

# Chromosome numbers of North African phanerogams.

## X. Plants collected during Iter Mediterraneum V of OPTIMA in Morocco

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### Abstract

Chromosome numbers are reported for 89 taxa belonging to 59 genera of 13 families. Eight reported taxa have not previously been studied cytologically or have chromosome numbers differing from previous reports.

**Key Words:** Flora of Morocco, chromosome counts.

### Introduction

The tenth contribution in this series dealing with cytological investigations in the North African flora provides 123 counts in 85 species out of 13 phanerogam families (for previous contributions see VOGT & OBERPRIELER 1993a, OBERPRIELER & VOGT 1993, HELLWIG & al. 1994, VOGT & OBERPRIELER 1994, KILIAN & al. 1995, OBERPRIELER & VOGT 1996, SCHOLZ & al. 1998, VOGT & OBERPRIELER 2008, and VOGT & OBERPRIELER 2009).

### Material and methods

The seed material used for this study was collected during Iter Mediterraneum V to Morocco organized by the Organization for the Phyto-Taxonomic Investigation of the Mediterranean Area (OPTIMA) in 1992, the corresponding collection number is given as “N° Rec. It.”

For the study of mitosis, root tips were obtained either by growing plants in the Botanic Garden Berlin-Dahlem or by germinating achenes in petri dishes. In both cases root tip meristems were pre-treated with hydroxyquinoline (0.002 molar aqueous solution) for four hours, fixed in 96% ethanol/glacial acetic acid (3:1) and refrigerated. Hydrolysis was performed with 1-2N hydrochloric acid for ten minutes at 60°C. For chromosome staining root tips were squashed in aceto-orcein.

For the study of pollen mother cell (PMC) meiosis, young capitula were fixed in 96% ethanol/glacial acetic acid (3:1) in the field and stored in a refrigerator after return to Ber-

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lin. For chromosome staining several buds of florets were removed from the capitulum, coarsely crushed, and squashed in aceto-orcein.

Voucher specimens of the original collections and of plants cultivated in the Botanic Garden are deposited in B.

To assess the existence of published chromosome numbers in the taxa studied, the online databases GOLDBLATT & JOHNSON (1979+), WATANABE (2002+) and ANTHOS (2006+) were consulted. The families, genera and species are listed in alphabetical order. Taxa marked with a single asterisk (\*) have been counted for the first time. The chromosome number of taxa marked with a double asterisk (\*\*) is deviating from former reports.

## Results and discussion

### GYMNOSPERMAE

#### Pinaceae

\**Abies marocana* TRAB. [≡ *Abies pinsapo* subsp. *marocana* (TRAB.) EMB. & MAIRE; ≡ *Abies pinsapo* var. *marocana* (TRAB.) CEBALLOS & MARTÍN BOL.] –  $2n = 24$  (Fig. 1).

Morocco, West Rif Mountains, Tétouan, c. 38 km from Chefchaouèn, 14 km above Bab Taza on track to Jbel Talamsantane, mixed forest of *Abies marocana* and *Cedrus atlantica*, limestone, 1765 m, 35°09'N, 5°12'W, 26.6.1992 B. Valdés, R. Vogt 9665, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 64-2228 [B].

This is the first report of a chromosome number for this species native to the surroundings of Chaouène (Chefchaouene) in the western part of the Rif Mountains. The chromosome number of  $2n = 24$  is common in the genus *Abies* and has once been reported for the closely related Andalusian endemic *Abies pinsapo* by FERNÁNDEZ CASAS (1977).

### ANGIOSPERMAE

#### Caryophyllaceae

*Paronychia capitata* (L.) LAM. subsp. *capitata* –  $2n = 36$  (Fig. 2).

Morocco, Aknoul, Taza, c. 14 km E from Boured on road to Taza, slaty mudstones, 1350 m, 34°44'N, 4°01'W, 17.6.1992 B. Valdés, R. Vogt 9519, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 35-1220 [B].

This is the first count for this species based on Moroccan plant material and it is in agreement with the former report by DIOSDADO & PASTOR (1994) who studied plants of Spanish origin.

#### Cistaceae

*Halimium lasianthum* (LAM.) SPACH subsp. *lasianthum* –  $2n = 18$  (Fig. 3).

Morocco, Central Rif Mountains, Fès, c. 40 km from Taounate on road to Ketama, Ikaouèn, 1000 m, 34°48'N, 4°38'W, 19.6.1992 B. Valdés, R. Vogt 9565, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Pec-

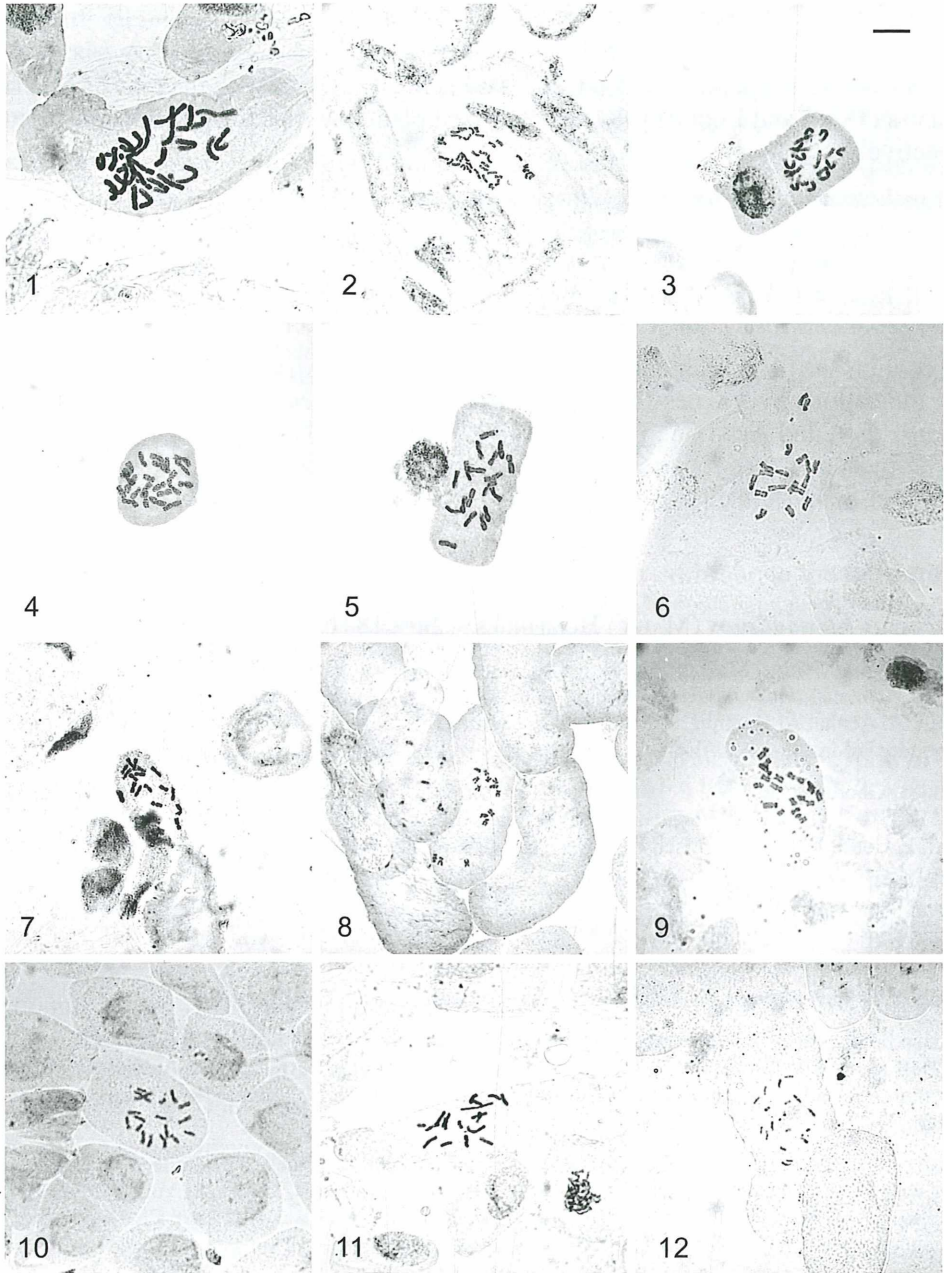


Fig. 1–12: Metaphases of root-tip mitoses – (1) *Abies marocana*,  $2n = 24$  (64-2228); (2) *Paronychia capitata* subsp. *capitata*,  $2n = 36$  (35-1220); (3) *Halimium lasianthum* subsp. *lasianthum*,  $2n = 18$  (42-1410); (4) *Helianthemum cinereum*,  $2n = 22$  (35-1182b); (5) *Anacyclus homogamos*,  $2n = 18$  (10-462b); (6) *Anacyclus pyrethrum* var. *pyrethrum*,  $2n = 18$  (16-652); (7) *Andryala integrifolia*,  $2n = 18$  (51-1665); (8) *Asteriscus aquaticus*,  $2n = 14$  (53-1775); (9) *Atractylis cancellata*,  $2n = 20$  (2-74); (10) *Bellis microcephala*,  $2n = 18$  (23-844); (11) *Bellis perennis*,  $2n = 18$  (12-520); (12) *Calendula maroccana*,  $2n = 18$  (28-1014). – Scale bar: 10  $\mu\text{m}$ .

cenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 42-1410 [B].

This first count in a population from N Africa is in accordance with the reports by LEITÃO & ALVES (1976) and LUQUE (1984) who studied plant material from Spain and Portugal, respectively.

***Helianthemum cinereum* (CAV.) PERS.** –  $2n = 22$  (Fig. 4).

Morocco, Aknoul, Taza, c. 14 km E from Boured on road to Taza, slatey mudstones, 1350 m, 34°44'N, 4°01'W, 17.6.1992 B. Valdés, R. Vogt 9512, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 35-1182b [B].

Our count is the first chromosome number report from N Africa for this taxon and agrees with indications by VALDÉS-BERMEJO (1981, sub *H. cinereum* subsp. *cinereum* and subsp. *rubellum*) and ARISTA & TALAVERA (1990) for Spain. The deviating number of  $2n = 20$  chromosomes was reported by LÖVE & KJELLQVIST (1974) and SANCHEZ ANTA & al. (1985) for Spanish plants.

