Mediterranean chromosome number reports — 6

edited by G. Kamari, F. Felber & F. Garbari

Abstract

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This is the sixth instalment of a series of reports of chromosome numbers from Mediterranean area, peri-Alpine communities and the Atlantic Islands, in French or English language. It comprises contributions on 93 taxa: *Mesembryanthemum, Capparis, Arthrocnemum, Atriplex, Beta, Chenopodium, Agrostemma, Cerastium, Corrigiola, Dianthus, Herniaria, Holosteum, Minuartia, Moenchia, Paronychia, Polycarpon, Sagina, Spergula, Velezia, Emex, Polygonum, Rumex, Montia, Parietaria* and *Urtica* from Greece, *Petrorhagia, Spergularia* and *Stellaria* from Greece and Crete, *Arenaria* and *Silene* from Greece, Crete and Turkey, by H. Runemark (Nos. 590-678); *Stachys* from Sicily and Italy, by L. Fàciani & G. Fiorini (Nos. 679-682); *Genocytisus* from Turkey, by T. Cusma Velari & L. Feoli Chiapella (No. 683); *Leopoldia, Muscari, Dipcadi, Gagea, Scilla* and *Ornithogalum* from Morocco, by G. Corsi, F. Garbari & A. Ghelardi (Nos. 684-691); *Dianthus, Limonium, Medicago, Prosopis, Salvia* and *Sideritis* from Cyprus, by Ch. Oberprieler & R. Vogt (Nos. 692-699); *Salvia* from Italy and Sardinia, by F. Del Carratore & F. Garbari (Nos. 700-704); *Emex, Biscutella, Eruca, Medicago, Ononis, Euphorbia, Centaurea, Allium, Dipcadi, Scilla* and *Ornithogalum* from Turkey, by G. Fiorini & M. Raffaelli (Nos. 705-715); *Angelica, Astrantia, Bunium, Bupleurum, Carum, Chaerophyllum, Cnidiocarpa, Cymbocarpum, Eleutherospermum, Eryngium, Ferulago, Gongyloscialium, Heracleum, Hydrocotyle, Johreniopsis, Pastinaca, Peucedanum, Pimpinella, Prangos, Scandix, Seseli, Sium* and *Torilis* from Turkey, by M. G. Pimenov, Ju. V. Daushkevich, M. G. Vasil'eva & E. V. Kljaykov (Nos. 716-748); *Biebersteinia, Cerinthe, Erodium, Nonea* and *Onosma* from Greece, by T. Constantinidis (Nos. 749-753); *Crepis* from Bulgaria, by D. Dimitrova (Nos. 754-756); *Ornithogalum* and *Potentilla* from Bulgaria, by M. Markova & V. Goranova (Nos. 757-761); *Oxytropis* and *Trigonella* from Bulgaria, by D. Pavlova (Nos. 762-766); *Centaurea* from Bulgaria, by S. T. Sharkova (Nos. 767-772); *Gypsophila, Moehringia* and *Matthiola* from Greece, by A. Tiniakou (Nos. 773-778).

Addresses of the editors:
Prof. G. Kamari, Department of Biology, Botanical Institute, University of Patras, GR-260 10 Patras, Greece.
Dr F. Felber, Institut de Botanique, Université de Neuchâtel, ch. de Chantemerle 22, CH-2000 Neuchâtel, Switzerland.
Prof. F. Garbari, Dipartimento di Scienze Botaniche dell'Università, via Luca Ghini 5, I-56126 Pisa, Italy.

Reports (590-678) by Hans Runemark

The herbarium sheets from which the seeds were taken as well as voucher specimens of cultivated plants (kept separately) are well preserved at LD.

In the locality lists the following abbreviations of collectors' names have been used: Be (Bengt Bentzer), Bo (Roland von Bothmer), BS (Britt Snogerup), E (Lennart Engstrand), G (Mats Gustaffson), N (Bertil Nordenstam), P (Jimmy Persson); R (Hans Runemark), S (Sven Snogerup), St (Arne Strid).

590. ***Mesembryanthemum nodiflorum*** L. — $2n = 20$.

Gr: Dodecanisa, Kamila (Chamili), 70 km S. of Astpalea, 35°52'N, 26°14'E, 6 May 1958, *R & S 7906*; Kasos, Plato Nisia, the W. island, 35°22'N, 26°50'E, 23 Jul 1966, *Bo 23200*; Kinaros (E. of Amorgos), 36°59'N, 26°17'E, 2 Jul 1958, *R & S 12134*; Kinaros, the island of Laro, 36°55'N, 26°19'E, 2 Jul 1958, *R & S 12091*; Sirina (S.E. of Astipalea), "Goat island", 36°19'N, 26°44'E, 15 May 1960, *R & N 14419*.
— Kiklades, Anafi, the harbour S. of Chora, 36°21'N, 26°41'E, 7 May 1958, *R & S 8007*; Keros (S. of Naxos), the island of Andreas, 36°52'N, 25°38'E, 10 Jun 1958, *R & S 10896*; Keros, small island N. of Andreas, 36°52'N, 25°37'E, 10 Jun 1958, *R & S 10946*; Keros, the island of Antikeros, 36°53'N, 25°32'E, 6 Jul 1958, *R & S 12379*.

591. ***Capparis spinosa*** L. subsp. ***rupestris*** (Sm.) Nyman — $2n = 38$.

Gr: Kiklades, Amorgos, the island of Biokastro, 36°49'N, 25°55'E, 6 Jul 1958, *R & S 12338*.

592. ***Arthrocnemum macrostachyum*** (Moric.) Moris — $2n = 36$.

Gr: Kiklades, Naxos, S. of the town, 37°05'N, 25°23'E, 1 Aug 1958, *R* seeds, *cult.* R-1518.

593. ***Atriplex davisii*** Aellen — $2n = 18$.

Gr: Dodecanisa, Rodhos, 1 km S. of Kattavia, 35°56'N, 27°47'E, 20 Oct 1982, *Carlström* seeds, *cult.* R-6796; Rodhos, Termae Kallidhies, 36°22'N, 28°15'E, 22 Oct 1982, *Carlström* seeds, *cult.* R-6797.

594. ***Atriplex prostrata*** DC. — $2n = 18$.

Gr: Dodecanisa, Rodhos, Oct 1982, *Carlström* seeds, *cult.* R-6798, R-6799.
— Kiklades, Mikonos, Ornos Ornos, 37°25'N, 25°19'E, 14 May 1968, *R&E 35465*.

595. ***Atriplex recurva*** Dum.-Urville — $2n = 18$.

Gr: Kiklades, Keros (S. of Naxos), the island of Plaki, 36°52'N, 25°37'E, 10 Jun 1958, *R & S 10931*.

596. ***Beta vulgaris*** L. subsp. ***maritima*** (L.) Arcangeli — $2n = 18$.

Gr: Kiklades, Kithnos, N. of Chora, 37°26'N, 24°26'E, 6 Jun 1968, *R & E 38236*; Skinousa (S. of Naxos), 36°52'N, 25°31'E, 9 Jun 1957, *R 4339*.

596a. ***Beta vulgaris*** L. subsp. ***adanensis*** (Aellen) Ford-Lloyd & Williams — $2n$=18.

Gr: Kiklades, Denousa (E. of Naxos), Ormos Chendrou, 37°06'N, 25°49'E, 24 May 1958, *R & S 9570*; Kimolos, between the town and the highest peak, 36°48'N, 24°34'E, 16 Jun 1967, *R & Be 29593*; Kithnos, Ormos Aporousi, 37°24'N, 34°24'E, 3 Jun 1968, *R & E 37976*; Sifnos, Ormos Kondos, 36°54'N, 24°42'E, 13 May 1958, *R & S 8778*; Siros, S.E. of Finikas, 37°24'N, 24°54'E, 29 May 1968, *S & Bo 33750*; Tinos, between Kolibitras and Komi, 37°36'N, 25°09'E, 23 May 1968, *R & E 37060*.

597. ***Chenopodium album*** L. — $2n = 36$.

Gr: Kiklades, Naxos, Komiaki to Apollona, 37°10'N, 25°33'E, 4 Jun 1967, *R 4015*.

598. ***Chenopodium murale*** L. — $2n = 18$.

Gr: Dodecanisa, Astipalea, E. of Panormos, 36°36'N, 26°17'E, 30 May 1960, *R & N 15042*; Astipalea, Chondro Nisos, 36°34'N, 26°24'E, 4 Jun 1960, *R & N 15475*; Dio Adelfi (N.W. of Sirina), the E. island, 36°25'N, 26°28'E, 14 May 1960, *R & N 14073*; Sirina, S. of the village, 36°20'N, 26°41'E, 2 May 1958, *R & S 7318*; Safora (45 km S. of Astiplaea), 36°04'N, 26°24'E, 1 May 1958, *R & S 7167*.

— E. Aegean islands, Ikaria, S.W. part, Ag. Nikolaos, 37°59'N, 24°15'E, 20 Apr 1958, *R & S 5492*.

— Evvia, S.W. part, Petalidhes, Megalo Nisi, 37°59'N, 24°15'E, 21 Jun 1958, *R & S 11525*.

— Kiklades, Anidros (S. of Amorgos), 36°38'N, 25°41'E, 30 May 1958, *R & S 8228*; Denousa (E. of Naxos), Ormos Rousa, 37°07'N, 25°49'E, 23 May 1958, *R & S 9369*; Iraklia (S. of Naxos), below S. exposed cliffs, 36°50'N, 25°26'E, 10 Apr 1958, *R & S 5510*; Mikonos, N. of the town, 37°27'N, 25°20'E, 11 May 1968, *R & E 35067*; Naxos, Axapsis to Mitria, 37°07'N, 25°26'E, 3 Jun 1957, *R 3919*; Paros, 2 km N. of Prof. Elias, 37°03'N, 25°12'E, 18 Jul 1958, *R & S 12708*; Sifnos, Ormos Kondos, 36°54'N, 24°42'E, 13 May 1958, *R & S 8494*; Siros, S.E. of Finikas, 37°24'N, 24°54'E, 29 May 1968, *S & Bo 33747*; Skinousa (S. of Naxos), N. of Psiliammos Ormos, 36°53'N, 25°32'E, 12 Jun 1960, *R & N 16006*.

599. ***Chenopodium opulifolium*** Schrader — $2n = 54$.

Gr: Kiklades, Siros, near the town, 37°27'N, 24°56'E, 30 May 1968, *R & E 37555*.

600. ***Chenopodium vulvaria*** L. — $2n = 18$.

Gr: Kiklades, Siros, near the town, 37°27'N, 24°56'E, 30 May 1968, *R & E 37554*.

601. ***Agrostemma githago*** L. — $2n = 48$.

Gr: Kiklades, Milos, the W. coast, valley N. of the monastery, 36°42'N, 24°21'E, 18 Jun 1967, *R & Be 29791*.

602. ***Arenaria aegaea*** Rech. fil. — $2n = 20$.

Gr: Dodecanisa, the island of Anedro (N.W. of Patmos), 34°27'N, 26°30'E, 4 May 1974, *R & Bo 46755*; Sirina, Ag. Ioannis Ormos, 36°20'N, 26°41'E, 2 May 1958, *R & S 7254*; Sirina, the N.W. point, 36°21'N, 26°42'E, 14 May 1960, *R & N 14237*; Tria Nisia (S. of Sirina), the S. island, 36°17'N, 26°45'E, 15 May 1960, *R & N 14261*; Ounia Nisia (60 km E. of Karpathos), the E. island, 35°50'N, 26°28'E, 6 May 1960, *R & S 7878*.

— Kiklades, Anafi, Kalamos, 36°21'N, 25°51'E, 28 May 1960, *R & N 14896*; Anafi, the island of Makra, 36°16'N, 25°53'E, 7 May 1958, *R & S 7991*; Amorgos, N.E. of Katapola, 36°50'N, 25°52'E, 17 Apr 1957, *R 1465*; Amorgos, E. of Tourlari, 36°55'N, 25°59'E, 24 Apr 1969, *R, St & G 41274*; Denousa, 2 km E.S.E. of Akr. Aspron, 37°07'N, 25°48'E, 25 May 1958, *R & S 9628*; Denousa, Makares, the island of Prasini, 37°05'N, 25°42'E, 26 May 1958, *R & S 9690*; Ios, the island of Psatis, 36°45'N, 25°22'E, 22 Apr 1969, *R, St & G 41093*; Sikinos, the island of Kalogeros, 36°38'N, 25°03'E, 24 May 1960, *R & N 14743*; Skinousa, the island of Ligari (Aspro Nisos), 36°51'N, 25°33'E, 12 Jun 1960, *R & N 15962*.

Arenaria aegaea is a uniform, easily recognized, diploid species. No intermediates to other members of the *A. serpyllifolia* complex have been seen. It is confined to the epilitoral zone, mainly on very small islands, in the C., E. and S. Aegean area. In Flora Europaea I (second edition) it is given subspecific rank under *A. serpyllifolia* L. This treatment, based on Akeroyd (1988), is apparently influenced by an assumed occurrence of intermediates between *A. leptoclados* (Reichenb.) Guss. and *A. serpyllifolia* L., that has nothing to do with the distinctiveness of *A. aegaea*. Akeroyd's information seems to be based on the scanty material of *A. aegaea* in British herbaria. The great majority of collections known (65 localities) in LD have not been consulted.

603. ***Arenaria fragillima*** Rech. fil. — $2n = 22$.

Cr: Crete, Psiloriti, above Kamares, 1200-2000 m, 35°11'N, 24°49'E, 1 Jul 1960, *R & N 16498*.

604. ***Arenaria graveolens*** Schreber — $2n = 44$.

