.
- MONTSERRAT, J. M. (2002). Draba L. In: VALDÉS, B., M. REJDALI, A. ACHHAL EL KADMIRI, J. L. JURY & J. M. MONTSERRAT (ed.), *Checklist of vascular plants of N Morocco with identification keys* 1: 256. Consejo Superior de Investigaciones Científicas.
- MUÑOZ GARMENDIA, F., C. NAVARRO & C. AEDO (1998). Crataegus L. In: CASTROVIEJO, S. & al. (ed.), *Fl. Iber.* 6: 404-414.
- NIETO FELINER, G. (1995). A neglected Daphne from Northern Africa: D. mauritanica, sp. nov., (Thymelaeaceae). *Anales Jard. Bot. Madrid* 53: 191-197.
- ORTEGA-OLIVENCIA, A., & J. A. DEVESA (2002). Scrophularia L. In: VALDÉS, B., M. REJDALI, A. ACHHAL EL KADMIRI, J. L. JURY & J. M. MONTSERRAT (ed.), *Checklist of vascular plants of N Morocco with identification keys* 2: 560-565. Consejo Superior de Investigaciones Científicas.
- OUHAMMOU, A. (1991). Troisième session extraordinaire de Botanique méditerranéenne; la région de Marrakech (Maroc, 9-16 avril 1988) (suite et fin): 2. Aperçu sur l'étagement de la végétation du bassin de l'Ourika (Haut-Atlas de Marrakech, Maroc). *Bull. Mens. Soc. Linn. Lyon* 60: 401-405.
- OUYAHYA, J. (1999a). Arenaria L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 201-207. Institut Scientifique, Université Mohammed V, Rabat.
- OUYAHYA, J. (1999b). Bufonia L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 223-226. Institut Scientifique, Université Mohammed V, Rabat.
- OUYAHYA, J. (1999c). Minuartia L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 219-223. Institut Scientifique, Université Mohammed V, Rabat.
- OUYAHYA, J. (1999d). Sagina L. In: FENNANE, M., M. IBN TATTOU, J. MATHEZ, A. OUYAHYA & J. EL OUALIDI (ed.), *Flore pratique du Maroc* 1: 218-219. Institut Scientifique, Université Mohammed V, Rabat.
- PELTIER, J. (1977). Contribution à la flore du bassin versant de l'Oued Sous (2^e fascicule). *Bull. Soc. Sci. Nat. Phys. Maroc* 54: 27-32.
- PUJADAS SALVÁ, A. (1993). Thlaspi L. In: CASTROVIEJO, S. & al. (ed.), *Fl. Iber.* 4: 255-264.
- QUÉZEL, P. (1957). *Peuplement végétal des hautes montagnes de l'Afrique du Nord*. Ed. Lechevalier.
- QUÉZEL, P. & S. SANTA (1962). *Nouvelle flore de l'Algérie et des régions désertiques méridionales*. Volume 1. CNRS.
- REJDALI, M. & J. M. MONTSERRAT (2002). Stachys L. In: VALDÉS, B., M. REJDALI, A. ACHHAL EL KADMIRI, J. L. JURY & J. M. MONTSERRAT (ed.), *Checklist of vascular plants of N Morocco with identification keys* 2: 515-518. Consejo Superior de Investigaciones Científicas.
- RICHARDSON, I. B. K. (1972). Scrophularia L. In: TUTIN, T. G. & al. (ed.), *Fl. Eur.* 3: 216-221.

- ROMO, A. M. (1988). *Drabo lutescentis-Violetum minimae*, ass. nova del Grand Atlas Central. *Acta Bot. Barcinon.* 37: 331-333.
- SÁEZ, L., J. M. MONTSERRAT & J. A. ROSSELLÓ (2002). A new subspecies of *Arenaria grandiflora* (Caryophyllaceae) from the Rif Mountains (Northern Morocco). *Folia Geobot.* 37: 339-349.
- SAUVAGE, Ch. & J. VINDT (1954). *Flore du Maroc, analytique, descriptive et illustrée*. Editions Internationales.
- SORIANO, I. (2002). *Veronica L.* In: VALDÉS, B., M. REJDALI, A. ACHHAL EL KADMIRI, J. L. JURY & J. M. MONTSERRAT (ed.), *Checklist of vascular plants of N Morocco with identification keys* 2: 581-585. Consejo Superior de Investigaciones Científicas.
- TALAVERA, S. (1990). *Silene L.* In: CASTROVIEJO, S. & al. (ed.), *Fl. Iber.* 2: 313-406.
- VALDÉS, B. (2002). *Lotus L.* In: VALDÉS, B., M. REJDALI, A. ACHHAL EL KADMIRI, J. L. JURY & J. M. MONTSERRAT (ed.), *Checklist of vascular plants of N Morocco with identification keys* 1: 317-321. Consejo Superior de Investigaciones Científicas.