## Compositae

***Anacyclus homogamos* (MAIRE) HUMPHRIES** –  $2n = 18$  (Fig. 5).

Morocco, Middle Atlas, Meknès, c. 22 km from Azrou - Midelt road, on minor road to Aïn Leuh, *Quercus ilex* and *Viburnum tinus* woodland, 1450 m, 32°25'N, 5°12'W, 11.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 10-0462b [B].

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992 leg. B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0779 [B].

Our counts agree with former reports by HUMPHRIES (1979) and VOGT & OBERPRIELER (1993a).

***Anacyclus pyrethrum* (L.) LINK var. *pyrethrum*** –  $2n = 18$  (Fig. 6).

Morocco, High Atlas, Qsar-Es-Souq, c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt 9397, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 07-0355 [B].

Morocco, Middle Atlas, Meknès, c. 19 km from Azrou on road to Midelt, Timahdite, volcanic cone and crater with loose volcanic soil, 1900 m, 33°19'N, 5°07'W, 12.6.1992 B. Valdés, R. Vogt 9437b, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 16-0652 [B].

Our counts confirm former reports from Morocco indexed in GOLDBLATT & JOHNSON (1979+) and WATANABE (2002+).

***Andryala integrifolia* L.** –  $2n = 18$  (Fig. 7).

Morocco, Ouezzane. Tétouan; c. 29 km from Chefchaouèn on road to Ouazzane, Douar-El-Kob, 115 m, 35°02'N, 5°26'W, 23.6.1992 [N° Rec. It. 51-1665], leg. B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark [B].

Our report agrees with previous counts from N Africa (VOGT & OBERPRIELER 1993a & 1994; PARRA & al. 1999) and from several other Mediterranean countries indexed in GOLDBLATT & JOHNSON (1979+) and WATANABE (2002+). For discussion see VOGT & OBERPRIELER (1993a).

***Asteriscus aquaticus* (L.) LESS.** [≡ *Nauplius aquaticus* (L.) CASS.] – 2n = 14 (Fig. 8).

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0109 [B].

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0791 [B].

Morocco, Ouezzane, Kenitra, c. 16 km from Ouazzane on road to Chechaouèn, 110 m, 34°55'N, 5°32'W, 23.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 53-1775 [B].

Our counts in plants from three N Moroccan populations corroborate the only former count based on N African plant material cited in VOGT & OBERPRIELER (2008) and is in accordance with reports on materials from Bulgaria, Cyprus, Greece, Italy and the Canary Islands cited in VOGT & OBERPRIELER (1993b, sub *Nauplius aquaticus* & 2008).

***Atractylis cancellata* L.** – 2n = 20 (Fig. 9).

Morocco, Forêt de la Mamora, Meknès, c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 B. Valdés, R. Vogt 9365, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 02-0074 [B].

Morocco, Guercif area, Taza, c. 52 km from Taza, 13 km to Guercif, semi-arid, stony area, planted area with *Schinus molle* and *Eucalyptus*, 520 m, 34°12'N, 3°27'W, 14.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 20-0806 [B].

Our counts in two N Moroccan populations of this widespread annual weed agree with previous counts in populations from the High Atlas mountains by HUMPHRIES & al. (1978) and VOGT & OBERPRIELER (1993a). They are also in accordance with reports from Italy (BARTOLO & al. 1977) and the Canary Islands (BORGÉN 1969).

***Bellis microcephala* LANGE** [≡ *Bellis annua* subsp. *microcephala* (LANGE) NYMAN] – 2n = 18 (Fig. 10).

Morocco, Kert Ganc, Taza, 4 km from Aïn Zorah on road from Saka, limestone gorge, 890 m, 34°38'N, 3°31'W, 14.6.1992 B. Valdés, R. Vogt 9455, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 23-0844 [B].

Our count agrees with the only former report for this taxon by VOGT & OBERPRIELER (2008).

***Bellis perennis* L.** – 2n = 18 (Fig. 11).

Morocco, Middle Atlas, Meknès, c. 14 km from Azrou - Midelt road, on minor road to Aïn Leuh, *Quercus ilex* woodland with open grassy clearing, 1550 m, 32°22'N, 5°15'W, 11.6.1992 B. Valdés, R. Vogt 9419, S.L.

Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 12-0520 [B].

This seems to be the first record of a chromosome number from N Africa for this common weed. It agrees with previous counts on materials from many countries listed in GOLDBLATT & JOHNSON (1979+) and WATANABE (2002+).

***Bellis sylvestris*** CYR. –  $2n = 54$ .

Morocco, Tazzeka, Taza, around summit of Jbel Tazzeka, *Cedrus* forest with clearings on acid rock, 1960 m, 34°05'N, 4°11'W, 16.6.1992, leg. R. Vogt 9493 & Ch. Oberprieler [B].

This seems to be the first record of a chromosome number from N Africa for this taxon and it agrees with previous counts on materials from several European countries listed in GOLDBLATT & JOHNSON (1979+) and WATANABE (2002+).

***Calendula arvensis*** (VAILL.) L. –  $2n = 44$ .

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0797 [B].

The report agrees with previous counts cited and discussed in OBERPRIELER & VOGT (1993a, 2008) and VOGT & APARICIO (1999).

***Calendula maroccana*** (BALL) B. D. JACKS. –  $2n = 18$  (Fig. 12).

Morocco, Tazzeka, Taza, c. 6 km SE of Sidi-Abdallah-des-Rhiata on minor road to Bab-Bou-Idir, around Jbel Tazzeka, limestone gorge, W-facing slopes and cliffs with *Olea europaea* and *Ceratonia siliqua*, 340 m, 34°09'N, 4°19'W, 15.6.1992 B. Valdés, R. Vogt 9479, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 28-1014 [B].

Our result confirms the former report based on plants from the Anti-Atlas in S Morocco by VOGT & OBERPRIELER (1993a). VALDÉS & PARRA (1997) found  $2n = 32$  chromosomes in plants from NE Morocco.

***Calendula stellata*** CAV. –  $2n = 14$  (Fig. 13).

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt 9366, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0086 [B].

The report agrees with previous counts (for discussion see VOGT & OBERPRIELER 2008).

***Centaurea pullata*** L. –  $2n = 22$  (Fig. 14).

Morocco, Ouezzane, Kenitra, c. 21 km from Ouazzane on road to Souk-el-Arba-du-Rharb, 140 m, 34°47'N, 5°45'W, 23.6.1992 B. Valdés, R. Vogt 9618, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 54-1798 [B].

This result agrees with previous counts (for discussion see HELLWIG & al. 1994).

\****Centaurea pullata*** subsp. ***claryi*** (DEBEAUX) BATT. –  $2n = 22$  (Fig. 15).

Morocco, High Atlas, Qsar-Es-Souq, c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 07-0357 [B].

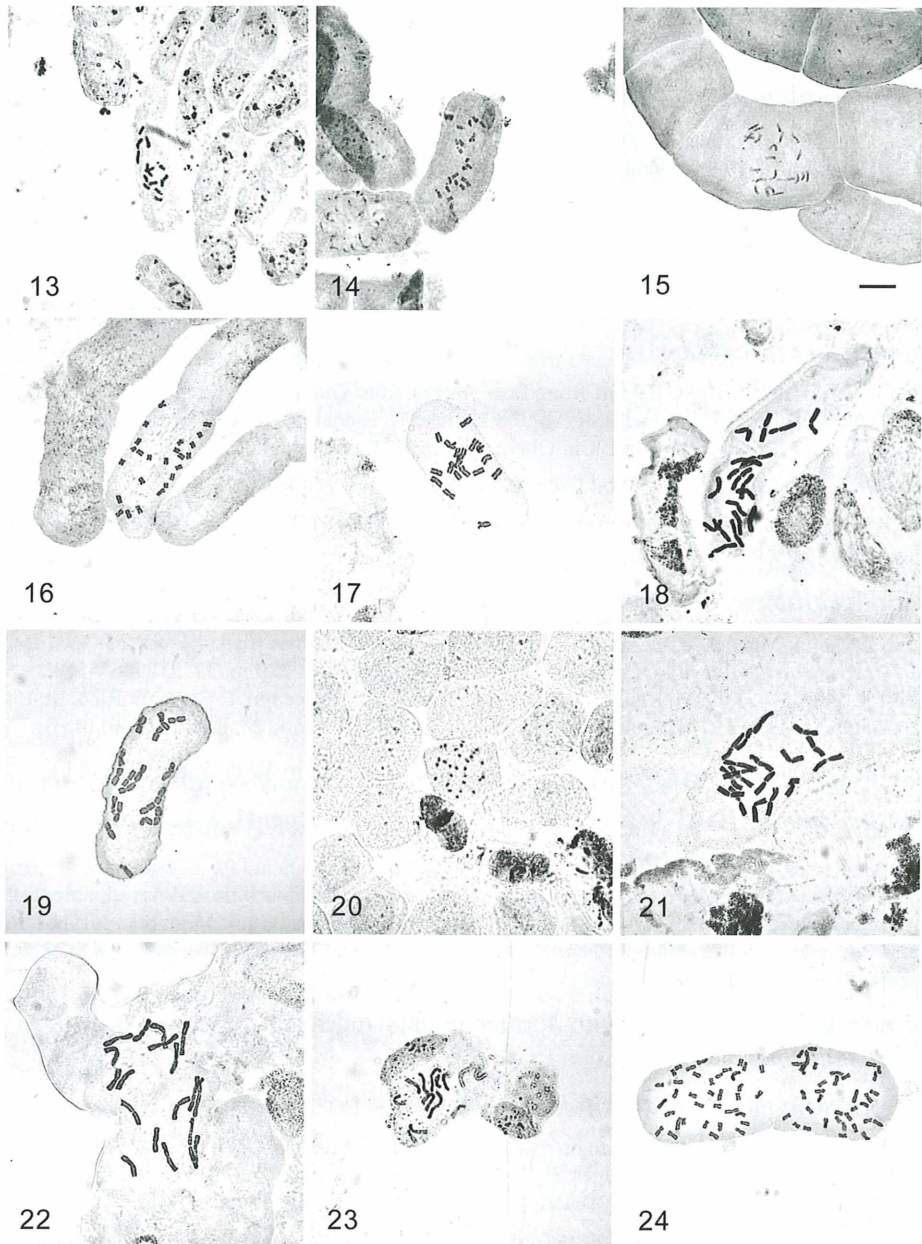


Fig. 13–24: Metaphases of root-tip mitoses – (13) *Calendula stellata*,  $2n = 14$  (3-86); (14) *Centaurea pullata*,  $2n = 22$  (54-1798); (15) *Centaurea pullata* subsp. *claryi*,  $2n = 22$  (7-357); (16) *Centaurea sulphurea*,  $2n = 24$  (43-1483); (17) *Chamaemelum fuscatum*,  $2n = 18$  (19-799); (18) *Cladanthus arabicus*,  $2n = 18$  (3-114); (19) *Cladanthus mixtus*,  $2n = 18$  (13-572); (20) *Crupina crupinastrum*,  $2n = 28$  (61-2066); (21) *Glossopappus macrotus* var. *hesperius*,  $2n = 18$  (51-1707); (22) *Glossopappus macrotus* subsp. *macrotus*,  $2n = 18$  (41-1384); (23) *Hedyppnois rhagadioloides*,  $2n = 13$  (23-847); (24) *Hieracium pseudopilosella* subsp. *atlantis*,  $2n = 36$  (Vogt 9587 & C. Oberprieler). – Scale bar: 10  $\mu\text{m}$ .