Gr: E. Aegean islands, Samos, W. of the harbour of Karlovassi, 37°48'N, 26°41'E, 22 May 1962, *R & S 18715*; Samos, 3-4 km W. of Marathokampos, 37°44'N, 26°39'E, 23 May 1962, *R & S 19169*; Samos, Mt Kerki, N. of Ag. Kiriaki, 37°42'N, 26°37'E, 26 May 1962, *R & S 19533*; Samos, Mt Kerki, S.W.-cliffs 800-1000 m, 37°43'N, 26°36'E, 26 May 1962, *R & S 19695*; Ikaria, 2 km W. of Praya Pt., 37°34'N, 26°08'E, 14 Jun 1958, *R & S* seeds, *cult.* R-1392.

Tu: Mugla, Marmaris, N.W. of the town, 36°08'N, 28°15'E, 3 Jun 1967, *R & Be 29416*; Fethyie, 2 km S.E. of Yelcegiz, 36°33'N, 29°07'E, 5 Jul 1967, *R & Be 29465*.

605. ***Arenaria leptoclados*** (Reichenb.) Guss. — $2n = 20$.

Cr: Sitia, S. of Tourloti, 35°09'N, 25°57'E, 13 May 1962, *R & S 17352*.
Gr: Dodecanisa, Karpathos, the island of Saria, Ormos Armiro, 35°50'N, 27°14'E, 4 May 1958, *R & S 7548*; Astipalea, the island of Ofidousa, 36°33'N, 26°09'E, 12 May 1960, *R & N 13721*.
— Kiklades, Antimilos, 1 km S. of Akr. Zigrazo, 36°48'N, 24°15'E, 15 May 1958, *R & S 8746*; Kea, N. of Ormos Kalogeros, 37°37'N, 24°17'E, 17 Apr 1969, *R, St & G 40820*; Naxos, Annomaxis Oros, 37°07'N, 35°33'E, 19 May 1963, *S 20222*; Tinos, N. of Isternia, 37°38'N, 25°03'E, 26 May 1967, *R & E 37237*.

606. ***Arenaria muralis*** (Link) Sprengel — $2n = 22$.

Cr: Sitia, S. of Tourloti, 35°09'N, 25°57'E, 13 May 1962, *R & S 17301*; W. of Zakro, 35°07'N, 26°13'E, 16 May 1962, *R & S 17886*; the valley W. of Maronia, 35°09'N, 26°04'E, 16 May 1962, *R & S 18093* a, b.
— Chania, Sfakia, 1-2 km W. of Cjora Sfakion, 35°12'N, 24°07'E, 15 May 1980, *R & BS 47882*.
Gr: Dodecanisa, Lipsos, the W. part, 37°18'N, 26°44'E, 1 May 1974, *R & Bo 46635*; Kalimnos, the Mt N. of Vathi, 37°00'N, 27°02'E, 7 May 1962, *R & Bo 46954*; Karpathos, the island of Saria, 35°51'N, 27°14'E, 5 May 1958, *R & S 7723*; Kinaros (E. of Amorgos), 36°59'N, 26°17'E, 2 Jul 1958, *R & S 12149*.
— E. Aegean islands, Ikaria, W. of Praya Pt., 37°34'N, 26°09'E, 14 Jul 1958, *R & S 12552*.
— Evvia, S. part, N. of Akr. Merouthi, 38°04'N, 24°35'E, 24 Jun 1958, *R & S 11869*; S. part, N. of Ag. Dimitrio, 38°09'N, 24°31'E, 23 Jun 1958, *R & S 11838*.
— Kiklades, Amorgos, 3 km E. of Ag. Alatos, 36°51'N, 25°25'E, 24 Apr 1969, *R, St & G 41210*; Amorgos, Prof. Elias, 36°50'N, 25°50'E, 25 Apr 1957, *R 1416*; Anafi, Kalamos, 36°21'N, 25°51'E, 28 May 1960, *R & N 14864*; Naxos, Ammomaxis Oros, 37°07'N, 25°33'E, 31 May 1958, *R & S 9924*; Naxos, Liona, 37°08'N, 25°35'E, 22 May 1958, *R & S 9198*; Naxos, 2 km N.N.E. of Ag. Stefano, 37°00'N, 25°27'E, 3 Jun 198, *R & S 10170*; Sifnos, E. of Akr. Khondropo, 36°58'N, 24°41'E, 14 May 1958, *R & S 8580*; Sifnos, Ormos Kamares, 26°59'N, 24°35'E, 16 May 1958, *R & S 8799*.

607. ***Arenaria runemarkii*** Phitos — $2n = 20$.

Gr: Ikaria, Peranora Vouno, W. part, at S. exposed cliffs, 600-700 m, 37°35'N, 26°11'E, 21 Jun 1960, *R & N 16414*.

608. ***Cerastium comatum*** Desv. — $2n = 34$.

Gr: Kiklades, Ios, N.W. of Prof. Elias, 36°43'N, 25°19'E, 6 May 1957, *R 2408*; Kithnos, N.E. of Merixas, 37°24'N, 24°24'E, 14 Apr 1969, *R, St & G 40588*; Dilos, the island of Kouncllonisi (near Rinia), 37°25'N, 25°15'E, 16 May 1968, *R & E 35953*; Mikonos, the valley S. of the W. Ag. Elias, 37°28'N, 25°20'E, 13 May 1968, *R & E 35382*; Mikonos, the island of Tragonisi, 37°27'N, 25°29'E, 14 May

1968, *R & E 35612*; Naxos, Metri (N. of Moni), 37°05'N, 25°30'E, 20 May 1957, *R 3244*; Santorin, the island of Nea Kaimeni, 36°24'N, 25°24'E, 19 Apr 1967, *R & Be 27182*.

609. *Cerastium glomeratum* Thuill. — $2n = 72$.

Gr: Kiklades, Ios, N.N.W. of the highest peak of Ag. Elias, 36°44'N, 25°20'E, 7 May 1957, *R 2520*; Kimolos, 25°24'E, 19 Apr 1967, *R & Be 27191*; Sikinos, the S.E. part, 36°40'N, 25°08'E, 10 Apr 1967, *R & Be 24838*; Tinos, 1 km N.E. of Falatados, 37°36'N, 25°12'E, 29 Mar 1969, *R, St & G 39688*.

610. *Corrigiola litoralis* L. — $2n = 54$.

Gr: Kiklades, Naxos, 2 km N.E. of Sangri, 37°03'N, 25°28'E, 18 Apr 1958, *R & S 5885*; Serifos, Livadion, 37°09'N, 24°31'E, 26 Apr 1967, *R & Be 27612*.

$2n = 18$ has been recorded from the W. Mediterranean area and W. Europe, but also the numbers $2n = 16$ and 32 (see Fedorov 1969). The hexaploids found in the Aegean area grow in natural habitats (sandy or gravelly areas flooded in spring and early summer). No morphological differences between Aegean and W. Mediterranean or W. European material of *Corrigiola litoralis* subsp. *litoralis* have been observed.

611. *Dianthus cinnamomeus* Sm. subsp. ***cinnamomeus*** — $2n = 30$.

Gr: Kiklades, Naxos, N. of Ag. Agiasou, 36°59'N, 25°26'E, 3 Jun 1958, *R & S 10158*; Naxos, N. of Mitria, 37°09'N, 25°29'E, 26 Jul 1958, *R & S* seeds, *cult.* R-1325; Makares (E. of Naxos), the island of Strongilo, 37°04'N, 25°42'E, 5 Jun 1958, *R & S 10362*.

One collection, *R & S 10158*, represents plants to some extent intermediate between subsp. *cinnamomeus* and subsp. *naxensis*.

611a. *Dianthus cinnamomeus* subsp. ***naxensis*** Runemark ined. — $2n = 60$.

Gr: Kiklades, Naxos, N.E. of Moni, Fanari Oros, the W. slope, 37°05'N, 25°30'E, 31 Jun 1958, *R & S 11926*.

The subspecies will be formally described in Flora Hellenica vol. 1.

612. *Dianthus diffusus* Sm. — $2n = 30$.

Gr: Evvia, S. part, N. of Akr. Mantili, 37°57'N, 24°30'E, 21 Jun 1958, *R & S 11637*; S. part, N. of Ag. Dimitriou, 38°08'N, 24°27'E, 23 Jun 1958, *R & S 11832*; C. part, 6-7 km N.E. of Steni, 28°33'N, 23°52'E, 19 Jul 1966, *St 23415*.

— Kiklades, Kimolos, between the town and the highest peak, 36°48'N, 24°34'E, 16 Jun 1967, *R & Be 29582*; Milos, "Mt 935", W. of Akr. Romma, 36°42'N, 24°32'E, 17 Jun 1967, *R & Be 29693*; Siros, the valley W. of Plato Vouni, 37°28'N, 24°55'E, 30 May 1968, *S & E 33819*.

613. ***Dianthus elegans*** Dum.-Urville — $2n = 30$.

Gr: E. Aegean islands, Ikaria, narrow canyon S.S.E. of Mt Melissa, 37°32'N, 26°05'E, 15 Jul 1958, *R & S 12629*.

614. ***Dianthus tripunctatus*** Sm. — $2n = 30$.

Gr: Kiklades, Serifos, Volo, 37°12'N, 24°30'E, 4 Jun 1969, *R & E 38081*.

615. ***Herniaria hirsuta*** L. — $2n = 36$.

Gr: Kiklades, Denousa, W. of Ormos Rousa (*H. hirsuta* s. str.), 37°06'N, 25°49'E, 24 May 1958, *R & S 9577*; Dinousa, Ormos Mateo (intermediate) 37°06'N, 25°50'E, 24 May 1958, *R & S 9554*; Iraklia, the island of Megalo Avelos (*H. cinerea*), 36°50'N, 25°25'E, 9 Jun 1960, *R & N 15498*; Keros, the island of Drima (*H. cinerea*), 36°50'N, 25°40'E, 11 Jun 1960, *R & N 15759*; Naxos, Ormos Psiliammos (*H. hirsuta* s. str.), 37°01'N, 25°34'E, 7 Jun 1958, *R & S 10658*; Naxos, Ormos Psiliammos (*H. cinerea*), 37°01'N, 25°34'E, 7 Jun 1958, *R & S 10659*; Naxos, Axapsis to Mitria (*H. hirsuta* s. str.), 37°07'N, 25°26'E, 3 Jun 1957, *R 3924*; Serifos, at the harbour (intermediate), 37°09'N, 24°31'E, 20 Jun 1967, *R & Be 30057*.

Herniaria cinerea DC. has been treated very differently. Hermann (1943) treated *H. cinerea* as a variety of *H. hirsuta* because of the frequent occurrence of intermediates, e.g., in the Aegean area. Chaudri (1868) recognized *H. cinerea* as a "distinct species, but unfortunately a highly misunderstood and misinterpreted one". The treatment is further complicated by the occurrence of both diploids and tetraploids. Diploids have been reported both in *H. cinerea* (Devesa 1987) and in *H. hirsuta* (Cheshmedziev 1994). In the Aegean area only tetraploids have so far been found. They represent typical *H. hirsuta* and *H. cinerea* as well as intermediates (see the list of cultivated material above). The intermediates breed true, i.e. the offspring are homogeneous and agree with the parents. A subdivision at specific or subspecific level of the predominantly autogamous *H. hirsuta* complex with local, stabilized hybrid derivatives seems hardly justified (cf. the discussion by Celebioglu & Favarger 1993).

616. ***Herniaria micrantha*** A. K. Jackson & Turrill — $2n = 18$.

Gr: Ikaria, S.E. part of Mt Melissa, 900 m, 37°22'N, 26°04'E, 16 Jul 1958, *R & S 12673*.

617. ***Holosteum umbellatum*** L. — $2n = 20$.

Gr: E. Aegean islands, Samos, Mt Kerki, the E. part, 800-1200 m, 37°30'N, 24°56'E, 24 May 1962, *R & S 19320*.

— Kiklades, Siros, Kastri, 37°44'N, 36°38'E, 3 Apr 1969, *R, Sr & G 40048*.

617a. *Holosteum umbellatum* L. — $2n = 40$.

Gr: Kiklades, Mikonos, 2 km of Ag. Stefani, 37°30'N, 25°19'E, 17 May 1968, *R & E 36152*; Tinos, E. of Kleptovouno, 37°38'N, 25°11'E, 1 Apr 1969, *R, St & G 39923*.

The diploids studied are small, slender, eglandular with petals shorter than sepals, 5 stamens and capsules 5-5.5 mm, scarcely exceeding sepals (var. *glabra* Kuntze, according to Coode 1967). The tetraploids are more robust, eglandular or moderately glandular with petals equalling sepals, 2-3 stamens, capsules 6-7 mm, distinctly longer than sepals. Both diploids and tetraploids usually have pointed hairs on the leaf margin and upper leaf lamina as described as characteristic of *H. umbellatum* subsp. *hirsuta* (Mutel) Breistr., endemic to S.E. France (see Fl. Europaea I, ed. 2).

618. *Minuartia attica* (Boiss. & Spruner) subsp. ***attica*** — $2n = 48$.

Gr: Dodecanisa, Sirina, N. exposed cliffs c. 150 m, 36°21'N, 26°40'E, 14 May 1960, *R & N 14220*.
— Kiklades, Naxos, Ammomaxis Oros, 650 m, 37°07'N, 25°33'E, 21 Jun 1958, *R & S 9943*.

619. *Minuartia hybrida* (Vill.) Siskin s.l. — $2n = 46$-48.

Gr: Kiklades, Naxos, between Moni and Sifones (*M. hybrida* s. str.), 37°05'N, 25°30'E, 10 May 1968, *R & E 35024*.

The exact chromosome number of *M. hybrida* s.l. ($2n = 46$ or 48) is virtually impossible to count on mitotic preparations (see Favarger & Garraud 1992).

620. *Minuartia lydia* (Boiss.) Bornm. — $2n = 46$-48.

Gr: Kiklades, Naxos, Fanari Oros, 37°04'N, 25°14'E, 1 May 1957, *R 2021*; Amorgos, 3 km E. of Ag. Alatos 36°51'N, 25°25'E, 24 Apr 1969, *R, St & G 41208*; Paros, S.E. of the highest peak 37°02'N, 25°11'E, 28 Apr 1969, *R, St & G 41505*.

621. *Minuartia mediterranea* (Link) K. Maly — $2n = 24$.

Gr: Kiklades, Kea, 1-2 km S. and E. of Otzia, 37°40'N, 24°21'E, 18 Apr 1969, *R, St & G 40883*.

622. *Minuartia mesogitana* (Boiss) Hand.-Mazz. subsp. ***mesogitana*** — $2n = 24$.

Gr: Kiklades, Naxos, Oros Zeus, 850 m, 37°02'N, 25°30'E, 14 May 1957, *R 2671*.

623. *Moenchia graeca* Boiss. & Spruner — $2n = 38$.

Gr: Kiklades, Kea, 1-3 km S. of Chora, 37°38'N, 24°20'E, 10 Apr 1969, *R, St & G 40739*; Naxos, 2 km S.E. of Sangri, 37°03'N, 25°28'E, 18 Apr 1958, *R & S 5908*; Paros, S.E. of the peak area, 37°02'N, 25°11'E, 28 Apr 1969, *R, St & G 41506*.

624. ***Paronychia argentea*** Lam. — $2n = 28$.

Gr: Kiklades, Naxos, 3 km S. of Akr. Axapsis, 37°07'N, 25°25'E, 30 Apr 1957, *R 1943*; Naxos, S. of Kato Potamia, 37°04'N, 25°26'E, 29 May 1958, *R 3429*.

625. ***Paronychia echinulata*** Chater — $2n = 10$.

Gr: Dodecanisa, Astipalea, Maltesana to Vriseu Punda, 36°35'N, 26°25'E, 11 May 1960, *R & N 13535*; Astipalea, Fokeo Nisos, 36°36'N, 26°21'E, 31 May 1960, *R & N 15120*.

— E. Aegean islands, Ikaria, S.W. of "Kara Rafija", 37°33'N, 26°09'E, 15 Jul 1958, *R & S* seeds, *cult.* R-1395.

— Kiklades, Anafi, central part, 36°22'N, 25°46'E, 29 May 1960, *R & N 14996*; Dilos, the island of Ekati, 37°24'N, 25°16'E, 16 May 1968, *R & E 36089*; Ios, Ormos Tris Klisies, 36°40'N, 25°23'E, 26 Jun 1967, *R & Be 30173*; Mikonos, the island of Tragonisi, 37°27'N, 25°29'E, 14 May 1967, *R & Be 35600*; Naxos, 3 km E.N.E. of Mitria, 37°08'N, 25°28'E, 13 May 1957, *R 2558*.

626. ***Paronychia macrosepala*** Boiss. — $2n = 18$.

Cr: Sitia, Cap Sidero, 35°19'N, 26°19'E, 4 Jul 1960, *R & N 16580*.

Gr: Dodecanisa, Astipalea, the island of Kounopia, 36°32'N, 26°28'E, 1 Jul 1960, *R & N 15244*; Nisiros, the island of Kandelioussa, 36°30'N, 26°58'E, 14 Jul 1960, *R & N 16782*.

— Kiklades, Keros (S. of Naxos), 36°54'N, 25°39'E, 9 Jun 1960, *R & N 10855*; Kithnos, Kavo Kephalos, 37°29'N, 24°26'E, 1 Jun 1968, *R & E 37829*; Makaers islands (E. of Naxos), Strongilo, 37°04'N, 25°42'E, 5 Jun 1958, *R & S 10354*; Makares islands, Ag. Nikolaos, 37°05'N, 25°42'E, 5 Jun 1958, *R & S 10451*; Mikonos, N.N.E. of Ormos Ornos, 37°25'N, 25°20'E, 18 Jun 1960, *R & N 16056*, *R & N 16115*; Mikonos, the bay of Elia, 37°25'N, 25°22'E, 17 May 1968, *R & E 36256*; Mikonos, S. side of the E. Prof. Elias Mt., 37°27'N, 25°27'E, 17 May 1968, *R & E 36217*; Mikonos, Dilos, the island of Ekati, 37°24'N, 25°16'E, 16 May 1968, *R & E 36077*; Mikonos, Rinia, the island of Kounellonisi, 37°25'N, 25°15'E, 16 May 1968, *R & E 35945*; Mikonos, Rinia, the N. part, 37°24'N, 25°16'E, 16 May 1968, *R & E 36025*; Paros, Prof. Elias, 37°05'N, 25°10'E, 18 Jul 1958, *R & S* seeds, *cult.* R-1375; Serifos, Pirgos, 37°11'N, 24°29'E, 5 Jun 1969, *R & E 38119*; Siros, Ag. Varvaras, 37°20'N, 24°55'E, 30 May 1968, *R &E 37592*; Skinousa, the island of Agrilosa, 36°51'N, 25°29'E, 9 Jun 1960, *R & N 15573*; Tinos, S. of the town, 27°32'N, 25°10'E, 19 May 1968, *R & E 36449*; Tinos, Ag. Ioannis, 37°32'N, 25°14'E, 24 May 1968, *R & E 37520*.

627. ***Petrorhagia armerioides*** (Ser.) P. W. Ball & Heywood — $2n = 26$.

Gr: Kiklades, Naxos, N. of Ormos Agiasou, 36°59'N, 25°26'E, 3 Jun 1958, *R & S 10141*; 1 km N.E. of Moni, 37°05'N, 25°30'E, 31 Jun 1958, *R & S 11939*.

628. ***Petrorhagia velutina*** (Guss.) P. W. Ball & Heywood — $2n = 30$.

Cr: Sitia, Mt. Spathi, 35°08'N, 25°55'E, 17 May 1962, *R & S 18343*.

Gr: Dodecanisa, Astipalea, Porto Maltesana to Vriseu Punda, 36°35'N, 26°25'E, 10 May 1960, *R & N 13574*.
— E. Aegean islands, Samos, 1-3 km W. of Marathokampos, 37°44'N, 26°40'E, 23 May 1962, *R & S 19047*.
— Evvia, S. part, bay 3 km W.S.W. of Akr. Kafirevs, 38°08'N, 24°37'E, 22 Jun 1958, *R & S 11738*.
— Kiklades, Antiparos, between the highest peak and the S. peak, 36°59'N, 25°03'E, 16 May 1967, *R & Be 28768*; Naxos, Ammomaxis Oros, 37°07'N, 25°33'E, 19 May 1963, *S 20221*.

629. *Polycarpon tetraphyllum* (L.) L. — $2n = 32$.

Gr: Dodecanisa, the island of Kamila (Chamili), 70 km S. of Astipalea, 35°52'N, 26°14'E, 4 May 1967, *R & Be 28157*.
— E. Aegean islands, Ikaria, 2 km N.N.W. of Ag. Kirikos, 37°37'N, 26°17'E, 12 Jul 1958, *R & S 12425*.
— Kiklades, Ios, between Chora and Prof. Elias, 36°43'N, 25°19'E, 6 May 1957, *R 2396*; Kea, the valley 2.5 km E. of Pisa, 37°36'N, 24°18'E, 3 Jun 1969, *S, Bo & E 34194*; Kea, the valley 1.5-2 km E.S.E. of Chora, 37°38'N, 24°22'E, 1 Jun 1968, *S, Bo & E 34042*; Kimolos, the small islands S.W. of Ag. Georgios, the W. island, 356°38'N, 24°55'E, 17 Apr 1967, *R & Be 25705*; Naxos, 3 km S. of Akr. Axapsis, 37°07'N, 25°25'E, 30 Apr 1957, *R 1933*; Santorin, Thera, around the town, 36°25'N, 25°26'E, 16 Apr 1967, *R & Be 27032*.

629a. *Polycarpon tetraphyllum* (L.) L. — $2n = 48$.

Gr: Dodecanisa, Ounia Nisia (60 km W. of Karpathos), the E. island, 35°50'N, 26°28'E, 6 May 1967, *R & Be 28292*.
— Kiklades, Paros, the shore E. of Parikia, 37°05'N, 25°09'E, 6 Apr 1967, *R & Be 24380*; Santorin, the island of Nea Kaimeni, 36°24'N, 25°24'E, 19 Apr 1967, *R & Be 27211*; Serifos, Ormos Psarometochion, 37°12'N, 24°28'E, 28 Apr 1967, *R & Be 28064*.

629b. *Polycarpon tetraphyllum* (L.) L. — $2n = c. 64$.

Gr: Kiklades, Santorin, the island of Thirasia, the harbour of Manolas, 36°26'N, 25°21'E, 27 Jun 1967, *R & Be 30327*.

The exact chromosome numbers have been difficult to count because of small chromosomes that show a tendency to stickiness. Intermediate numbers, $2n = 34$-38 and $2n = 52$-56, seem to occur in some collections (not recorded above), possibly representing hybrid derivatives between plants of different ploidy levels. In the material studied from the Aegean no correlation between morphology and ploidy level has been observed (cf. Celebioglu & Favarger 1993).

630. ***Sagina apetala*** Ard. — $2n = 12$.

Gr: Kiklades, Mikonos, the island of Tragonisi, 37°27'N, 25°29'E, 26 Mar 1969, *R, St & G 39419*; Tinos, 4 km E.N.E. of Ag. Ioannis, 37°34'N, 25°14'E, 28 Mar 1969, *R, St & G 39639*.

631. ***Sagina maritima*** G. Don — $2n = 28$.

Gr: Kiklades, Mikonos, the bay E. of Mirsini, 37°30'N, 25°24'E, 26 Mar 1969, *R, St & G 39494*; Tinos, Akr. Mouronia, 37°39'N, 24°59'E, 30 Mar 1969; *R, St & G 39841*.

632. ***Silene behen*** L. — $2n = 24$.

Cr: Sitia, S. of Tourloti, 35°09'N, 25°57'E, 13 May 1962, *R & S 17300*.
Gr: E. Aegean islands, Ikaria, 2-4 km W.N.W. of Praia P:t, 37°35'N, 26°08'E, 17 Jun 1958, *R & S 11388*; Samos, Mt Kerki, N. of Ag. Kiriaki, 37°42'N, 26°37'E, 26 May 1962, *R & S 19531*.
— Kiklades, Kithnos, Ormos Flamporion, 37°22'N, 24°24'E, 3 Jun 1968, *R & E 38007*; Naxos, the bay N. of Moutsonis, 37°06'N, 25°35'E, 6 Jun 1958, *R & S 10521*; Skinousa (S. of Naxos), 36°52'N, 25°32'E, 9 Jun 1957, *R* seeds, *cult.* R-59.

633. ***Silene colorata*** Poiret — $2n = 24$.

Cr: Sitia, the valley and shore S. of the town, 35°11'N, 26°07'E, 15 May 1962, *R & S 17926*.
Gr: Dodecanisa, Sirina, N.E. part, 36°21'N, 26°42'E, 9 May 1967, *R & Be* seeds, *cult.* R-4129; Sirina, the shore N. of Ag. Ioannis Ormos, 36°20'N, 26°41'E, 2 May 1958, *R & S 7266*.
— E. Aegean islands, Ikaria, the S.W. part, Ag. Nikolaos, 37°31'N, 26°03'E, 20 Apr 1958, *R & S 6058*.
— Kiklades, Anafi, Kalamos, E. of the monastery, 36°22'N, 25°51'E, 8 May 1958, *R & S 8128*; Anafi, Fteni, the W. island, 36°19'N, 25°48'E, 28 May 1960, *R & N 14931*; Mikonos, the island of Ag. Georgios, 37°27'N, 25°18'E, 15 May 1968, *R & E 35664*; Naxos, Ag. Chrisostomos, 37°06'N, 25°26'E, 9 Apr 1957, *R* seeds, *cult.* R-100; Paros, at the monastery S. of Parikia, 37°09'N, 25°04'E, 5 Apr 1967, *R & Be* seeds, *cult.* R-4130; Serifos, Ormos Psarometokhion, 37°12'N, 24°28'E, 28 Apr 1967, *R & Be 28067*; Sikinos, the E. part, 36°42'N, 25°11'E, 10 Apr 1967, *R & Be 24771*.

634. ***Silene compacta*** Fischer — $2n = 24$.

Gr: Kiklades, Koronos Oros, the W. peak, 37°07'N, 25°30'E, 10 Jul 1958, *R & S 12397*; Tinos, cliffs N. of Tripotamos, 37°34'N, 25°12'E, 11 Jun 1964, *S 21063*.

The two collections represent the only known localities from the Kikladhes and differ from other Greek populations by being monocarpic, growing in cliffs (hard stratified, siliceous rock), and in having a thick, woody root.

635. *Silene cretica* L. — $2n = 24$.

Cr: Sitia, N.E. exposed slope of Mt Spathi, 35°04'N, 25°55'E, 17 May 1962, *R & S 18381*.

Gr: E. Aegean islands, Samos, 1-3 km W. of Marathokampos, 37°44'N, 26°40'E, 23 May 1962, *R & S 19003*.

— Kiklades, Kea, the valley 2 km S.W. of Chora, 37°38'N, 24°19'E, 3 Jun 1968, *S & Bo 34159*; Kea, the valley 1.5-2 km E.S.E. of Chora, 37°38'N, 24°21'E, 1 Jun *1968*, *S & Bo* 34018; Kea, 1 km S.W. of the island of Spanopoula, 37°41'N, 24°22'E, 4 Jun 1968, *S & Bo 34283*; Tinos, S.E. of Steni, 37°34'N, 25°12'E, 20 May 1968, *R & E 36557*.