This seems to be the first count for this subspecies of *Centaurea pullata* characterised by pale yellow florets and a perennial life form.

***Centaurea sulphurea* WILLD. – 2n = 24 (Fig. 16).**

Morocco, Central Rif Mountains, Fès, c. 15 km SW of Ketama on road to Taounate and Fès, 1000 m, 34°53'N, 4°38'W, 19.6.1992 B. Valdés, R. Vogt 9570, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 43-1483 [B].

Our count is in accordance with the former reports based on N African plant materials given by HUMPHRIES & al. (1978), HELLOWIG & al. (1994), and VALDÉS & PARRA (1997).

***Chamaemelum fuscatum* (BROT.) VASC. – 2n = 18 (Fig. 17).**

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0799 [B].

The report agrees with previous counts based on N African plants reported by VOGT & OBERPRIELER (1993a & 2008).

***Cladanthus arabicus* (L.) CASS. – 2n = 18 (Fig. 18).**

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0114 [B].

Our count is in accordance with previous counts indexed in WATANABE (2002+).

***Cladanthus mixtus* (L.) CHEVALL. [≡ *Chamaemelum mixtum* (L.) ALL.] – 2n = 18 (Fig. 19).**

Morocco, Middle Atlas, Meknès, c. 4 km from Aïn-Leuh on road to Tiouririne and Azrou, amongst rocky outcrops in cultivated area, 1150 m, 32°02'N, 5°21'W, 11.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 13-0572 [B].

Our count is in accordance with former counts indexed in WATANABE (2002+, sub *Chamaemelum mixtum*).

***Crepis vesicaria* subsp. *taraxacifolia* (THUILL.) THELL. – 2n = 16.**

Morocco, Meknès, 15 km from El Hajeb on road to Ifrane, Forêt de Jaaba, *Quercus canariensis* wood, 1400 m, 33°36'N, 5°17'W, 9.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 04-0186 [B].

Our report agrees with previous counts (see VOGT & OBERPRIELER 1994 & 2008).

***Crupina crupinastrum* (MORIS) VIS. – 2n = 28 (Fig. 20).**

Morocco, West Rif Mountains, Tétouan, c. 40 km from Chefchaouèn, 10 km above Talenbote on route to Jbel Tassaot, mixed forest of *Quercus ilex* and *Q. alpestris*, 1565 m, 35°16'N, 5°08'W, 25.6.1992 B. Valdés, R. Vogt 9643, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 61-2066 [B].

The report agrees with previous counts (see VOGT & APARICIO 1999).



***Glebionis coronaria* (L.) SPACH** ( $\equiv$  *Chrysanthemum coronarium* L.) –  $2n = 18$ .

Morocco, Forêt de la Mamora, Meknès, c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 B. Valdés, R. Vogt 9363, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 02-0068 [B].

Our count is in accordance with the numerous former reports (mostly sub *Chrysanthemum coronarium*) on this widespread weed indexed in GOLDBLATT & JOHNSON (1979+) and WATANABE (2002+).

***Glossopappus macrotus* (DURIEU) BRIQ. & CAVILL.** –  $2n = 18$ .

Morocco, Tazzeka, Taza, c. 6 km SE of Sidi-Abdallah-des-Rhiata on minor road to Bab-Bou-Idir, around Jbel Tazzeka, limestone gorge, W-facing slopes and cliffs with *Olea europaea* and *Ceratonia siliqua*, 340 m, 34°09'N, 4°19'W, 15.6.1992 B. Valdés, R. Vogt 9481, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 28-1018 [B].

Our count agrees with previous counts (for discussion see VOGT & OBERPRIELER 2008).

***Glossopappus macrotus* var. *hesperius* MAIRE** –  $2n = 18$  (Fig. 21).

Morocco, Ouezzane, Tétouan, c. 29 km from Chefchaouèn on road to Ouazzane, Douar-El-Kob, 115 m, 35°02'N, 5°26'W, 23.6.1992 B. Valdés, R. Vogt 9601, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 51-1707 [B].

Morocco, Aknoul, Taza, c. 50 km due NNW of Taza at junction of roads from Tahar-Souk, Boured & Taineste, dry roadside banks and fiels margins, 855 m, 34°39'N, 4°13'W, 18.6.1992 R. Vogt 9563 & Ch. Oberprieler [B].

Our counts agree with previous counts (for discussion see VOGT & OBERPRIELER 2008).

***Glossopappus macrotus* (DURIEU) BRIQ. & CAVILL. var. *macrotus*** –  $2n = 18$  (Fig. 22).

Morocco, Aknoul, Taza, c. 50 km due NNW of Taza at junction of roads from Tahar-Souk, Boured & Taineste, dry roadside banks and fiels margins, 855 m, 34°39'N, 4°13'W, 18.6.1992 B. Valdés, R. Vogt 9555, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 41-1384 [B].

Our count agrees with previous counts (for discussion see VOGT & OBERPRIELER 2008).

***Hedypnois rhagadioloides* (L.) F. W. SCHMIDT** [= *Hedypnois cretica* (L.) DUM.-COURS.] –  $2n = 13$ , 14 (Fig. 23).

Morocco, Middle Atlas, Meknès, c. 22 km from Azrou - Midelt road, on minor road to Aïn Leuh, *Quercus ilex* and *Viburnum tinus* woodland, 1450 m, 32°25'N, 5°12'W, 11.6.1992 B. Valdés, R. Vogt 9406, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 10-0459a [B] –  $2n = 13$ .

Morocco, Kert Ganc, Taza, 4 km from Aïn Zorah on road from Saka, limestone gorge, 890 m, 34°38'N, 3°31'W, 14.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 23-0847 [B] –  $2n = 13$ .

Morocco, Aknoul, Taza, c. 42 km due NNW of Taza, Tahar-Souk, 9 km from Taineste, 1000 m, 34°36'N, 4°05'W, 18.6.1992 B. Valdés, R. Vogt 9552, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 40-1372 [B] –  $2n = 13$ .

Morocco, West Rif Mountains, Tétouan, c. 37 km from Chefchaouèn, 7 km above Talenbote on route to Jbel Tassaot, cultivated fields on limestone, 1195 m, 35°17'N, 5°08'W, 25.6.1992 B. Valdés, R. Vogt, S.L. Jury,

M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 62-2130 [B] – 2n = 14.

Our reports agree with previous counts (for discussion see VOGT & OBERPRIELER 1993a & 2008).

***Hertia maroccana*** (BATT.) MAIRE – 2n = 20.

Morocco, High Atlas. Qsar-Es-Souq; outskirts of Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1500 m, 32°04'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt 9389, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 06-0284 [B].

Our count in this Moroccan endemic corroborates the only former reports by QUÉZEL (1957) and HUMPHRIES & al. (1978).

***Hieracium pseudopilosella*** subsp. ***atlantis*** ZAHN [ $\equiv$  *Pilosella pseudopilosella* subsp. *atlantis* (ZAHN) ined.] – 2n = 36 (Fig. 24).

Morocco, Central Rif Mountains, Al Hoceima, Ketama, 1 km SW of Tleta Ketama, 15 km to top of Jbel Tidirine, 2200 m, 34°52'N, 4°30'W, 20.6.1992 R. Vogt 9587 & Ch. Oberprieler [B].

Our report agrees with the former reports by MERXMÜLLER (1975) and GALLAND (1991). For discussion see VOGT & OBERPRIELER (1993a).

***Hyoseris radiata*** L. – 2n = 16 (Fig. 25).

Morocco, Middle Atlas, Meknès, c. 22 km from Azrou - Midelt road, on minor road to Aïn Leuh, *Quercus ilex* and *Viburnum tinus* woodland, 1450 m, 32°25'N, 5°12'W, 11.6.1992 B. Valdés, R. Vogt 9408, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 10-0466b [B].

Morocco, Tazzeka, Taza, around summit of Jbel Tazzeka, *Cedrus* forest with clearings on acid rock, 1960 m, 34°05'N, 4°11'W, 16.6.1992 B. Valdés, R. Vogt 9485, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 29-1035 [B].

Our counts are in accordance with the numerous former reports on this widespread weed indexed in GOLDBLATT & JOHNSON (1979+) and WATANABE (2002+).

***Hypochaeris achyrophorus*** L. – 2n = 12 (Fig. 26).

Morocco, Aknoul, Taza, c. 14 km E from Boured on road to Taza, slaty mudstones, 1350 m, 34°44'N, 4°01'W, 17.6.1992 R. Vogt 9522 & Ch. Oberprieler [B].

Morocco, Aknoul, Taza, c. 10 km from Aknoul on road to Boured, Col du Nador, 1340 m, 34°43'N, 3°56'W, 17.6.1992 B. Valdés, R. Vogt 9526, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 37-1258 [B].

The report agrees with previous counts (see OBERPRIELER & VOGT 2002 and WATANABE 2002+).

***Hypochaeris laevigata*** (L.) CES., PASSER & GIBELLI – 2n = 12 (Fig. 27).

Morocco, Tazzeka, Taza, c. 11 km from Taza, on minor road S to Ras-El-Ma and Jbel Tazzeka, hillsides and bank of oued, 745 m, 34°09'N, 4°01'W, 15.6.1992 B. Valdés, R. Vogt 9461, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 25-0883b; cultivated in the Botanic Garden Berlin-Dahlem, 17.8.1993 R. Vogt & Ch. Oberprieler s.n. [B].