636. *Silene cythnia* (Halácsy) Walters — $2n = 24$.

Gr: Kiklades, Kea, valley 2 to 4 km E.S.E. to S.E. of Chora, 37°38'N, 24°22'E, 1 Jun 1968, *S, Bo & E 34081*; Kea, valley 1.5 to 2 km E.S.E. of Chora, 37°38'N, 24°22'E, 1 Jun 1968, *S, Bo & E 34017*; Kea, valley 3 to 3.5 km N.E. of the top of Ag. Theodoros, 37°34'N, 24°20'E, 6 Jun 1968, *S, Bo & E 34427*; Kithnos, W. of Stenon Kanalas, 37°20'N, 24°24'E, 8 Jun 1969, *R & E 38304*; Kithnos, Ormos Aporousi, 37°24'N, 24°24'E, 3 Jun 1969, *R & E 37985*; Mikonos, E. of Marmaris, 37°30'N, 25°21'E, 17 May 1968, *R & E 36196*; Mikonos, the Mt N. of Ano Mera, 37°28'N, 25°24'E, 12 May 1968, *R & E 35253*; Naxos, Stavros Keramotis, 37°06'N, 25°30'E, 13 Jun 1957, *R* seeds, *cult.* R-78; Naxos, between Moni and Sifones, 37°05'N, 25°30'E, 12 Jun 1967, *R & Be 29511*; Paros, Prof. Elias, 37°12'N, 25°12'E, 18 Jul 1958, *R & S 12740*; Serifos, Kampos, 37°10'N, 24°28'E, 21 Jun 1967, *R & Be 30093*.

637. *Silene fabaria* (L.) Sm. — $2n = 24$.

Gr: Dodecanisa, Astipalea, inside Baia di Vazze, 36°31'N, 26°19'E, 3 Jun 1960, *R & N 15351*; Astipalea, the island of Kounopia, S. part, 36°32'N, 26°28'E, 1 Jun 1960, *R & N 15258*; Astipalea, the island of Ofidousa, 36°33'N, 26°09'E, 12 May 1960, *R & N 13852*.

— Kiklades, Mikonos, Tershan P:t, 37°26'N, 25°25'E, 19 Jun 1960, *R & N 16270*.

— Skiros, the island of Mirmingia, 38°52'N, 24°27'E, 26 Jul 1960, *R & N 16851*.

Tu: Izmir, 4 km N.W. of Foca, small island at the sea shore, 38°36'N, 26°43'E, 26 Jun 1966, *Bo 23063*.

638. *Silene fruticosa* L. — $2n = 24$.

Gr: Dodecanisa, Karpathos, cliffs at Meso Chorio, 35°37'N, 27°07'E, 12 Jul 1966, *Bo 23156*.

639. *Silene gallica* L. — $2n = 24$.

Gr: E. Aegean islands, Ikaria, W. part, Ag. Nikolaos, 37°31'N, 26°03'E, 20 Apr 1958, *R & S 5986, 5989*.

— Kiklades, Antimilos, 36°48'N, 24°14'E, 15 May 1958, *R & S 8773*; Ios, between Chora and Prof. Elias, 36°43'N, 25°19'E, 6 May 1957, *R 2382*; Mikonos, N. of Ano Mera, 37°27'N, 25°24'E, 12 May 1968, *R & E 35184*; Mikonos, 1 to 2 km N.N.W. of Ano Mera, 37°28'N, 25°23'E, 12 May 1968, *R & E 35240*; Mikonos, the town, 37°27'N, 25°20'E, 12 May 1968, *R & E 35139*; Mikonos, Ormos Ornos, 37°25'N, 25°19'E, 14 May 1968, *R & E 35519*; Naxos, E. of Apollona, 37°11'N, 25°33'E, 4 Jun 1957, *R 3963*; Naxos, N. of the W. peak of Koronos Oros, 37°08'N, 25°29'E, 2 Jun 1958, *R & S 9997*, 10027; Naxos, Ag. Theodoro, 37°11'N, 25°29'E, 20 Jun 1958, *R & S 8919*; Naxos, 1 km N.E. of Moni, 37°05'N, 25°30'E, 31 Jun 1958, *R & S 11913*; Naxos, Stavros Keramotis, 37°06'N, 25°30'E, 13 Jun 1957, *R* seeds, *cult.* R-27; Santorin, Thirasia, between Manolas and the peak area, 36°26'N, 25°21'E, 27 Jun 1967, *R & Be 30361*; Serifos, Livadion, 37°09'N, 24°31'E, 26 Apr 1967, *R & Be 27622*; Serifos, between Livadion and Chora, 37°09'N, 24°30'E, 26 Apr 1967, *R & Be 27397*; Serifos, Koutalas, 37°08'N, 24°27'E, 28 Apr 1967, *R & Be 27965*.

640. *Silene gigantea* L. — $2n = 24$.

Gr: E. Aegean islands, Ikaria, 4 km W.N.W. of Praia P:t, 37°35'N, 26°08'E, 17 Jun 1958, *R & S 11382*; Ikaria, N. of Praia P:t, 37°34'N, 26°11'E, 18 Jun 1958, *R & S 11486*.

— Ionian islands, Kefallinia, 0.5 to 2 km S. of Assos, 38°22'N, 20°23'E, 12 Jun 1966, *S 23670*.

Tu: Izmir, 1 to 3 km N. of Kusch-Adassi, sea cliffs, 37°52'N, 27°15'E, 28 May 1962, *R & S 20019*.

641. *Silene graeca* Boiss. & Spruner — $2n = 24$.

Gr: Peloponnisos, 2 km S. of Kiverion (on the border between Argolis and Arkadia), 37°31'N, 22°40'E, 1 May 1967, *R & Be 41514*.

642. *Silene holzmannii* Boiss. — $2n = 24$.

Gr: Attiki, the island of Disaki (S.W. of Idhra), 37°16'N, 23°21'E, 14 May 1974, *R & Bo 47232*; Diaphori Nisi (W.N.W. of Egina), the island of Moladhi, 37°48'N, 23°17'E, 17 May 1974, *R & Bo 47456*; S.W. coast of the peninsula of Attiki, Markello, the E. island, 37°45'N, 23°54'E, 18 May 1974, *R & Bo 47521*; S.W. coast of the peninsula of Attiki, the island of Pothito, 37°46'N, 23°53'E, 18 May 1974, *R & Bo 47527*.

— Dodecanisa, Leros, Kalapodi, the W. island, 37°15'N, 26°49'E, 29 Apr 1974, *R & Bo 46409*; Lipsos, the small island N. of Somo (close to Lipsos), 37°17'N, 26°45'E, 29 Apr 1974, *R & Bo 46392*; Safora (45 km S. of Astipalea), 36°04'N, 26°24'E, 8 Apr 1958, *R & S 7075*, 5 Apr 1967, *R & Be 28185*; Tria Nisia (S. of Sirina), the E. island, 36°37'N, 26°43'E, 15 May 1960, *R & N 14579*.

— Kiklades, Antiparos, N. of Kavouras, the S. island, 37°05'N, 25°06'E, 3 Jul 1967, *R & Be 30755*; Ios, the island of Prassos, 36°40'N, 25°19'E, 26 Jun 1974, *R & Be 30248*; Paros, the small, narrow island W. of Ovriokastro, 37°09'N, 25°17'E, 18 May 1967, *R & Be 29151*; Paros, the small island E. of Gaidaronisi, 37°10'N,

25°17'E, 18 May 1967, *R & Be 29185*; Siros, the island of Delfini (N.N.W. of Kini), 37°27'N, 24°54'E, 28 May 1968, *S & Bo 33681*.

Silene holzmannii is endemic to the S. and C. Aegean. It has only been found in the epilitoral zone on c. 25 very small islands, almost always ungrazed and lacking phrygana vegetation.

643. *Silene italica* (L.) Pers. — $2n = 24$.

Gr: Kiklades, Naxos, near the chapel N. of Oros Zeus, 600 m, 37°03'N, 25°30'E, 4 Aug 1957, *R* seeds, *cult.* R-1486.

644. *Silene nocturna* L. — $2n = 24$.

Gr: Dodecanisa, safora (45 km S. of Astipalea), 36°04'N, 26°24'E, 1 May 1957, *R & S 7183*.

— Kiklades, the bay N.E. of Arionisi, 36°45'N, 25°16'E, 21 Apr 1969, *R, St & G 40957*; Kimolos, Ormos Vroma, 36°49'N, 24°34'E, 18 Apr 1967, *R & Be 26085*; Mikonos, the town, 37°27'N, 25°20'E, 12 May 1968, *R & E 35138*; Mikonos, Dilos, Fourni, 37°23'N, 25°16'E, 18 May 1968, *R & E 36287*; Naxos, N. of Mitria, 37°09'N, 25°29'E, 25 Apr 1967, *R* seeds, *cult.* R-134; Naxos, 1 km N.W. of Moutsonis, 37°05'N, 25°25'E, 6 Apr 1958, *R & S 10542*; Naxos, E. of Ag. Theodoro, 37°11'N, 25°29'E, 20 May 1958, *R & S 8895*; Paros, the island of Glaropounda, 36°59'N, 25°09'E, 17 May 1967, *R & Be 29037*; Poliegos, the N.W. part, 36°47'N, 24°37'E, 19 Apr 1967, *R & Be 26316*; Serifos, the island of Vous, 37°09'N, 24°34'E, 27 Apr 1967, *R & Be 27905*; Siros Ag. Varvaras, 37°28'N, 24°54'E, 30 May 1968, *R & Bo* 37617; Tinos, below Kardiani, 37°36'N, 25°04'E, 30 Mar 1969, *R, St & G 39809*.

645. *Silene samia* Melzheimer & Christodoulakis — $2n = 24$.

Gr: Samos, 3-4 km W. of Marathokampos, 37°42'N, 26°79'E, 23 May 1962, *R & S 19064*; Mt Kerki, N. of Ag. Kiriaki, 37°43'N, 26°39'E, 26 May 1962, *R & S 19541*.

646. *Silene sartorii* Boiss. & Heldr. — $2n = 20$.

Gr: Kiklades, Antiparos, the E. side, central part, 37°00'N, 25°05'E, 27 Apr 1969, *R, St & G 41464*; Dilos, the island of Rinia, Lazaretto, 37°24'N, 25°14'E, 16 May 1968, *R & E 35903*; Ios, N. of the harbour, 36°44'N, 25°17'E, 5 May 1957, *R 2185*; Iraklia (S. of Naxos), between the harbour and the cove, 36°50'N, 25°28'E, 7 May 1960, *R & N 13211*; Kea, Korissia, 37°40'N, 24°19'E, 5 Jun 1968, *S & Bo 34384*; Kithnos, Loutra, 37°27'N, 24°25'E, 31 May 1968, *R & E 37746*; Mikonos, Ormos Ftelia, 37°28'N, 25°25'E, 12 May 1968, *R & E 35333*; Mikonos, 2 km N. of Ag. Stefano, 37°30'N, 25°19'E, 17 May 1968, *R & E 36157*; Mikonos, Ormos Ornos, 37°25'N, 25°19'E, 17 Jun 1960, *R & N 16058*; Naxos, 3 km N. of Mitria, 37°08'N, 25°26'E, 18 May 1957, *R 3106*; Naxos, 2.5 km W. of Mitria, 37°06'N, 25°24'E, 30 Jul 1958, *R* seeds, *cult.* R-1497; Santorin, Thirasia, the peak area, 36°26'N,

25°21'E, 27 Jun 1967, *R & Be 30351*; Tinos, S. of the town, 37°32'N, 25°10'E, 19 May 1968, *R & E 36464*.

647. *Silene sedoides* Poiret — $2n = 24$.

Gr: Dodecanisa, Kamila (Chamili), 70 km S. of Astipalea, 35°52'N, 26°14'E, 6 May 1958, *R &S 7926*; Levitha, Porto di Levitha, 37°00'N, 26°26'E, 1 Jul 1958, *R & S 12039*; Kinaros, the island of Mavronisi, 36°59'N, 26°26'E, 2 Jul 1958, *R & S 12074*.

— Kiklades, Kea, Ozia, 37°41'N, 24°21'E, 4 Jun 1968, *S, Bo & E 34243*; Keros (S. of Naxos), the island of Ag. Andreas, 36°52'N, 25°38'E, 10 Jun 1958, *R & S 10918*; Keros, the island of Plaki, 36°52'N, 25°37'E, 10 Jun 1958, *R & S 10936*; Keros, small island N. of Plaki, 36°52'N, 25°37'E, 10 Jun 1957, *R & S 10966*; Kithnos, the island of Piperi, 37°20'N, 24°31'E, 30 Jun 1966, *S 23340*; Naxos, E. of Apollona, 37°11'N, 25°33'E, 5 Jun 1957, *R* 4112; Paros, the island W. of Ovriokastro, 37°07'N, 25°17'E, 18 May 1967, *R & Be 29162*; Siros, the island of Aspronisos, 37°24'N, 25°00'E, 27 May 1968, *S, Bo & E 33480*; Skinousa (S. of Naxos), 36°52'N, 25°31'E, 9 Jun 1957, *R 4432*; Tinos, Prassonia, the N. island, 37°39'N, 25°08'E, 22 May 1968, *R & E 36928*; Tinos, Oros Ag. Elias, 300-400 m, 37°40'N, 25°02'E, 28 May 1968, *R & E 37450*.

648. *Silene spinescens* Sm. — $2n = 24$.

Gr: Evvia, S. part, Ag. Dimitrio, 38°08'N, 24°27'E, 23 Jun 1958, *R & S 11837*.

— Peloponnisos, Argolis, Nauplion, below the castle, 37°34'N, 22°48'E, 19 May 1964, *R & S 21950*.

649. *Silene subconica* Friv. — $2n = 20$.

Gr: E. Aegean islands, Samos, E. part of Mt Kerki, 800 to 1200 m, 24 May 1962, *R & S 19363*.

650. *Silene urvillei* Dum.-Urville — $2n = 24$.

Gr: E. Aegean islands, Samos, Mt Kerki, 1400 m, 37°44'N, 26°37'E, 2 Aug 1960, *R & N 16939*.

651. *Silene vulgaris* (Moench) Garcke subsp. ***macrosperma*** Turrill — $2n = 48$.

Gr: Kiklades, Kea, Kato Meria, c. 2 km S. of Ag. Nikolaos, 37°35'N, 24°19'E, 6 Jun 1968, *S, Bo & E 34477*; Kea, the valley 1.5-2 km E.S.E. of Chora, 37°38'N, 24°22'E, 1 Jun 1968, *S, Bo & E 34027*; Kithnos, Ormos Ag. Dimitrio, 37°18'N, 24°22'E, 4 Jun 1968, *R & E 38058*; Kithnos, 3 km N. of Loutra, 37°28'N, 24°25'E, 1 Jun 1968, *R & E 37796*; Makares (E. of Naxos), the island of Ag. Nikolaos, 37°05'N, 25°42'E, 5 Jun 1958, *R & S 10405*; Mikonos, the island of Rinia, N. part, 37°25'N, 25°13'E, 16 May 1968, *R & E 36003*; Milos, the W. side, valley N. of the monastery, 36°42'N, 24°21'E, 18 Jun 1967, *R & Be 29808*; Paros, the bay E. of

Akr. Makria, 36°59'N, 25°12'E, 4 Jul 1967, *R & Be 30914*; Skinousa (S. of Naxos), 36°52'N, 25°31'E, 9 Jun 1957, *R 4373*.

651a. ***Silene vulgaris*** (Moench) Garcke subsp. ***megalosperma*** (Heldr.) Hayek — $2n = 24$.

Gr: Evvia, S. part, N. of Ag. Dimitrio, 37°25'N, 25°13'E, 23 Jun 1958, *R & S 11837*.

652. ***Spergula arvensis*** L. — $2n = 18$.

Gr: Kiklades, Mikonos, the island of Rinia, central part, 38°08'N, 24°27'E, 25 Mar 1969, *R, St & G 39298*.

653. ***Spergula pentandra*** L. — $2n = 18$.

Gr: Kiklades, Tinos, 3 km N.E. of Falatados, 37°36'N, 25°13'E, 29 Mar 1969, *R, St & G 39703*.

654. ***Spergularia bocconei*** (Scheele) Graebner — $2n = 36$.

Gr: Dodecanisa, Lipsos, W. and N. of the harbour, 37°18'N, 26°47'E, 28 Apr 1974, *R & Bo 46368*.

— Kiklades, Ios, Ormos Tris Klisies, 36°40'N, 25°23'E, 26 Jun 1967, *R & Be 30176*; Ios, 2 km E. of Akr. Aspros Gremnos, 36°47'N, 25°17'E, 21 Apr 1969, *R, St & G 41010*; Mikonos, E. of Ano Mera, 37°27'N, 25°24'E, 27 Mar 1969, *R, St & G 39560*; Mikonos, N.N.W. of the town, 37°27'N, 37°20'E, 11 May 1968, *R & E 35097*; Mikonos, the island of Nihero (S.W. of Dilos), 37°24'N, 25°16'E, 15 May 1968, *R & E 35746*; Mikonos, the island of Dhilos, central part, 37°22'N, 25°16'E, 15 May 1968, *R & E 35766*; Milos, W. part, N. of the monastery, 36°42'N, 24°21'E, 18 Jun 1967, *R & Be 29806*; Siros, Varvaras, 37°28'N, 24°54'E, 30 May 1968, *R & Bo 37628*; Siros, Varvaras to Kini, 37°27'N, 24°50'E, 30 May 1968, *R & Bo 37660*.

655. ***Spergularia diandra*** (Guss.) Boiss. — $2n = 18$.

Cr: Sitia, S. of the town, 35°11'N, 26°07'E, 15 May 1962, *R & S 17943*.

Gr: Dodecanisa, Kamila (Chamili), 70 km S. of Astipalea, 35°52'N, 26°14'E, 4 May 1967, *R & Be 28155*.

— Kiklades, Amorgos, Kampos, 36°48'N, 25°48'E, 26 Apr 1969, *R, St & G 41355*; Amorgos, between the villages N.E. of Oros Korax, 36°48'N, 25°42'E, 26 Apr 1969, *R, St & G 41366*; Siros, Prionaki, 37°31'N, 24°53'E, 3 Apr 1969, *R, St & G 40020*; Siros, the bay of Vari, 37°23'N, 24°57'E, 26 May 1968, *S & Bo 33333*.

656. ***Spergularia marítima*** (All.) Chiov. — $2n = 18$.

Gr: Kiklades, Kea, Korissia, 37°40'N, 24°19'E, 5 Jun 1968, *S & Bo 34349*.

657. *Spergularia salina* J. & C. Presl — $2n = 36$.

Gr: Dodecanisa, Leros, Churni Nisia, the W. island, 37°08'N, 26°49'E, 27 Apr 1974, *R & Bo 46167*.
— E. Aegean islands, Samos, Tigani, 37°42'N, 26°57'E, *R & S 19947*.
— Kiklades, Amorgos, N.E. of Katapola, 36°50'N, 25°52'E, 17 Apr 1957, *R 1394*; Kea, Korissia, 37°41'N, 24°21'E, 4 Jun 1968, *R & Bo* 34235; Kithnos, E. of Merixas, 37°24'N, 24°24'E, 6 Jun 1968, *R & E 38201*; Kithnos, Loutra, 37°27'N, 24°25'E, 31 May 1968, *R & E 37767*; Mikonos, N. of Ano Mera, 37°27'N, 25°24'E, 12 May 1968, *R & E 35205*; Mikonos, 2 km N. of Ag. Stefano, 37°30'N, 25°19'E, 17 May 1968, *R & E 36153*; Mikonos, the island of Rinia, Lazaretto, 37°24'N, 25°19'E, 16 May 1968, *R & E 35910*; Mikonos the island of Dilos, S. of the ruins, 37°24'N, 25°16'E, 24 Mar 1969, *R, St & G 39273*; Naxos, 3 km N. of Mitria, 37°08'N, 25°26'E, 18 May 1957, *R 3075*, *R 3076*; Tinos, Mamados, 37°39'N, 25°01'E, 28 May 1968, *R & E 37406*; Tinos, Ag. Ioannis, 37°32'N, 25°14'E, 29 May 1968, *R & E 37534*.

658. *Stellaria cupaniana* (Jord. & Fourr.) Béguinot — $2n = 22$.

Cr: Sitia, above Dri, 35°09'N, 26°07'E, 12 May 1962, *R & S 17206*.
Gr: Kiklades, Ios, N.W. of Prof. Elias, 36°43'N, 25°19'E, 6 May 1957, *R 2444*; Naxos, Xalandra to Mitria, 37°07'N, 25°28'E, 29 Mar 1957, *R* 597; Sikinos, the N. coast W. of Kastro, 36°42'N, 25°06'E, 11 Apr 1967, *R & Be 25018*.

659. *Stellaria media* (L.) Vill. — $2n = 44$.

Gr: Kiklades, Naxos, Faneromeni, 37°09'N, 25°29'E, 22 May 1957, *R 3398*; Naxos, 1 km E. of Mitria, 37°07'N, 25°27'E, 31 May 1957, *R 3655*; Sifnos, S. of Kastro, 36°59'N, 24°45'E, 10 Apr 1969, *R, St & G 40438*; Tinos, E. of Kleptovouno, 37°38'N, 25°11'E, 1 Apr 1969, *R, St & G 39916*; Tinos, the Mt E. of Falatados, 37°35'N, 25°13'E, 24 May 1968, *R & E 37116*.

660. *Stellaria pallida* (Dumort.) Piré — $2n = 22$.

Gr: Kiklades, Amorgos, 3 km E. of Ag. Alatos, 36°51'N, 25°25'E, 24 Apr 1969, *R, St & G 41212*; Mikonos, the bay E. of Mirsini, 37°30'N, 25°24'E, 26 Mar 1969, *R, St & G 39484*; Mikonos, the peak area of W. Ag. Elias, 37°29'N, 25°20'E, 28 Mar 1969, *R, St & G 39591*; Mikonos, the island of Dhilos, S.W. part, 37°23'N, 25°16'E, 25 Mar 1969, *R, St & G 39368*; Siros, the valley near Kiperoussia, 37°28'N, 24°55'E, 30 May 1968, *S & E 33871*; Tinos, 3 km N.W. of Aetofolia, 37°36'N, 25°06'E, 2 Apr 1969, *R, St & G 39964*; Tinos, 4 km E.N.E. of Ag. Ioannis, 37°34'N, 25°14'E, 28 Mar 1969, *R, St & G 39644*; Tinos, 4 km E.S.E. of Kardiani, 37°35'N, 25°07'E, 30 Mar 1969, *R, St & G 39795*.

661. *Velezia quadridentata* Sm. — $2n = 26$.

Gr: Kiklades, Kithnos, Ormos Ag. Dimitrio, 37°18'N, 24°22'E, 4 Jun 1968, *R & E 38065*; Mikonos, the S. part of E. Ag. Elias, 37°27'N, 25°27'E, 17 Jun 1968, *R & E*

36236; Mikonos, the island of Rinia, N. part, 37°25'N, 25°13'E, 16 May 1968, *R & E 36034*; Naxos, Metri (N. of Moni), 37°05'N, 25°30'E, 20 May 1957, *R 3207*.

662. *Velezia rigida* L. — $2n = 28$.

Gr: Kiklades, Paros, the bay E. of Akr. Makria, 36°59'N, 25°12'E, 4 Jul 1967, *R & Be 30898*; Paros, 2-3 km N. of the peak of Prof. Elias, 37°03'N, 25°12'E, 18 Jul 1958, *R & S 12698*; Tinos, below Isternia, 37°37'N, 25°03'E, 26 May 1968, *R & E 37269*.

663. *Emex spinosa* (L.) Campd. — $2n = 20$.

Gr: Dodecanisa, Astipalea, E. of Panormos, Doma, 36°36'N, 26°17'E, 30 May 1960, *R & N 15051*; Sirina, N. and W. of Ag. Ioannis Ormos, 36°20'N, 26°41'E, 6 Apr 1966, *R & P 22354*.

— Kiklades, Antiparos, near the village, 37°02'N, 25°05'E, 17 May 1967, *R & Be 28888*; Mikonos, the island of Rinia, S. part, 37°27'N, 25°29'E, 24 Mar 1969, *R, St & G 39396*; Naxos, S. of the town, 37°06'N, 25°22'E, 4 May 1957, *R 2150*; Siros, 1.5-2 km N. of Kini, 37°28'N, 24°54'E, 28 May 1968, *S & Bo 33711*.

664. *Polygonum aviculare* L. subsp. ***neglectum*** (Besser) Arcangeli — $2n = 60$.

Gr: Dodecanisa, Rodhos, 3 km N.E. of Embona, 36°14'N, 27°53'E, Oct 1982, *Carlström 5149*.

665. *Polygonum lapathifolium* L. — $2n = 22$.

Gr: Kiklades, Naxos, E. of Appollona, 37°11'N, 25°33'E, 4 Jun 1957, *R 3965*.

666. *Polygonum maritimum* L. — $2n = 20$.

Gr: Kiklades, Kea, Ozia, 1968, 37°41'N, 24°21'E, 4 Jun 1968, *S & Bo 34240*; Serifos, Koutalas, 37°08'N, 24°27'E, 28 Apr 1967, *R & Be 27966*; Sifnos, Ormos Kondos, 36°54'N, 24°42'E, 13 May 1958, *R & S 8454*; Siros, the island of Didimi, 37°26'N, 24°58'E, 27 May 1968, *S, Bo & E 33372*.

667. *Rumex bucephalophorus* L. subsp. ***aegaeus*** Rech. fil. — $2n = 16$.

Gr: Dodecanisa, Astipalea, the island of Ofidousa, 36°33'N, 26°09'E, 12 May 1960, *R & N 13719*.

— Evvia, S.W. corner of the island, Mantili Nisos, 37°56'N, 24°31'E, 21 Jun 1960, *R & S* seeds, *cult.* R-1307.

— Kiklades, Ananes (20 km S.W. of Milos), the largest island, 36°31'N, 24°08'E, 17 Jun 1967, *R & Be 29741*; Kithnos, the island of Piperi, 37°20'N, 24°31'E, 27 Apr 1967, *R & Be 27717*; Milos, Kastro to Adamas, 36°44'N, 24°26'E, 20 Apr 1967, *R & Be 26565*; Naxos, 3 km S. of Axapsis, 37°07'N, 25°25'E, 30 Apr 1957, *R 1936*;

Santorin, Thera, near the town, 36°25'N, 25°26'E, 16 Apr 1967, *R & Be 26985*; Sikinos, E. of Kastro, 36°42'N, 25°08'E, 9 Apr 1967, *R & Be 24631*.

667a. *Rumex bucephalophorus* L. subsp. ***graecus*** (Steinh.) Rech. fil. — $2n = 16$.

Gr: E. Aegean islands, Samos, 3-4 km W. of Marathokampos, 37°43'N, 26°39'E, 23 May 1962, *R & S 19250*; Samos, S. of Vourliotes, Mt Ag. Elias, 37°46'N, 26°51'E, 27 May 1962, *R & S 19843*.
— Ionian islands, Kefallinia, 2 km E.N.E. of Sami, 38°16'N, 20°41'E, 10 Jun 1966, *S 23639*.