Morocco, Tazzeka, Taza, around summit of Jbel Tazzeka, *Cedrus* forest with clearings on acid rock, 1960 m, 34°05'N, 4°11'W, 16.6.1992 R. Vogt 9495 & Ch. Oberprieler [B] – n = 6.

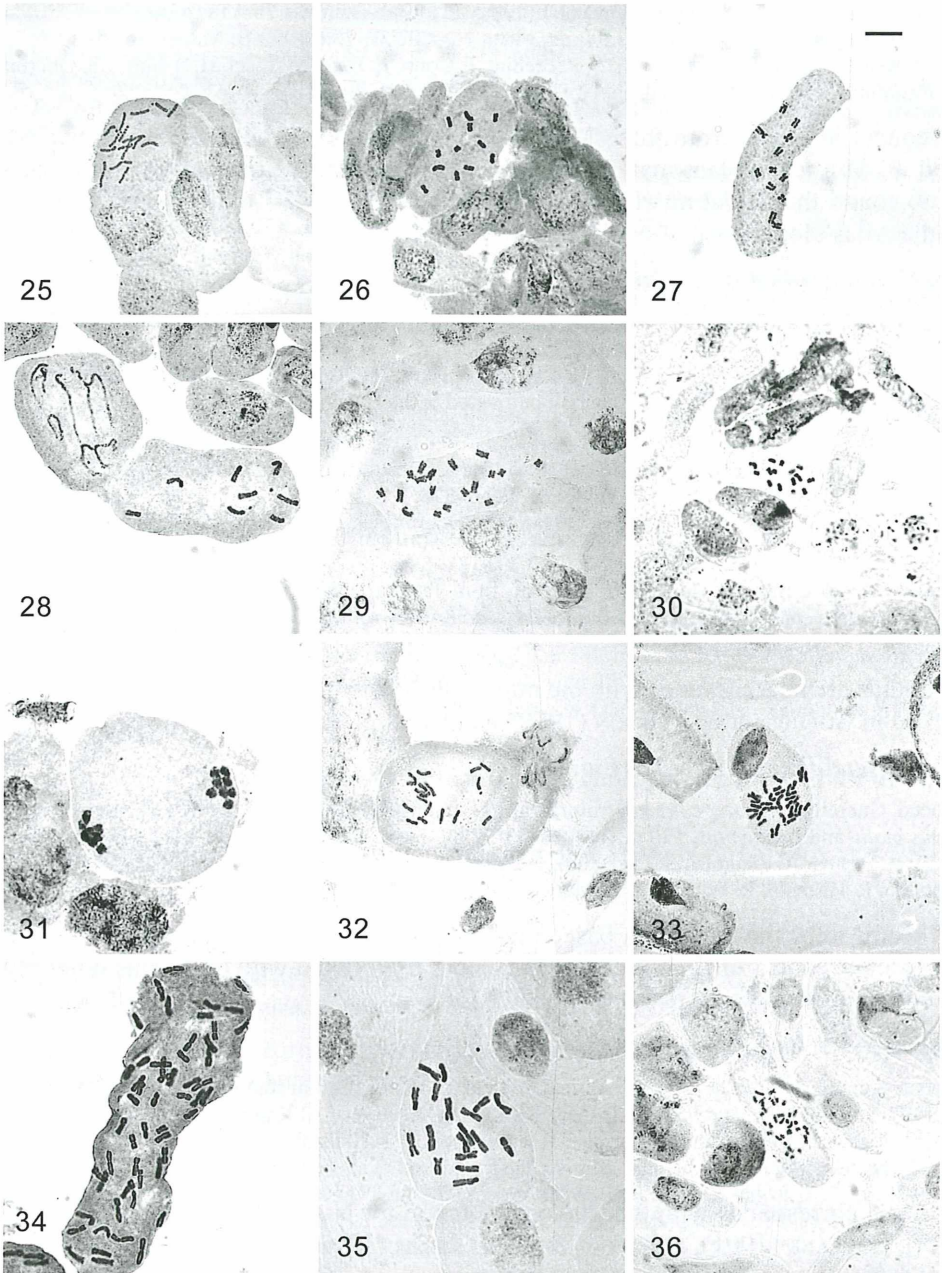


Fig. 25–36: Metaphases of root-tip mitoses and PMC meiosis – (25) *Hyoseris radiata*,  $2n = 16$  (29-1035); (26) *Hypochaeris achyrophorus*,  $2n = 12$  (Vogt 9522 & C. Oberprieler); (27) *Hypochaeris laevigata*,  $2n = 12$  (25-883b); (28) *Hypochaeris radicata*,  $2n = 8$  (1-8a); (29) *Lactuca serriola*,  $2n = 18$  (20-807); (30) *Lactuca tenerrima*,  $2n = 16$  (37-1252); (31) *Launaea fragilis*,  $n = 8$  (7-352); (32) *Launaea lanifera*,  $2n = 18$  (34-1161); (33) *Launaea nudicaulis*,  $2n = 36$  (19-763); (34) *Leucanthemopsis longipectinata*,  $2n = 54$  (45-1554); (35) *Nivellea nivellei*,  $2n = 18$  (12-515a); (36) *Onopordum acaulon*,  $2n = 34$  (7-345). – Scale bar: 10  $\mu\text{m}$ .

Morocco, Tazzeka, Taza, 18 km from Taza on minor road to Bab-Bou-Idir, Jbel Tazzeka, above Sidi Majbar, limestone rocks under *Quercus ilex*, 1200 m, 34°08'N, 4°02'W, 15.6.1992 B. Valdés, R. Vogt 9467, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 26-0933 [B].

Our counts in plants from three Moroccan populations corroborate the former counts based on Moroccan plant material cited in OBERPRIELER & VOGT (1993). VALDÉS & al. (1999) found the deviating chromosome number of  $2n = 14$  in a population from the Middle Atlas mountains.

***Hypochoeris radicata* L.** –  $2n = 8$  (Fig. 28).

Morocco, Forêt de la Mamora, Kenitra, 12 km from Rabat on road to Meknès, Forêt de la Marmora, *Quercus suber* forest, 80 m, 34°02'N, 6°42'W, 9.6.1992 B. Valdés, R. Vogt 9354, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 01-0008a [B]; cultivated in the Botanic Garden Berlin-Dahlem, 7.6.1993 R. Vogt & Ch. Oberprieler s.n. [B].

Morocco, Meknès, 15 km from El Hajeb, road to Ifrane, Forêt de Jaaba, *Quercus canariensis* wood, 1400 m, 33°36'N, 5°17'W, 9.6.1992 leg. B. Valdés, R. Vogt 9378, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 04-0167 [B].

Morocco, Tazzeka, Bab-Bou-Idir, Taza, c. 42 km from Taza on minor road to Sidi Abdallah, around Jbel Tazzeka, *Quercus suber* and *Q. canariensis* forest on acid slaty schist, 1200 m, 34°03'N, 4°12'W, 15.6.1992 R. Vogt 9475 & Ch. Oberprieler [B].

Our counts are in accordance with the numerous former reports on this widespread weed indexed in GOLDBLATT & JOHNSON (1979+) and WATANABE (2002+).

***Lactuca serriola* L.** –  $2n = 18$  (Fig. 29).

Morocco, Guercif area, Taza, c. 52 km from Taza, 13 km to Guercif, semi-arid, stony area, planted area with *Schinus molle* and *Eucalyptus*, 520 m, 34°12'N, 3°27'W, 14.6.1992 B. Valdés, R. Vogt 9452, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 20-0807 [B].

This seems to be the first count based on Moroccan plant material and it agrees with the only former report from N Africa (KAMEL 2004, Egypt) and with numerous other reports from other areas indexed in WATANABE (2002+).

***Lactuca tenerrima* POURR.** –  $2n = 16$  (Fig. 30).

Morocco, Aknoul, Taza, c. 10 km from Aknoul on road to Boured, Col du Nador, 1340 m, 34°43'N, 3°56'W, 17.6.1992 B. Valdés, R. Vogt 9524, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 37-1252 [B].

Our result corresponds with reports for this taxon for N Africa cited in HUMPHRIES & al. (1978), GALLAND (1991), and VOGT & OBERPRIELER (1993a & 1994).

***Launaea fragilis* (Asso) Pau** –  $n = 8$  (Fig. 31).

Morocco, High Atlas, Qsar-Es-Souq, c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt 9395, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 07-0352 [B].

This report agrees with previous counts (for discussion see KILIAN & al. 1995, sub *Launaea resedifolia*).

***Launaea lanifera* PAU (= *Launaea acanthoclada* MAIRE) – 2n = 18 (Fig. 32).**

Morocco, High Atlas, Qsar-Es-Souq, outskirts of Midelt, on track to Cirque du Jaffar, Jbel Ayachi, 1500 m, 32°04'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt 9386, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 06-0270 [B] – n = 9.

Morocco, Aknoul, Taza, c. 37 km from Taza on road to Nador, S of Dar-Caïd-Medboh, steep open mudstone and marl hills, 900 m, 34°26'N, 3°54'W, 17.6.1992 B. Valdés, R. Vogt 9509, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 34-1161 [B].

This number counted in two populations agrees with previous counts (for discussion see KILIAN & al. 1995).

***Launaea nudicaulis* (L.) HOOK. f. – 2n = 36 (Fig. 33).**

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992 B. Valdés, R. Vogt 9447, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0763 [B].

The tetraploid cytotype of this S Mediterranean-Saharo-Arabian perennial herb has been reported for the first time by KILIAN & al. (1995).

***Leucanthemopsis longipectinata* (FONT QUER) HEYWOOD – 2n = 54 (Fig. 34).**

Morocco, Central Rif Mountains, Al Hoceima, Ketama, 1 km SW of Tleta Ketama, 15 km to top of Jbel Tidirine, 2200 m, 34°52'N, 4°30'W, 20.6.1992 B. Valdés, R. Vogt 9580, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 45-1554 [B].

Our count agrees with the only former indication of a chromosome number for this taxon endemic to the Moroccan Rif Mountains by WILCOX (in HEYWOOD 1975).