668. *Rumex conglomeratus* Murray — $2n = 20$.

Gr: Kiklades, Mikonos, S:t Anna Bay, 37°25'N, 25°23'E, 19 Jun 1960, *R & N 16186*.

669. *Rumex crispus* L. — $2n =$ c. 60.

Gr: Kiklades, Siros, near Kiperoussia, 37°38'N, 24°55'E, 30 May 1968, *S & E 33875*.

670. *Rumex tuberosus* L. subsp. ***creticus*** (Boiss.) Rech. fil. — $2n = 14♀, 15♂$.

Gr: Dodecanisa, Astipalea, the island of Pontikoutha, 36°33'N, 26°14'E, 13 May 1960, *R & N 13882*.
— Kiklades, Amorgos, Katapola, 36°50'N, 25°52'E, 15 Apr 1957, *R* 1218; Ios, N.W. of the highest peak, 36°44'N, 25°20'E, 7 May 1958, *R 2528*; Kimolos, S. and S.W. of the harbour, 36°47'N, 24°35'E, 17 Apr 1967, *R & Be 25736*.

671. *Rumex pulcher* L. subsp. ***pulcher*** — $2n = 20$.

Gr: Dodecanisa, Levitha, Porto di Levitha, (subsp. *pulcher*), 37°00'N, 26°28'E, 1 Jul 1958, *R & S 12027*.
— E. Aegean islands, Ikaria, the pass W. of Mt Melissa, (subsp. *pulcher*), 37°33'N, 26°02'E, 20 Jun 1960, *R & N 16306*.
— Evvia, S. part, 3 km W.S.W. of Akr. Kafireus, (subsp. *raulinii*), 38°08'N, 24°33'E, 22 Jun 1958, *R & S 11753*.
— Kiklades, Naxos, 2.5 km W. of Mitria, 37°07'N, 25°24'E, 30 Jul 1958, *R* seeds, *cult.* R-1502; Naxos, 1 km E. of Mitria, (subsp. *raulinii*), 37°07'N, 25°27'E, 31 May 1957, *R 3704*; Naxos, S. of Kato Potamia, (subsp. *raulinii*), 37°04'N, 25°26'E, 29 May 1957, *R 3486*; Naxos, 1 km N.E. of Apiranthos, (subsp. *raulinii*), 37°07'N, 25°32'E, 17 May 1957, *R 2981*.

Rumex pulcher L. subsp. *raulinii* (Boiss.) Rech. fil. is characterized by long valves (5-6 mm) with long teeth (3-4 mm). In the Aegean it intergrades with "normal" subsp. *pulcher* (with smaller valves and teeth). The two subspecies will, however, be kept separate in Flora Hellenica (Snogerup, pers. comm.). Snogerup's determinations are therefore given in parenthesis in the locality listed above.

671a. *Rumex pulcher* L. subsp. ***woodsi*** (De Not.) Arcangeli — $2n = 20$.

Gr: Dodecanisa, Astipalea, Vathi, 36°37'N, 26°25'E, 31 May 1960, *R & N 15159*; Kinaros (E. of Amorgos), 36°59'N, 26°17'E, 2 Jul 1958, *R & S 12129 a, b*.
— Kiklades, Amorgos, Langada, 36°54'N, 25°59'E, 30 Jun 1967, *R & Be 30653*; Naxos, the valley W. of Liona, 37°08'N, 25°35'E, 22 May 1958, *R & S 9201*.

672. *Montia fontana* L. subsp. ***amporitana*** Sennen — $2n = 20$.

Gr: Kiklades, Tinos, Mt E. of Kardiani, 37°36'N, 25°06'E, 27 May 1968, *R & E 37345*.

673. *Parietaria cretica* L. — $2n = 12$.

Gr: Dodecanisa, Astipalea, the island of Kounopia, S. part, 36°32'N, 26°28'E, 1 Jun 1960, *R & N 15248*.
— Kiklades, Ios, between the harbour and Chora, 36°44'N, 25°17'E, 6 May 1957, *R 2363*; Naxos, E. of Apollona, 37°11'N, 25°33'E, 5 Jun 1957, *R 4106*; Tinos, N. of Isternia, 37°38'N, 25°03'E, 26 May 1968, *R & E 37224*.

674. *Parietaria judaica* L. — $2n = 26$.

Gr: E. Aegean islands, Ikaria, Kampos, 37°38'N, 26°10'E, 25 Apr 1958, *R & S 6900*; Ikaria, the pass N. of Praia P:t, 37°34'N, 26°09'E, 18 Jun 1958, *R & S 11445*.
— Evvia, S. part, 3 km W.S.W. of Akr. Kafirevs, 38°08'N, 24°33'E, 22 Jun 1958, *R & S 11669*.
— Kiklades, Makares (E. of Naxos), the island of Strongilo, 37°04'N, 25°42'E, 5 Jun 1958, *R & S 10352*; Naxos, W. of Ormos Liona, 37°08'N, 25°35'E, 22 May 1958, *R & S 9204*; Naxos, N. of the W. peak of Koronos Oros, 37°08'N, 25°29'E, 2 Jun 1958, *R & S 10049*; Naxos, 2 km N.N.W. of Kato Potamia, 37°05'N, 25°25'E, 2 Apr 1958, *R & S 4771*; Serifos, Pirgos, 37°11'N, 24°29'E, 5 Jun 1968, *R & E 38130*; Siros, Ag. Varvaras, 37°28'N, 24°54'E, 30 May 1968, *R & E 37588*; Siros, the harbour, 37°26'N, 24°56'E, 8 Apr 1958, *R & S 5276*; Tinos, Mamados, 37°39'N, 25°01'E, 28 May 1968, *R & E 37399*; Tinos, S. of the town, 37°32'N, 25°10'E, 19 May 1968, *R & E 36447*.

675. *Parietaria lusitanica* L. — $2n = 16$.

Gr: Kiklades, Ios, N.W. of Prof. Elias, 36°43'N, 25°19'E, 6 May 1957, *R 2437*.

676. *Urtica membranacea* Poir. — $2n = 22$.

Gr: Kiklades, Mikonos, at the town, 37°27'N, 25°20'E, 12 May 1968, *R & E 35129*.

677. *Urtica pilulifera* L. — $2n = 26$.

Gr: Kiklades, Amorgos, Katapola, 36°49'N, 25°52'E, 15 Apr 1957, *R 1252*.

678. ***Urtica urens*** L. — $2n = 24$.

Gr: Kiklades, Siros, 2 km S. to S.E. of the peak of Mt Siringas, 37°24'N, 24°53'E, 30 May 1968, *S & Bo 33901*; Tinos, between Kromos and Komi, 21 May 1968, *R & E 36786*.

References

Akeroyd, J. R. 1988: *Arenaria serpyllifolia* L. and related species. [In Chater, A. O. (ed.), Flora Europaea: Notulae systematicae ad Floram Europaeam spectantes. Ser. 2, no. 2]. — Bot. Journ. Linn. Soc. **97**: 335-337.

Celebioglu, T. & Favarger, C. 1993: Rapports 125-166. [In Kamari, G., Felber, F. & Garbari, F. (ed.), Mediterranean chromosome number reports 3] — Fl. Medit. **3**: 323-333.

Chaudri, M. N. 1968: A revision of the *Paronychiineae*. — Meded. Bot. Mus. herb. Rijks. Univ. Utrecht **285**: 331.

Cheshmedziev, I. V. 1994: Reports 313-366. [In Kamari, G., Felber, F. & Garbari, F. (ed.), Mediterranean chromosome number reports 4] — Fl. Medit. **4**: 269-279.

Coode, J. M. E. 1967: *Holosteum*. [In Davis, P. H., Flora of Turkey **2**: 85-87] — Edinburgh.

Devesa, J. A. 1987: *Herniaria*. [In Valdés, B., Tavalesa, S. & Fernandes-Galiano, E. (ed.), Flora Vascular de Andalucia Oriental **1**: 211] — Barcelona.

Favarger, C. & Garraud, L. 1992: Morphologie et écologie de trois cytotypes de *Minuartia hybrida* (Vill.) Schiskin. — Bauhinia **10**: 91-98.

Fedorov, A. A. (ed.) 1969: Hromosomiye chicla tsvetkovykh rastenij. — Leningrad.

Hermann, F. 1943: *Herniaria*. [In Rechinger, K. H., Flora Aegaea]. — Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. **105(1)**: 128, 129.

Address of the author:
Prof. Hans Runemark, Department of Systematic Botany, University of Lund, Ö. Vallgatan 18, S-22361 Lund, Sweden.

Reports (679-682) by Lucia Falciani & Graziana Fiorini

679. ***Stachys byzantina*** C. Koch — $2n = 30$ (Figs. 1a & 2a).

Si: Piano della Battaglia, Madonie (PA), 37°51'N, 14°36'E, 1600 m, 29 Jun 1994, *L. Falciani, S. Fici & U. Miniati* (FI) s.n.

Stachys byzantina, generally cultivated as an ornamental plant, occasionally escapes from gardens and naturalizes in fields around the areas of cultivation. The native occurrence of the species in Sicily (Raimondo & Ottonello 1979) is doubtful. It is distributed in Turkey and Anatolia, locally naturalized in France and Spain and adventive in Italy and Crimea (Greuter & al. 1986).

The chromosome number of this species in Italy was hitherto unknown; the number $2n=30$ agrees with the one given for this taxon by the authors cited in Goldblatt & Johnson (1994). The apparent overall length of chromosomes varies from 1.3 to 2 µm; their width is about 0.8 µm. The karyotype formula (Levan & al. 1964) is: $2n = 2M + 18m + 4m\text{-SAT} + 6sm = 30$. The karyotype has the asymmetry index (Arano & Saito 1980) AsK%=59.93.

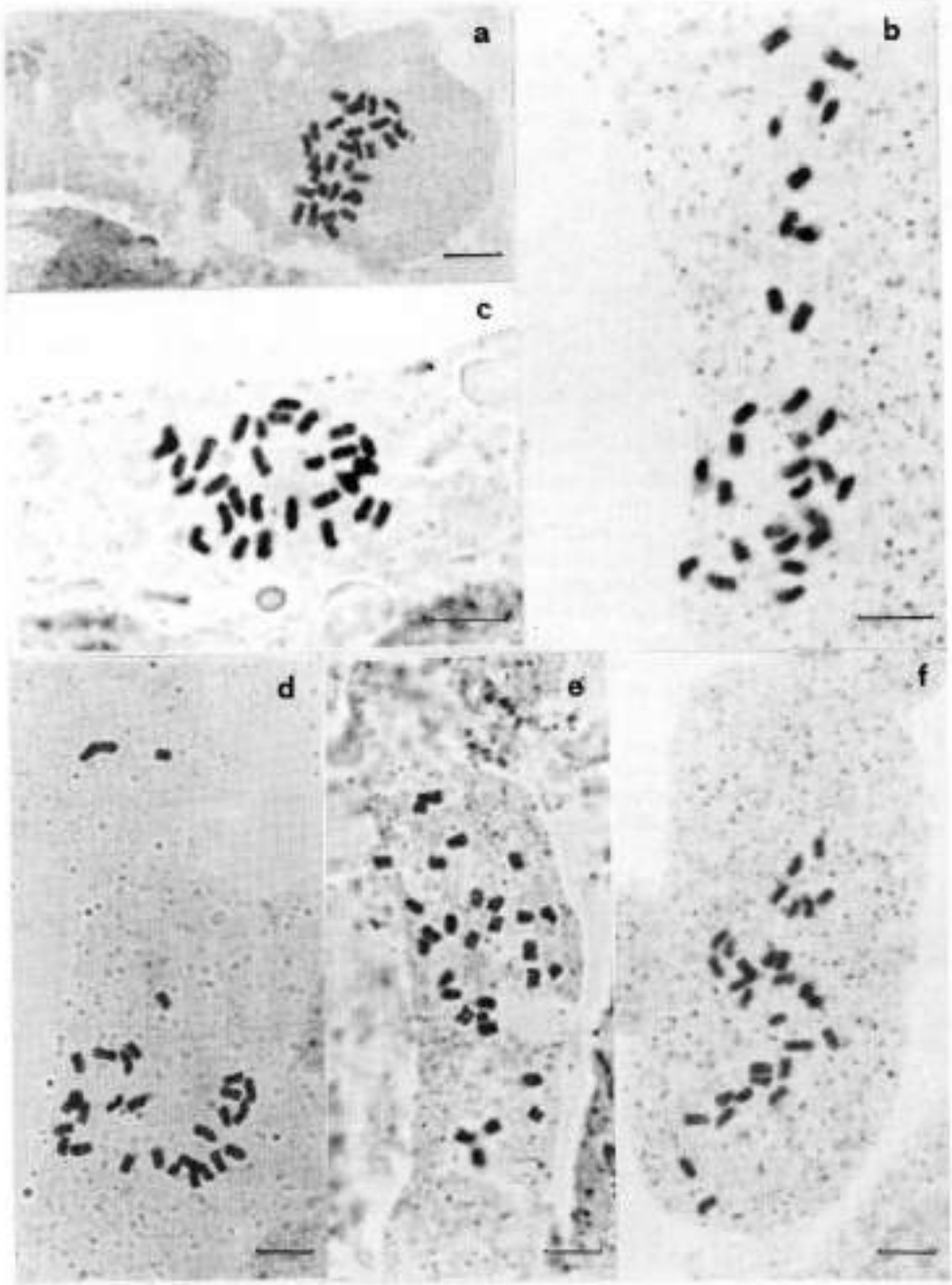

Fig. 1. Mitotic metaphase plates of *Stachys* species from Italy with $2n = 30$. — **a**, *S. byzantina*; **b**, *S. germanica* subsp. *dasyanthes*; **c**, *S. germanica* subsp. *salviifolia*; **d**, *S. heraclea* "rose"; **e**, *S. heraclea* "yellow"; **f**, *S. thirkei*. - Scale bars = 5 µm.

680. ***Stachys germanica*** L. subsp. ***dasyanthes*** (Rafin.) Arcangeli — $2n = 30$ (Figs. 1b & 2b).

Si: Road to Piano Zucchi (PA), near the crossroad to Minciarrati, 37°54'N, 14°33'E, *Quercus pubescens* woodland, 29 Jun 1994, *L. Falciani, S. Fici & U. Miniati* (FI) s.n.

— Monte delle Rose (PA), 37°39'N, 13°58'E, Jul 1994, *S. Fici & F. M. Raimondo* (FI, PA) s.n.

Endemic to Sicily.

These counts confirm the number given for this taxon by the authors cited in Goldblatt (1984). The apparent overall length of chromosomes varies from 1.6 to 3 µm; width about 1 µm. The reported karyotype is from plants of Monte delle Rose. The chromosomes can be grouped as follows: $2n = 4M + 19m + 5m\text{-}SAT + 2sm = 30$. The karyotype has AsK% = 57.22.

680a. ***Stachys germanica*** L. subsp. ***salviifolia*** (Ten.) Gams — $2n = 30$ (Figs. 1c & 2c).

It: Ponte di Picerno (PZ), 40°48'N, 16°15'E, 487 m , 1 Jul 1994, *L. Falciani & U. Miniati* (FI) s.n.

It is distributed in southern Europe from southern France eastwards to Greece and Bulgaria; in Italy it is found in the central and southern regions.

The chromosome number of this taxon was hitherto unknown from Italy. It agrees with the numbers given by the authors cited in Goldblatt & Johnson (1994). The apparent overall length of chromosomes varies from 1.3 to 2.5 µm; width about 0.8 µm. The chromosomes can be grouped as follows: $2n = 2M + 19m + 1m\text{-}SAT + 8sm = 30$. The karyotype has AsK% = 60.11.

681. ***Stachys heraclea*** All. — $2n = 30$ (Figs. 1d, 1e & 3a, 3b).

It: Road to Rifreddo (PZ), 40°38'N, 16°21'E, 25 Jun 1994, *L. Falciani & U. Miniati* (FI) s.n.

— Gallipoli Cognato (PZ), 40°31'N, 16°41'E, 25 Jun 1994, *L. Falciani & U. Miniati* (FI) s.n.

— Monti Li Foi (PZ), 40°38'N, 16°15' E, 25 Jun 1994, *L. Falciani & U. Miniati* (FI) s.n.

It is distributed in France, Spain and Italy, where it is found from Liguria and Emilia-Romagna to Calabria, more frequent in central and southern Italy.

Lacaita (1923) observed some specimens of *S. heraclea* collected in Gallipoli Cognato and in the "valle del Basiento" with bracts especially rich in glandulosity and "corolla sulphureo lateritia plus minus punctis striisque ferrugineo purpureis maculata". He identified them as *S. heraclea* var. *lucana* Lacaita. Field investigations were made (Falciani 1995) and have shown that the same populations consist of both plants with rose-purple flowers and plants with white-yellow flowers.

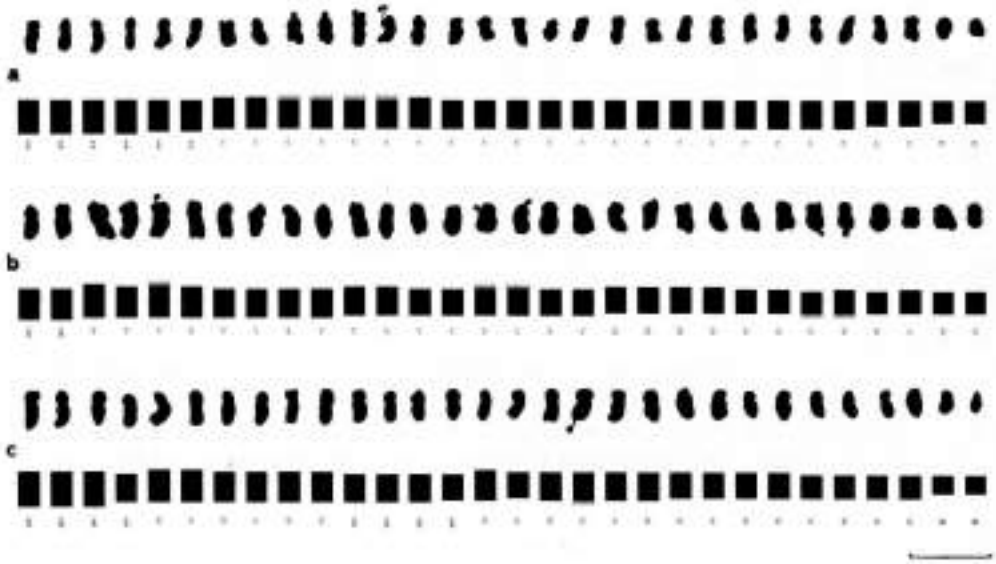

Fig. 2. Karyograms and idiograms of *Stachys* species from Italy with $2n = 30$. — **a**, *S. byzantina*; **b**, *S. germanica* subsp. *dasyanthes*; **c**, *S. germanica* subsp. *salviifolia*. - Scale bar = 5 µm.

Fig. 3. Karyograms and idiograms of *Stachys* species from Italy with $2n = 30$. — **a**, *S. heraclea* "rose"; **b**, *S. heraclea* "yellow"; **c**, *S. thirkei*. - Scale bar = 5 µm.

Moreover both rose-purple and white-yellow flowers was found on the same plant. The somatic chromosome number was observed in the three populations and agrees with the numbers given for this taxon by the authors cited in Goldblatt & Johnson (1990). The apparent overall length of chromosomes varies from 1.3 to 2.7 µm; width about 1 mm. The chromosomes can be grouped as follows: *S. heraclea* "rose": $2n = 6M + 15m + 5m$-

SAT + 4sm = 30, the karyotype has AsK% = 57.22; *S. heraclea* "yellow": $2n$ = 4M + 16m + 6m-SAT + 4sm = 30, the karyotype has AsK% = 56.67.

682. *Stachys thirkei* C. Koch — $2n$ = 30 (Figs. 1f & 3c).

It: Ciano d'Enza (RE), 44°36'N, 10°56'E, 6 Sep 1994, *L. Falciani & U. Miniati* (FI) s.n.
— Canossa (RE) 44°34'N, 10°58'E, 6 Sep 1994, *L. Falciani & U. Miniati* (FI) s.n.

It is distributed in Italy, Balkan Peninsula and Turkey. In Italy the species was known as *S. janiana* Cesati, Passer. & Gibelli (Cesati & al. 1874, Arcangeli 1882, 1894, Fiori 1926).

The distribution of this species in Italy is limited to the calcareous - clay hills of Emilia. The chromosome number of this species was hitherto unknown from Italy. It was observed in the two populations. It agrees with the numbers given for this taxon by the authors cited in Goldblatt & Johnson (1994). Only Aydin (1978) reports for *S. thirkei* $2n$=18. The karyotype of this species was studied in plants from Ciano d'Enza. The apparent overall length of chromosomes varies from 1.5 to 2.8 µm; width about 1 µm. These chromosomes can be grouped as follows: $2n$ = 20m + 6m-SAT + 4sm = 30. The karyotype has AsK%=52.66.

References

Arano, H. & Saito, H. 1980: Cytological studies in Family *Umbelliferae* V. Karyotypes of seven species in Subtribe Seselinae. — La Kromosomo II-17.

Arcangeli, G.1882: Compendio della Flora Italiana. — Torino.

— 1894: Compendio della Flora Italiana — Ed. 2. Torino, Roma.

Aydin, A. 1978: Reports. [In Löve, A. (ed.), Chromosome number reports LXI.] — Taxon **27**: 375-392.

Cesati, V., Passerini, G. & Gibelli, E. G. 1874: Compendio della Flora Italiana. — Milano.

Falciani, L. 1995: Systematic revision of *Stachys* sect. *Eriostomum* (Hoffmans. & Link) Dumort. in Italy. — Lagascalia (in press).

Fiori, A. 1926: Nuova flora analitica d'Italia **2**: 428-430. — Firenze.

Goldblatt, P.(ed.) 1984: Index to Plant chromosome numbers 1979-1981: 220. — Missouri Botanical Garden.

— & Johnson, D. E. (ed.) 1990: Index to Plant chromosome numbers 1986-1987: 108. — Missouri Botanical Garden.

— 1994: Index to Plant chromosome numbers 1990-1991: 118 - 120. — Missouri Botanical Garden.

Greuter, W., Burdet, H. M. & Long, G. 1986: Med-Checklist **3**: 357 — Ed. Conservatoire et Jardin Botanique. Genève.

Lacaita, C. 1923: Piante critiche o rare LXXX - LXXXI. — Nuovo Giorn. Bot. It. ser. 2, **29**: 188-192.

Levan, A., Fregda, K. & Sandberg, A. A. 1964: Nomenclature for centromeric position on chromosomes. — Hereditas **52**: 201- 220.

Raimondo, F. M. & Ottonello, D. 1979: Entità nuove per la flora siciliana. — Atti Accad. Sc. Lett. Arti Palermo **38**: 3-12.

Address of the authors:
L. Falciani & G. Fiorini, Dipartimento di Biologia Vegetale, Università di Firenze, Via La Pira 4, I-50121 Firenze, Italy.

Report (683) by Tiziana Cusma Velari & Laura Feoli Chiapella

683. *Gonocytisus angulatus* (L.) Spach — $2n = 48$ (Fig. 1).

Tu: Edremit, along the road from Edremit to Ilica, 39°36'N, 26°55'E, clearing in a mediterranean wood, 20 m, 17 Sep 1986, *L. Feoli Chiapella* (TSB) s.n.

The chromosome number $2n = 48$, based on 50 metaphase plates, differs from the only available reference. In fact Goldblatt (1981) reported the chromosome number $2n = 50$ for material from Izmir (Turkey). Chromosome size ranges between 0.30 and 1.60 µm.

Fig. 1. A photomicrograph and a drawing somatic metaphase plate of *Gonocytisus angulatus*, $2n=48$. - Scale bar= 5µm.

Gonocytisus Spach is a homogeneous genus with an E-Mediterranean distribution. It includes *G. angulatus* (L.) Spach, *G. pterocladus* (Boiss.) Spach and *G. dirmilensis* Hub.-Mor. (Gibbs 1970). Its systematic relationships with other genera of *Genisteae* are controversial. Species of *Gonocytisus* have subsequently been assigned to different genera, such as *Spartium* L., *Genista* L., *Cytisus* L., *Retama* Boiss. *Gonocytisus* has recentely been considered an "intermediate" genus of the tribe (Gibbs 1966, Polhill 1976, Bisby 1981). It differs both from the *Cytisus* and from the *Genista* group due to a number of characters relative to seeds and flowers. It also shows a mixture of "genistoid" characters (upper lip deeply bifid, estrophiolate seeds, leaves with three vascular traces) and "cytisoid" characters (trifoliolate leaves, subfalcate keel, membranaceous calyx). The other two species of the genus have not been karyologically studied yet.

Acknowledgements

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References

Bisby F. A., 1981: *Genisteae* (Adans.) Benth. — In: Polhill, R. M. & Raven, P.H. (eds.), Advances in Legume Systematics. 1. — Royal Bot. Gardens, Kew, 409-425.

Gibbs, P. E. 1966: A revision of the genus *Genista* L. — Notes Roy. Bot. Gard. Edinburgh **27(1)**: 11-99.

— 1970: *Genista* L. — In: Davis, P. H. (ed.), Flora of Turkey and the East Aegean Islands. 3. — Edinburgh University Press, Edinburgh, 24-32.

Goldblatt, P. 1981: Chromosome numbers in Legumes II. — Ann. Missouri Bot. Gard. **68**: 551-557.

Polhill, R. M. 1976: *Genisteae* (Adans) Benth. and related tribes *(Leguminosae)*. — Bot. Syst. **1**: 143-368.

Address of the authors:
Dr T. Cusma Velari & Prof. L. Feoli Chiapella, Dipartimento di Biologia, Università degli Studi di Trieste, Via Licio Giorgieri 10, I-34127 Trieste, Italy.

Reports (684-691) by Gabriella Corsi, Fabio Garbari & Alessandro Ghelardi

684. ***Leopoldia comosa*** (L.) Parl. — $2n = 18$ (Figs. 1, 1a, 1b).

Ma: Ben Monsour, near the city, in an *Eucalyptus* wood on the dunes, about two km from the coast, 34°35'N, 06°26'W, 1 May 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 205/1986, *exsicc.* PI, s.n.).

— S.W. from Ifrane, wood with *Quercus rotundifolia*, 33°25'N, 05°17'W, 1450 m, 30 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 189/1986; *exsicc.* PI, s.n.).

— Seven km from Ifrane, karstic highland, by a spring among rocks, 33°35'N, 05°01'W, 1600 m, 29 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 18/1986-1; *exsicc.* PI, s.n.).

This entity is widely distributed in the whole Mediterranean basin; it prefers ruderal, open, dry, either siliceous or calcareous environments.

Our chromosome count - $2n = 18$ - agrees with that reported by many authors (Fedorov 1969). Like Bentzer & Ellmer (1975), we too pointed out a structural heterozygosity in the second pair. The idiogramatic formula according to Levan & al. (1964), is the following (Fig. 1b): $2n = 2x = 18$: 2t + 10m + 2sm + 4m.