***Nivellea nivellei* (BRAUN-BL. & MAIRE) B. H. WILCOX, BREMER & HUMPHRIES – 2n = 18 (Fig. 35)**

Morocco, Middle Atlas, Meknès, c. 14km from Azrou - Midelt road, on minor road to Aïn Leuh, *Quercus ilex* woodland with open grassy clearing, 1550 m, 32°22'N, 5°15'W, 11.6.1992 B. Valdés, R. Vogt 9418, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 12-0515a [B].

Our result agrees with the former reports based on authentic plant material of the Moroccan endemic by VOGT & OBERPRIELER (1993a, 1994, 1996).

***Notobasis syriaca* (L.) CASS. – 2n = 34.**

Morocco, West Rif Mountains, Tétouan, c. 37 km from Chefchaouèn, 7 km above Talenbote on route to Jbel Tassaot, cultivated fields on limestone, 1195 m, 35°17'N, 5°08'W, 25.6.1992 B. Valdés, R. Vogt 9649, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 62-2133 [B].

This is the second report for this Mediterranean weed based on Moroccan plants.

***Onopordum acaulon* L. – 2n = 34 (Fig. 36).**

Morocco, High Atlas, Qsar-Es-Souq, c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt 9392, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 07-0345 [B].

Our count of  $2n = 34$  chromosomes confirms the only former one based on N African plants by VOGT & OBERPRIELER (2008) and agrees with the previous counts by FERNÁNDEZ CASAS & PUECHE (1978) and LUQUE & DÍAZ LIFANTE (1991) who studied plant material of Spanish origin.

***Otospermum glabrum*** (LAG.) WILLK. –  $2n = 18$  (Fig. 37).

Morocco, Ouezzane, Kenitra, c. 16 km from Ouazzane on road to Chechaouèn, 110 m, 34°55'N, 5°32'W, 23.6.1992 R. Vogt & Ch. Oberprieler [B].

Morocco, Ouezzane, Kenitra, c. 21 km from Ouazzane on road to Souk-el-Arba-du-Rharb, 140 m, 34°47'N, 5°45'W, 23.6.1992 B. Valdés, R. Vogt 9616, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 54-1791 [B].

Our counts in two Moroccan populations agree with previous counts from N Africa and the Iberian peninsula cited in VOGT & OBERPRIELER (1993a & 1994) while GALLEGO MARTÍN & al. (1984) found a tetraploid population with  $2n = 36$  chromosomes in southern Spain.

\****Pallenis cuspidata*** subsp. ***canescens*** (MAIRE) GREUTER [ $\equiv$  *Asteriscus cuspidatus* subsp. *canescens* (MAIRE) AURICH & PODLECH] –  $2n = 10$ .

Morocco, High Atlas, Qsar-Es-Souq, c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt 9396, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 07-0354 [B].

This seems to be the first report of a chromosome number for this taxon endemic to NW Africa (Algeria and Morocco).

***Pallenis maritima*** (L.) GREUTER [ $\equiv$  *Asteriscus maritimus* (L.) LESS.] –  $2n = 12$  (Fig. 38).

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0800 [B].

Morocco, Kert Ganc, Taza, 4 km from Aïn Zorah on road from Saka, limestone gorge, 890 m, 34°38'N, 3°31'W, 14.6.1992 B. Valdés, R. Vogt 9456, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 23-0845 [B].

These first counts based on plants from Moroccan populations are in accordance with former reports sub *Asteriscus maritimus* from Algeria (WIKLUND 1985), Portugal (FERNANDES & QUEIRÓS 1971; QUEIRÓS 1973), and Spain (BJORKQVIST & al. 1969; RUÍZ DE CLAVIJO Y JIMÉNEZ 1988; UBERA 1980).

***Pallenis spinosa*** subsp. ***maroccana*** (AURICH & PODLECH) GREUTER [ $\equiv$  *Asteriscus spinosus* subsp. *maroccanus* AURICH & PODLECH] –  $2n = 10$  (Fig. 39).

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt 9369, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0093 [B].

Morocco, Ouezzane, Tétouan, c. 29 km from Chefchaouèn on road to Ouazzane, Douar-El-Kob, 115 m, 35°02'N, 5°26'W, 23.6.1992 R. Vogt 9611 & Ch. Oberprieler [B].

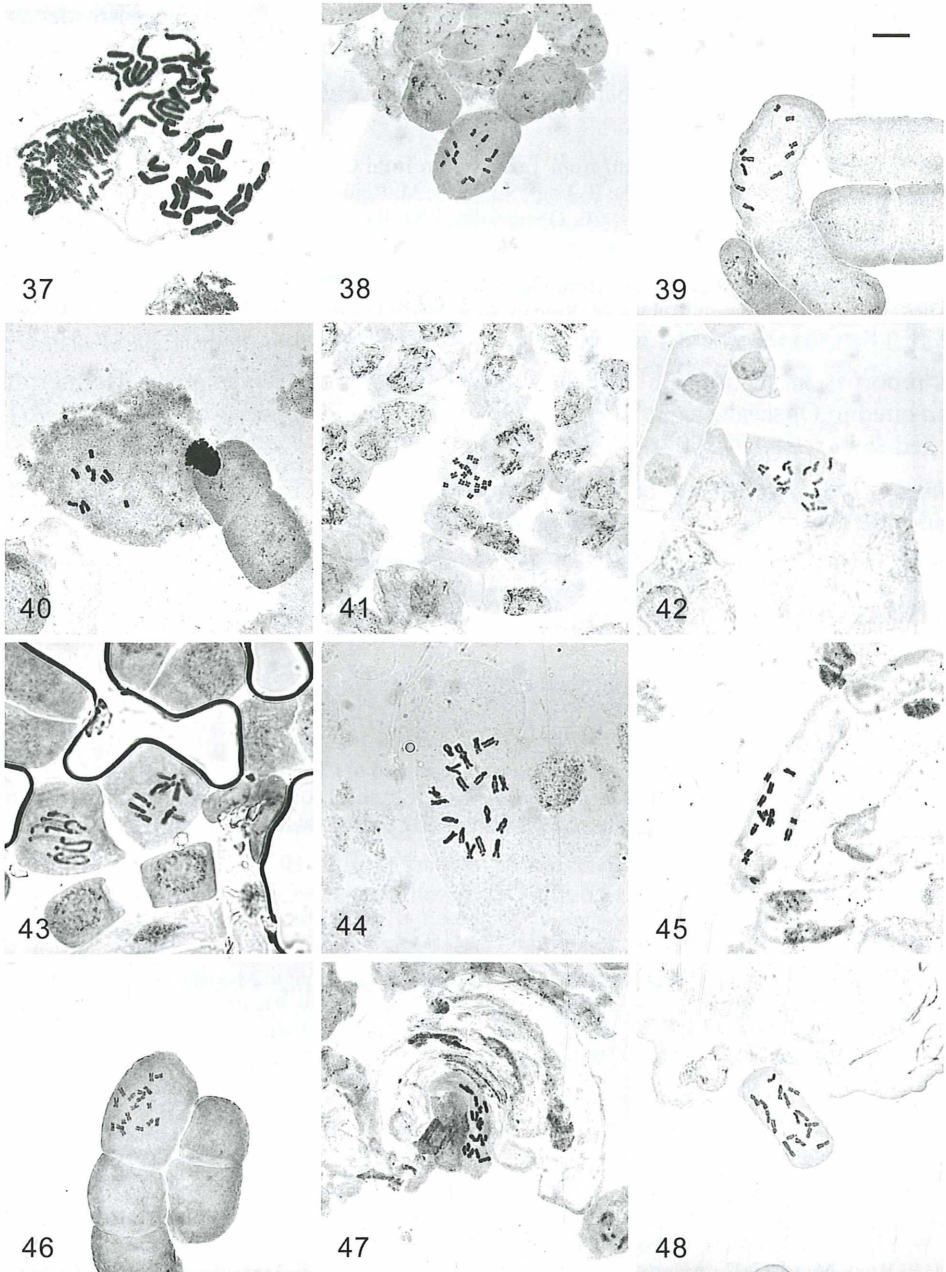


Fig. 37–48: Metaphases of root-tip mitoses – (37) *Otospermum glabrum*,  $2n = 18$  (54-1791); (38) *Pallenis maritima*,  $2n = 12$  (23-845); (39) *Pallenis spinosa* subsp. *maroccana*,  $2n = 10$  (Vogt 9611 & C. Oberprieler); (40) *Pallenis spinosa* subsp. *spinosa*,  $2n = 10$  (19-796); (41) *Phagnalum calycinum* subsp. *caroli-pau*,  $2n = 18$  (43-1488); (42) *Phagnalon saxatile*,  $2n = 18$  (2-45); (43) *Picris cupuligera*,  $2n = 10$  (2-72); (44) *Picris hispanica*,  $2n = 20$  (16-625); (45) *Podospermum laciniatum*,  $2n = 14$  (4-174); (46) *Pulicaria arabica* subsp. *hispanica*,  $2n = 18$  (2-54); (47) *Pulicaria odora*,  $2n = 18$  (51-1701); (48) *Reichardia intermedia*,  $2n = 16$  (3-100). – Scale bar: 10  $\mu$ m.

Our counts in two populations agree with the only former report for this Moroccan endemic by OBERPRIELER & VOGT (1993, sub *Asteriscus spinosus* subsp. *maroccanus*).

***Pallenis spinosa* (L.) CASS. subsp. *spinosa* [≡ *Asteriscus spinosus* (L.) SCH. BIP. subsp. *spinosus*] – 2n = 10 (Fig. 40).**

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0796 [B].

Morocco, Ouezzane. Kenitra; c. 16 km from Ouazzane on road to Chechaouèn, 110 m, 34°55'N, 5°32'W, 23.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 53-1776 [B].

This report is in accordance with previous counts for this widespread Mediterranean taxon cited in OBERPRIELER & VOGT (1993, sub *Asteriscus spinosus* subsp. *spinosus*) and indexed in WATANABE (2002+).

\* ***Phagnalum calycinum* subsp. *caroli-pau*i (FONT QUER) EMB. & MAIRE (≡ *Phagnalon caroli-pau*i FONT QUER) – 2n = 18 (Fig. 41).**

Morocco, Central Rif Mountains, Fès, c. 15 km SW of Ketama on road to Taounate and Fès, 1000 m, 34°53'N, 4°38'W, 19.6.1992 B. Valdés, R. Vogt 9571, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 43-1488 [B].

This is the first indication of a chromosome number for this N Moroccan endemic.

***Phagnalon rupestre* (L.) DC. – 2n = 18.**

Morocco, Ouezzane, Kenitra, c. 16 km from Ouazzane, on road to Chechaouèn, 110 m, 34°55'N, 5°32'W, 23.6.1992. B. Valdés, R. Vogt 9613, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 53-1773 [B].

The report agrees with previous counts (for discussion see OBERPRIELER & VOGT 1993).

***Phagnalon saxatile* (L.) CASS. – 2n = 18 (Fig. 42).**

Morocco, Forêt de la Mamora, Meknès, c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 B. Valdés, R. Vogt 9359, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 02-0045 [B].

Morocco, Tazzeka, Taza, c. 11 km from Taza on minor road S to Ras-El-Ma and Jbel Tazzeka, hillsides and bank of oued, 745 m, 34°09'N, 4°01'W, 15.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 25-0888 [B].

Morocco, Aknoul, Taza, c. 40 km due NNW of Taza, western outskirts of Taineste, 1100 m, 34°34'N, 4°08'W, 18.6.1992 B. Valdés, R. Vogt 9536, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 39-1334 [B].

The counts in three populations agree with previous counts (see OBERPRIELER & VOGT 1993).

***Picris cupuligera* (DURIEU) WALP. – 2n = 10 (Fig. 43).**

Morocco, Forêt de la Mamora, Meknès, c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 B. Valdés, R. Vogt 9364,



S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 02-0072 [B].

Our count agrees with the only former reports by HUMPHRIES & al. (1978) and VOGT & OBERPRIELER (2008).

***Picris hispanica*** (WILLD.) P. D. SELL –  $2n = 20$  (Fig. 44).

Morocco, Middle Atlas, Qsar-Es-Souq, Azrou – Midelt, 10.5 km N Zaïda, 3.5 km N Boullajoul, Plateau de l'Arid, 1470 m, 32°54'N, 5°W, 10.6.1992 B. Valdés, R. Vogt 9385, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 05-0266 [B].

Morocco, Middle Atlas, Meknès, c. 19 km from Azrou on road to Midelt, Timahdite, volcanic cone and crater with loose volcanic soil, 1900 m, 33°19'N, 5°07'W, 12.6.1992 B. Valdés, R. Vogt 9435, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 16-0625 [B].

Our counts in plants from two populations agree with previous reports (for discussion see OBERPRIELER & VOGT 1993).

***Podospermum laciniatum*** (L.) DC. ( $\equiv$  *Scorzonera laciniata* L.) –  $2n = 14$  (Fig. 45).

Morocco, Meknès, 15 km from El Hajeb on road to Ifrane, Forêt de Jaaba, *Quercus canariensis* wood, 1400 m, 33°36'N, 5°17'W, 9.6.1992 B. Valdés, R. Vogt 9379, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 04-0174 [B].

Morocco, High Atlas, Qsar-Es-Souq; c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 R. Vogt 9401 & Ch. Oberprieler [B].

The report agrees with previous counts based on Moroccan plants (see VOGT & OBERPRIELER 1993a, 1994, & 2008).

\****Pulicaria arabica*** subsp. ***hispanica*** (BOISS.) MURB. –  $2n = 18$  (Fig. 46).

Morocco, Forêt de la Mamora, Meknès, c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 B. Valdés, R. Vogt 9360, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 02-0054 [B].

This seems to be the first count for this taxon based on N African plants. It agrees with the former reports by FERNANDES & QUEIRÓS (1971), SILVESTRE (1986), and LUQUE & DÍAZ LIFANTE (1991) based on plants from Portugal and Spain, respectively (all sub *Pulicaria paludosa*).

***Pulicaria odora*** (L.) RCHB. –  $2n = 18$  (Fig. 47).

Morocco, Ouezzane, Tétouan, c. 29 km from Chefchaouèn on road to Ouazzane, Douar-El-Kob, 115 m, 35°02'N, 5°26'W, 23.6.1992 B. Valdés, R. Vogt 9600, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 51-1701 [B].

Our count is in accordance with the only former report based on Moroccan plants by VALDÉS & al. (1998).

***Reichardia intermedia*** (SCH. BIP.) SAMP. –  $2n = 16$  (Fig. 48).

Morocco, Forêt de la Mamora, Meknès, c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 B. Valdés, R. Vogt 9358, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 02-0044 [B].

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt 9370, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0098 [B].

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0100 [B].

Our counts in three populations agree with former reports based on Moroccan plants by TALAVERA & al. (1984) and VOGT & OBERPRIELER (2008). For further discussion see MEJÍAS (1998).

***Reichardia tingitana* (L.) ROTH** – 2n = 16 (Fig. 49).

Morocco, Kert Ganc, Taza, 4 km from Aïn Zorah on road from Saka, limestone gorge, 890 m, 34°38'N, 3°31'W, 14.6.1992 B. Valdés, R. Vogt 9457, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 23-0848 [B].

This report agrees with previous counts; for discussion see OBERPRIELER & VOGT (1993) and MEJÍAS (1998).

***Rhagadiolus edulis* GAERTN.** – 2n = 10 (Fig. 50).

Morocco, Middle Atlas, Meknès, c. 22 km from Azrou - Midelt road, on minor road to Aïn Leuh, *Quercus ilex* and *Viburnum tinus* woodland, 1450 m, 32°25'N, 5°12'W, 11.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 10-0464b [B].

Our count of 2n = 10 chromosomes is considered to be the first chromosome number obtained from N African plant material. It confirms earlier findings by FERNANDES & QUEIRÓS (1971, sub *Rhagadiolus stellatus* var. *edulis*) and LUQUE & DÍAZ LIFANTE (1991) for Portugal and Spain respectively.

***Rhodanthemum arundanum* (BOISS.) VOGT** – 2n = 18 (Fig. 51).

Morocco, West Rif Mountains, Tétouan, c. 38 km from Chefchaouèn, 14 km above Bab Taza on track to Jbel Talamssemtane, mixed forest of *Abies marocana* and *Cedrus atlantica* on limestone, 1765 m, 35°09'N, 5°12'W, 26.6.1992 B. Valdés, R. Vogt 9667, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 64-2231 [B].

The report agrees with previous counts based on Moroccan plants (sub *Leucanthemum arundanum*) by WILCOX (1982) and GALLAND (1991).

***Rhodanthemum gayanum* subsp. *demnatense* (MURB.) VOGT** – 2n = 18.

Morocco, Central Rif Mountains, Al Hoceima, Ketama, 1 km SW of Tleta Ketama, 15 km to top of Jbel Tidirine, 2200 m, 34°52'N, 4°30'W, 20.6.1992 B. Valdés, R. Vogt 9575, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 45-1539 [B].

Our count is in accordance with the former reports by WILCOX (1982, sub *Leucanthemum gayanum* subsp. *demnatense*) and VOGT & OBERPRIELER (2008).

***Rhodanthemum laouense* VOGT** – 2n = 18.

Morocco, West Rif Mountains, Tétouan, 20 km from Chefchaouèn, Talenbote, on track to Jbel Tassaot, N-facing limestone cliffs, 350 m, 35°17'N, 5°14'W, 25.6.1992 B. Valdés, R. Vogt 9633, S.L. Jury, M. Rejdali,

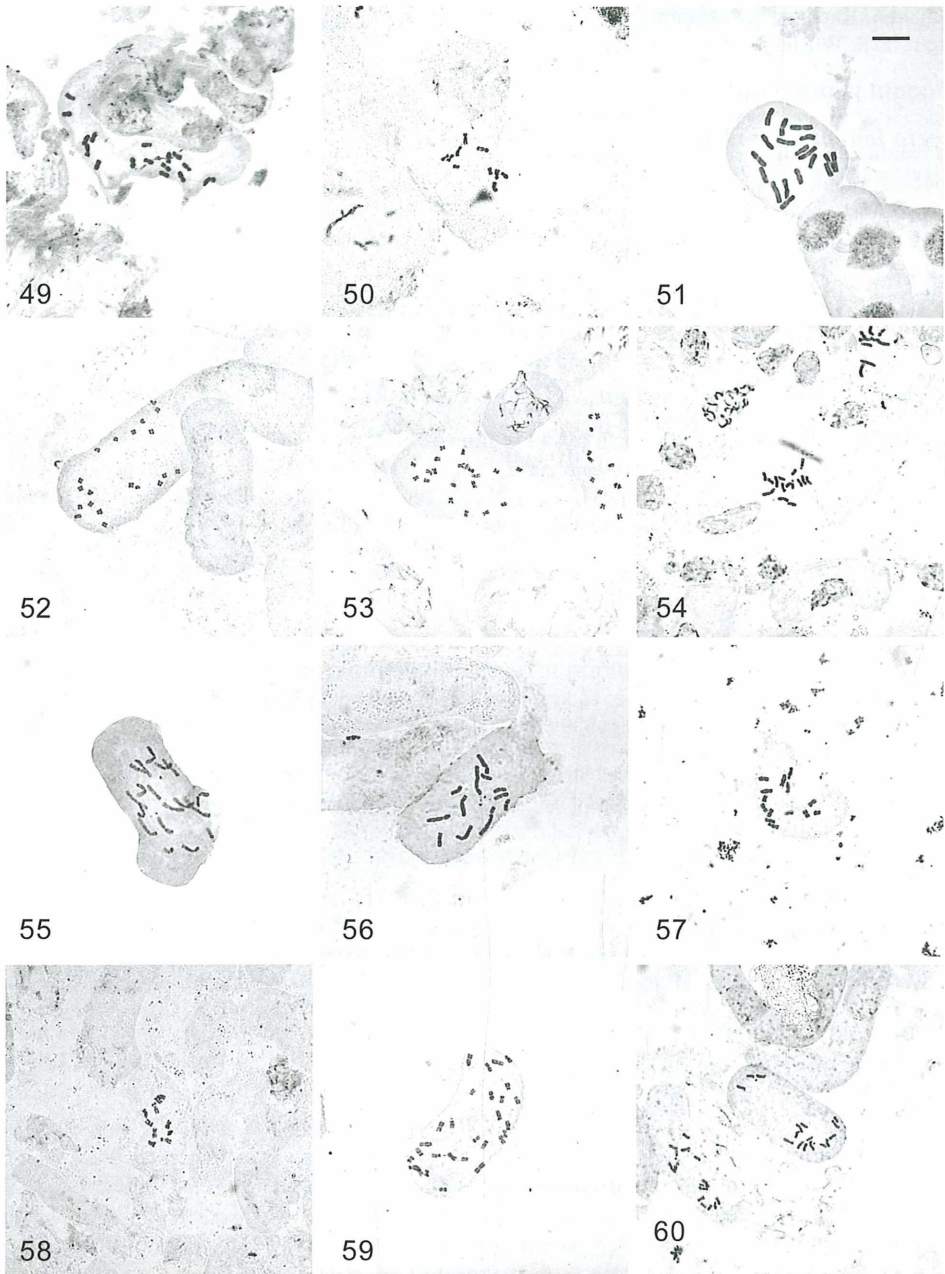


Fig. 49–60: Metaphases of root-tip mitoses – (49) *Reichardia tingitana*,  $2n = 16$  (23-848); (50) *Rhagadiolus edulis*,  $2n = 10$  (10-464b); (51) *Rhodanthemum arundanum*,  $2n = 18$  (64-2231); (52) *Senecio leucanthemifolius* var. *fradinii*,  $2n = 20$  (35-1183); (53) *Senecio squalidus* subsp. *araneosus*,  $2n = 20$  (60-1989); (54) *Sonchus tenerrimus*,  $2n = 14$  (2-60); (55) *Tolpis barbata*,  $2n = 18$  (1-7); (56) *Tragopogon porrifolius*,  $2n = 12$  (Vogt 9423 & Oberprieler); (57) *Urospermum dalechampii*,  $2n = 14$  (4-234); (58) *Urospermum picroides*,  $2n = 10$  (42-1402); (59) *Xeranthemum inapertum*,  $2n = 28$  (61-2068); (60) *Carrichtera annua*,  $2n = 16$  (3-110). – Scale bar: 10  $\mu$ m.

A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 59-1987 [B].

Our count is in accordance with the only former report by VOGT (1994).

***Senecio leucanthemifolius* var. *fradinii* (POMEL) BATT. – 2n = 20 (Fig. 52).**

Morocco, Aknoul, Taza, c. 14 km E from Boured on road to Taza, slaty mudstones, 1350 m, 34°44'N, 4°01'W, 17.6.1992 B. Valdés, R. Vogt 9513, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 35-1183 [B].

The report agrees with previous counts by ALEXANDER (1979) and OBERPRIELER & VOGT (1993).

***Senecio squalidus* subsp. *araneosus* (EMB. & MAIRE) C. ALEXANDER – 2n = 20 (Fig. 53).**

Morocco, West Rif Mountains, Tétouan, c. 44 km from Chefchaouèn, 14 km above Talenbote on route to Jbel Tassaot, limestone, forests of *Abies marocana*, 1600 m, 35°15'N, 5°05'W, 25.6.1992 B. Valdés, R. Vogt 9636, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 60-1989 [B].

Our count in this N Moroccan endemic corroborates the only former report by ALEXANDER (1979).

***Sonchus asper* (L.) HILL – 2n = 18.**

Morocco, High Atlas, Qsar-Es-Souq, c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 R. Vogt 9399 & Ch. Oberprieler [B].

The report agrees with previous counts in Moroccan populations of this widespread weed by TALAVERA & al. (1984) and VOGT & OBERPRIELER (1993a, 2008).

***Sonchus masgindalii* PAU & FONT QUER – 2n = 18.**

Morocco, Targuist area, Al Hoceima, c. 40 km N from Targuist, track from Torres de Alcalá to Peñon de Velez de la Gomera, 5 m, 35°01'N, 4°18'W, 21.6.1992 B. Valdés, R. Vogt 9594, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 50-1657 [B].

This count confirms the former report for this N Moroccan endemic by VOGT & OBERPRIELER (2008) and KIM & al. (2008).

***Sonchus tenerrimus* L. – 2n = 14 (Fig. 54).**

Morocco, Forêt de la Mamora, Meknès, c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 B. Valdés, R. Vogt 9361, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 02-0060 [B].

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0090 [B].

Morocco, Aknou, Taza, c. 14 km E from Boured on road to Taza, slaty mudstones, 1350 m, 34°44'N, 4°01'W, 17.6.1992 B. Valdés, R. Vogt 9514, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 35-1184 [B].

Our counts in three populations agree with reports from Morocco by OBERPRIELER & VOGT (1993) and VOGT & OBERPRIELER (2008).

***Taraxacum obovatum* subsp. *ochrocarpum* SOEST – 2n = 32.**

Morocco, Middle Atlas, Meknès, c. 7 km from Azrou on road to Midelt, Jbel Hebri, *Cedrus atlantica* forest surrounded by *Quercus rotundifolia* scrubland, 1650 m, 33°26'N, 5°12'W, 12.6.1992 B. Valdés, R. Vogt 9428, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 14-0613 [B].

Morocco, Tazzeka, Taza, c. 6 km up track from road on Jbel Tazzeka, 3 km from summit, *Cedrus* forest and open area of dry acid grassland, 1780 m, 34°05'N, 4°01'W, 16.6.1992 B. Valdés, R. Vogt 9497, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 30-1084 [B].

Our counts confirm the tetraploid nature of this W Mediterranean taxon (see VOGT & OBERPRIELER 1993a).

***Tolpis barbata* (L.) GAERTN. – 2n = 18 (Fig. 55).**

Morocco, Forêt de la Mamora, Kenitra, 12 km from Rabat on road to Meknès, Forêt de la Marmora, *Quercus suber* forest, 80 m, 34°02'N, 6°42'W, 9.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 01-0007 [B].

This report agrees with former counts in Moroccan populations by VOGT & OBERPRIELER (1993a, 1994) and VALDÉS & al. (1998).

***Tragopogon crocifolium* L. – 2n = 12.**

Morocco, High Atlas, Qsar-Es-Souq, c. 15 km from Midelt on track to Cirque du Jaffar, Jbel Ayachi, 1700 m, 32°38'N, 4°46'W, 10.6.1992 B. Valdés, R. Vogt 9393a, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 07-0347a [B].

Morocco, Middle Atlas, Meknès, c. 19 km from Azrou on road to Midelt, Timahdite, volcanic cone and crater with loose volcanic soil, 1900 m, 33°19'N, 5°07'W, 12.6.1992 B. Valdés, R. Vogt 9436, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 16-0646 [B].

Our count of 2n = 12 chromosomes in two populations appears to be the second report for plant materials of Moroccan origin for this W Mediterranean species and confirms the former indication given by HUMPHRIES & al. (1978).

***Tragopogon porrifolius* L. – 2n = 12 (Fig. 56).**

Morocco, Middle Atlas, Meknès, c. 4 km from Aïn-Leuh, on road to Tiouririne and Azrou, amongst rocky outcrops in cultivated area, 1150 m, 32°02'N, 5°21'W, 11.6.1992 R. Vogt 9423 & Ch. Oberprieler [B]; cultivated in the Botanic Garden Berlin-Dahlem, 18.6.1994 R. Vogt & Ch. Oberprieler s.n. [B].

Morocco, Middle Atlas, Meknès, c. 19 km from Azrou on road to Midelt, Timahdite, volcanic cone and crater with loose volcanic soil, 1900 m, 33°19'N, 5°07'W, 12.6.1992 B. Valdés, R. Vogt 9437, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 16-0650 [B].

Morocco, Aknoul, Taza, c. 14 km E from Boured on road to Taza, slaty mudstones, 1350 m, 34°44'N, 4°01'W, 17.6.1992 R. Vogt 9523 & Ch. Oberprieler [B]; cultivated in the Botanic Garden Berlin-Dahlem, 13.6.1994 R. Vogt & Ch. Oberprieler s.n. [B].

Morocco, Aknoul, Taza, c. 10 km from Aknoul on road to Boured, Col du Nador, 1340 m, 34°43'N, 3°56'W, 17.6.1992, R. Vogt 9527 & Ch. Oberprieler 3964; cultivated in the Botanic Garden Berlin-Dahlem, 1.6.1994 M. Cubr 32591 [B].

Our counts in four populations of this widespread species confirms the previous reports for N Africa by HUMPHRIES & al. (1978) and VOGT & OBERPRIELER 1993a, 1994 & 2008).

***Urospermum dalechampii* (L.) SCOP. ex F. W. SCHMIDT** –  $2n = 14$  (Fig. 57).

Morocco, Meknès, 15 km from El Hajeb on road to Ifrane, Forêt de Jaaba, *Quercus canariensis* wood, 1400 m, 33°36'N, 5°17'W, 9.6.1992 B. Valdés, R. Vogt 9382, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 04-0234 [B].

This first count based on N African plants is in accordance with previous reports by LOON & al. (1971), CAPINERI & al. (1978), LÖVE & LÖVE (1982), LARSEN (1956), LOON & JONG (1978), DAHLGREN & al. (1971), and LUQUE & al. (1984) who studied plants from France, Italy, and Spain.

***Urospermum picroides* (L.) SCOP. ex F. W. SCHMIDT** –  $2n = 10$  (Fig. 58).

Morocco, Central Rif Mountains, Fès, c. 40 km from Taounate on road to Ketama, Ikaouèn, 1000 m, 34°48'N, 4°38'W, 19.6.1992 B. Valdés, R. Vogt 9564, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 42-1402 [B].

Our count agrees with the two former reports for plant materials of Moroccan origin for this widespread weed by VALDÉS & al. (1998) and VOGT & OBERPRIELER (2008).

***Xeranthemum inapertum* (L.) MILL.** –  $2n = 28$  (Fig. 59).

Morocco, West Rif Mountains, Tétouan, c. 40 km from Chefchaouèn, 10 km above Talenbote on route to Jbel Tassaot, mixed forest of *Quercus ilex* and *Q. alpestris*, 1565 m, 35°16'N, 5°08'W, 25.6.1992 B. Valdés, R. Vogt 9644, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 61-2068 [B].

This count of  $2n = 28$  for a population from the Rif Mountains corroborate the report of HUMPHRIES & al. (1978) for the High Atlas and OBERPRIELER & VOGT (1993) for the Middle Atlas.

## Cruciferae

***Alyssum simplex* RUDOLPHI** –  $2n = 32$ .

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt 9368, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0091 [B].

This result confirms the tetraploid nature of this taxon in N Africa reported for the first time by VOGT & OBERPRIELER (2009).

***Carrichtera annua* (L.) DC.** –  $2n = 16$  (Fig. 60).

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt 9372, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0110 [B].

Our count agrees with the previous reports for Morocco by ARISTA & ORTIZ (1994) and VOGT & OBERPRIELER (2009) and for other regions of the distribution range of this

widespread Mediterranean weed indexed in GOLDBLATT & JOHNSON (1979+) and ANTHOS (2006+).

***Cordylocarpus muricatus* DESF. –  $2n = 16$ .**

Morocco, Guercif area, Taza, c. 19 km from Taza, 46 km from Guercif, basic marls with wheat, 520 m, 34°05'N, 3°05'W, 14.6.1992. B. Valdés, R. Vogt 9448, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 19-0768 [B].

Our count agrees with the only former report for this NW African endemic published by ARISTA & ORTIZ (1994).

**\*\**Isatis djurdjurae* COSS. & DURIEU –  $2n = 14$ .**

Morocco, West Rif Mountains, Tétouan, c. 38 km from Chefchaouèn, 14 km above Bab Taza on track to Jbel Talamssemtane, mixed forest of *Abies marocana* and *Cedrus atlantica* on limestone, 1765 m, 35°09'N, 5°12'W, 26.6.1992. B. Valdés, R. Vogt 9662, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 64-2215 [B].

The count of  $2n = 14$  is the first indication of a diploid number for this species endemic to Morocco and Algeria. The tetraploid number  $2n = 28$  has previously been reported by FAVARGER & al. (1979).

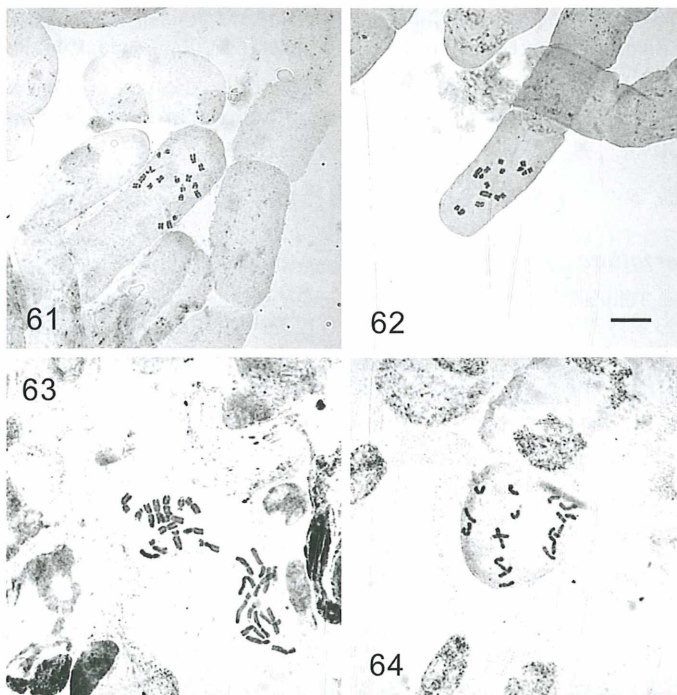


Fig. 61–64: Metaphases of root-tip mitoses – (61) *Lomelosia stellata*,  $2n = 18$  (25-900); (62) *Scabiosa atropurpurea*,  $2n = 16$  (51-1660); (63) *Vicia ervilia*,  $2n = 14$  (36-1248); (64) *Rumex papilio*,  $2n = 18$  (3-88). – Scale bar, 10  $\mu$ m.

## Dipsacaceae

\*\**Lomelosia stellata* (L.) RAF. ( $\equiv$  *Scabiosa stellata* L.) –  $2n = 18$  (Fig. 61).

Morocco, Tazzeka, Taza, c. 11 km from Taza on minor road S to Ras-El-Ma and Jbel Tazzeka, hillsides and bank of oued, 745 m, 34°09'N, 4°01'W, 15.6.1992 B. Valdés, R. Vogt 9463, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 25-0900 [B].

Our count of  $2n = 18$  is deviating from previous reports by VERLAQUE (1982 & 1986) who found  $2n = 28$  chromosomes in plants from S Spain.

*Scabiosa atropurpurea* L. –  $2n = 16$  (Fig. 62).

Morocco, Ouezzane, Tétouan, c. 29 km from Chefchaouèn on road to Ouazzane, Douar-El-Kob, 115 m, 35°02'N, 5°26'W, 23.6.1992 B. Valdés, R. Vogt 9597, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 51-1660 [B].

Our count agrees with the only former report based on Moroccan plants by VALDÉS & al. (1997).

## Euphorbiaceae

*Mercurialis ambigua* L.f. ( $\equiv$  *Mercurialis annua* subsp. *ambigua* (L.f.) ARCANG.) –  $2n = 48$ .

Morocco, Central Rif Mountains, Fès, c. 15 km SW of Ketama on road to Taounate and Fès, 1000 m, 34°53'N, 4°38'W, 19.6.1992 B. Valdés, R. Vogt 9569, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 43-1476 [B].

The report agrees with previous counts based on Moroccan plants reported by VOGT & OBERPRIELER (2009).

## Gentianaceae

\**Blackstonia perfoliata* subsp. *grandiflora* (VIV.) MAIRE –  $2n = 20$ .

Morocco, Ouezzane, Tétouan, c. 29 km from Chefchaouèn, on road to Ouazzane, Douar-El-Kob, 115 m, 35°02'N, 5°26'W, 23.6.1992 B. Valdés, R. Vogt 9598, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 51-1671 [B].

This seems to be the first report of a chromosome number for this taxon.

## Labiatae

*Lavandula multifida* L. –  $2n = 22$ .

Morocco, Forêt de la Mamora, Meknès; c. 45 km W of Meknès on Rabat to Meknès road, 2 km W of Oued Beht, open rocky area with *Pinus halepensis*, 150 m, 33°52'N, 5°57'W, 9.6.1992 [N° Rec. It. 02-0066], leg. B. Valdés, R. Vogt 9362, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark; cultivated in the Botanic Garden Berlin-Dahlem, 14.4.1994, R. Vogt & Ch. Oberprieler s.n. [B].

This seems to be the first record of a chromosome number from N Africa for this taxon and it agrees with the previous count on materials from Spain by BALTISBERGER & CHARPIN (1989).



## Leguminosae

### *Dorycnium rectum* (L.) SER. – $2n = 14$ .

Morocco, Ouezzane, Tétouan, c. 29 km from Chefchaouèn on road to Ouazzane, Douar-El-Kob, 115 m, 35°02'N, 5°26'W, 23.6.1992 B. Valdés, R. Vogt 9604, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 51-1735 [B, LD].

This seems to be the first record of a chromosome number from N Africa for this taxon and it agrees with the previous reports by COLOMBO & al. (1982), FERNANDES & SANTOS (1971 & 1975), and VIOQUE & PASTOR (1991) on plants from Italy, Portugal and Spain respectively.

### *Lotus arenarius* BROT. – $2n = 14$ .

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt 9371, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0106 [B].

Our count agrees with the previous reports by LOON & JONG (1978) and VIOQUE & PASTOR (1991) who studied plants from Spain.

### *Vicia ervilia* (L.) WILLD. – $2n = 14$ (Fig. 63).

Morocco, Aknoul, Taza, c. 19 km E of Boured on road to Taza, 78 km from Taza, c. 2 km E of Ajdir, 860 m, 34°45'N, 3°59'W, 17.6.1992 B. Valdés, R. Vogt, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 36-1248 [B].

Our count agrees with previous records (see OBERPRIELER & VOGT 1996).

## Polygonaceae

### *Rumex papilio* COSS. & BALANSA – $2n = 18$ (Fig. 64).

Morocco, Zerhoun, Meknès, c. 42 km E of Meknès on Rabat to Meknès road, 1 km E of Oued Beht, degraded *Tetraclinis articulata* woodland with planted *Pinus halepensis*, 220 m, 33°53'N, 5°55'W, 9.6.1992 B. Valdés, R. Vogt 9367, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 03-0088 [B].

This is the second report for this Moroccan endemic and it is in accordance with the finding of BALTISBERGER & CHARPIN (1989) who studied plants from the High Atlas.

## Ranunculaceae

### *Ranunculus spicatus* subsp. *fontqueri* ROMO – $2n = 16$ .

Morocco, Tazzeka, Bab-Bou-Idir, Taza, c. 42 km from Taza on minor road to Sidi Abdallah, around Jbel Tazzeka, *Quercus suber* and *Q. canariensis* forest, acid slatey schist, 1200 m, 34°03'N, 4°12'W, 15.6.1992 R. Vogt 9477 & Ch. Oberprieler [B]; cultivated in the Botanical Garden Berlin-Dahlem, 14.4.1994 R. Vogt & Ch. Oberprieler [B].

Morocco, Tazzeka, Taza, c. 6 km up track from road on Jbel Tazzeka, 3 km from summit, *Cedrus* forest and open area of dry acid grassland, 1780 m, 34°05'N, 4°01'W, 16.6.1992 R. Vogt 9503 & Ch. Oberprieler [B]; cultivated in the Botanical Garden Berlin-Dahlem, 14.4.1994 R. Vogt & Ch. Oberprieler [B].

Our counts in two populations of this Moroccan endemic agree with the only previous record (for discussion see VOGT & OBERPRIELER 1994).

## Scrophulariaceae

### *Misopates orontium* (L.) RAF. – $2n = 16$ .

Morocco, Aknoul, Taza, c. 40 km due NNW of Taza, western outskirts of Taineste, 1100 m, 34°34'N, 4°08'W, 18.6.1992 B. Valdés, R. Vogt 9535, S.L. Jury, M. Rejdali, A. Achhal Al Kadmiri, S. Peccenini, F. Conti, E. Rico, M. Lisci, H. 't Hart, Ch. Oberprieler, F.M. Raimondo, P. Mazzola, R. Wilson, G. Stark, N° Rec. It. 39-1329 [B].

The present count is the first on material from Morocco and agrees with the reports from Europe on this species (see GOLDBLATT & JOHNSON 1979+).

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