The chromosome length varies between 3.6 and 15.6 µm. The first pair is very long with a subterminal centromere; the second pair shows structural heterozygosity; the remaining pairs have small chromosomes with metacentric or sub-metacentric centromere.

This result shown here appears to be the only known karyological data for *L. comosa* in this North-African sector.

685. ***Muscari grandifolium*** Baker in Saund. var. ***populeum*** (Br. Bl. et Maire) Maire — $2n = 108$ (Figs. 2, 2a).

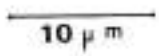
Ma: Seven km from Ifrane, karstic highland, by a spring among rocks, 33°35'N, 05°01'W, 1600 m, 29 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 188/1986-2; *exsicc.* PI, s.n.).

Muscari grandifolium is distributed in Northern Africa and in the Iberian Peninsula. *M. populeum* is considered as a variety of *M. grandifolium* and is reported by Maire (1958) as very common in the Middle and Upper Atlas.

This entity has a karyotype set with $2n = 108$ chromosomes, i.e. dodecaploid, given that the base number for this genus is $x = 9$. This number - the highest ever known for the whole genus - has never been reported to the best of our knowledge. No idiogram could be derived due to the large number of chromosomes and to the difficulty to obtain clear metaphasic plates (Fig. 2). From the correspondent explicative scheme (Fig. 2a), it can be seen that the chromosomes' size is small on average (less than 10 µm) and that only two chromosomes have satellites.

686. ***Dipcadi serotinum*** (L.) Medik. subsp. ***lividum*** (Pers.) Maire et Weiller var. ***fulvum*** (Cav.) Ball. — $2n = 8$ (Figs. 3, 3a, 3b).

Ma: Aim Défali, road between Ouezzane and Meknès, 34°36'N, 05°33'W, 25 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 209/1986-2; *exsicc.* PI, s.n.).



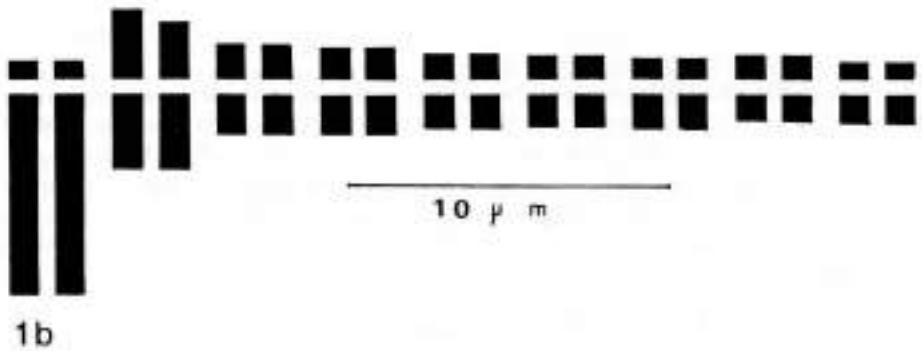


Fig. 1. *Leopoldia* - metaphase plate (1), scheme (1a) and correspondent idiogram (1b) of *L. comosa* L., $2n = 18$.

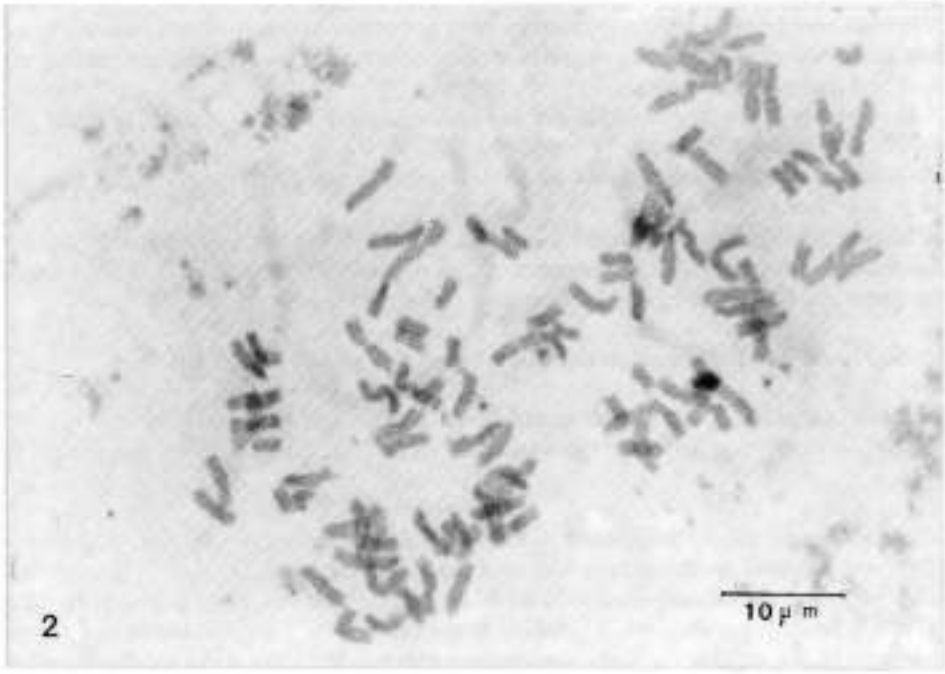


Fig. 2. *Muscari* - metaphase plate (2) and scheme (2a) of *M. grandifolium* var. *populeum*, $2n = 108$.

Dipcadi serotinum is widely distributed both in circum-Mediterranean countries and in other countries of the European continent. It is a xerophilous species and prefers arid slopes and rocky or sandy areas.

Many ploidy levels are reported for this species (see Fiorini & Raffaelli (1996), this issue, for references).

We have recorded a karyotype with $2n = 8$ chromosomes and the following formula: $2n = 2x = 8$: 2sm + 2st + 4sm.

Chromosome sizes vary between 5 and 6 µm. The chromosomes of the first and last pairs have a submetacentric centromere; those of the second pair have a subterminal centromere; finally, unlikely other authors, we could not observe any satellites.

687. *Gagea durieui* Parl. for. ***vestita*** Faure et Maire — $2n = 36$ (Figs. 4, 4a, 4b).

Ma: Near the ruins of Volubilis, in the fields, fifteen km E. from Ketama, 34°05'N, 05°34'W, 21 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 269/1986-bis; *exsicc.* PI, s.n.).

This species is widely distributed in the whole Mediterranean basin and in Europe; it prefers open, ruderal environments, with rocky or sandy substrate.

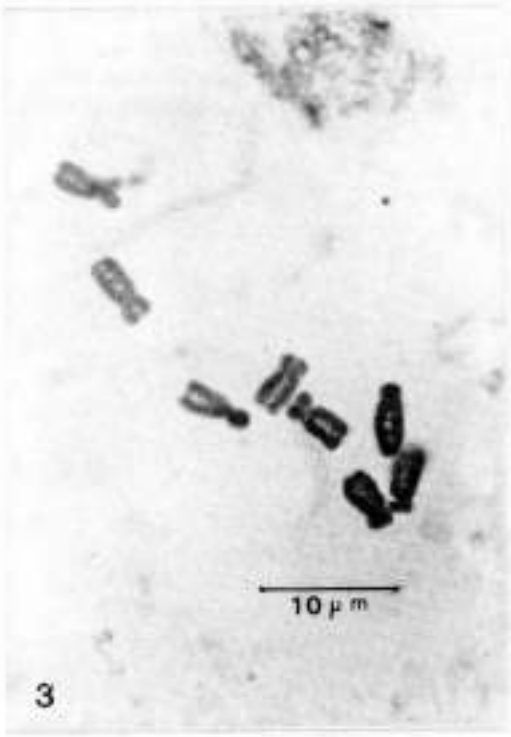
The observed chromosome number, $2n = 36$, agrees with that reported by Ruiz Rejon (1978) for Spanish populations. According to this author the base number is $x = 12$ and, consequently, the specimens here examined are triploid. We have recorded the following karyotype formula: $2n = 3x = 36$: 8st + 2sm + 2st + 2m + 8sm + 2sm' + 2sm + 2st + 4sm + 2m + 2M. The chromosome sizes vary between 2.2 and 5.1 µm, on average. There are in the karyotype eight initial pairs of chromosomes with subterminal centromere, a series of pairs of heterobrachial chromosomes and, finally, a pair of isobrachial chromosomes. The presence of a single satellited pair in place 12 and the possibility to create homologous pairs of metaphasic chromosomes allow to hypothesize that the entity be not a triploid, but a tetraploid. To the best of our knowledge, this species had not yet been studied from the karyological standpoint in Northern Africa.

688. *Scilla monophyllos* Link in Schrad. var. ***tingitana*** (Schousb.) Pau — $2n = 20$ (Figs. 5, 5a, 5b).

Ma: Cap Spartel (Tangeri), 35°49'N, 05°50'W, 2 May 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 195/1986, *exsicc.* PI, s.n.).

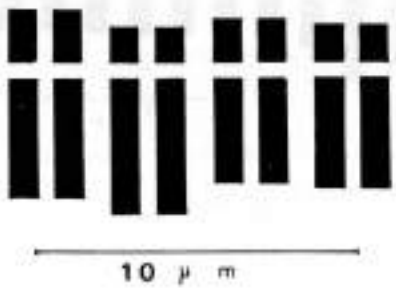
Scilla monophyllos var. *tingitana* is described by Maire (1958) as a North-African endemic, distributed in woods and pastures up to 1400 m. From the karyological standpoint, for the Iberian Peninsula diploid ($2n = 20$, Gimenez Martin 1959) and tetraploid levels ($2n = 4x = 40$, Barros Neves 1973) have been reported. For the Moroccan material we have observed the following karyotype: $2n = 2x = 20$: 2m + 4sm + 2t + 2st' + 2sm + 2st + 4m + 2sm. The chromosome sizes vary between 3 and 11.2 µm, on average: our results agree with Gimenez Martin's (1959) report as regards the typology of chromosomes with respect to their position.

The first pair has metacentric chromosomes; there follow three pairs with heterobrachial chromosomes, a pair with satellites and finally, five pairs with heterobrachial chromosomes of decreasing size.



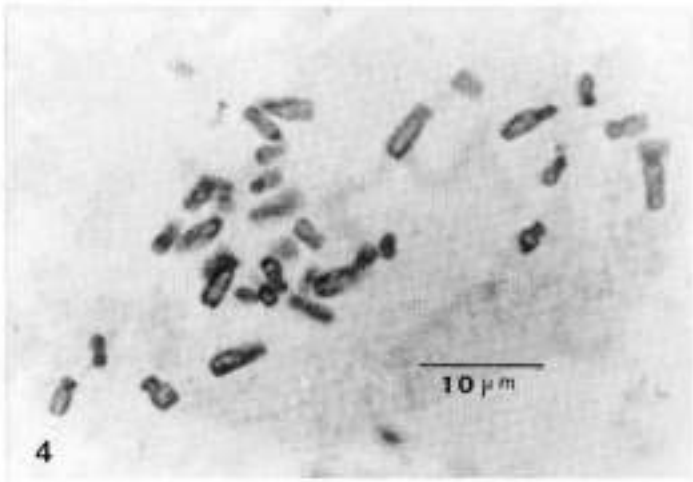
3

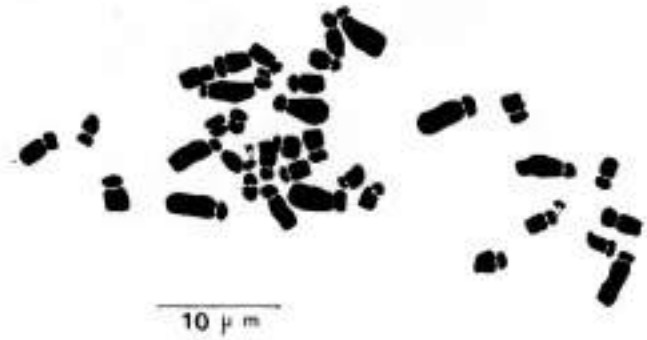
3a



3b

Fig. 3. *Dipcadi* - metaphase plate (3), scheme (3a) and correspondent idiogram (3d) of *D. serotinum* subsp. *lividum* var. *fulvum*, $2n = 8$.





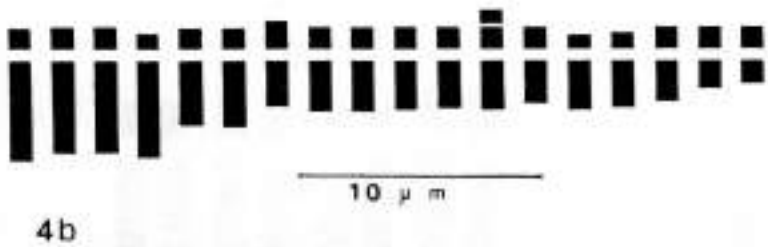


Fig. 4. *Gagea* - metaphase plate (4), scheme (4a) and correspondent idiogram (4b) of *G. durieui* for. *vestita*, $2n = 36$.

The first pair has metacentric chromosomes; there follow three pairs with heterobrachial chromosomes, a pair with satellite and finally, five pairs with heterobrachial chromosome of decreasing size.

Fig. 5. *Scilla* - metaphase plate (5), scheme (5a) and correspondent idiogram (5b) of *S. monophyllos* var. *tingitana*, $2n = 20$.

689. *Scilla lingulata* Poir. — $2n = 16$ (Figs. 6, 6a, 6b).

Ma: Garigue with *Chamaerops* and cultivated fields at the foot of Mt Zerhoun, 34°03'N, 05°43'W, 650 m, 28 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 218/1986; *exsicc.* PI, s.n.).

Scilla lingulata is a North-African endemic.

The observed chromosome number, $2n = 16$, agrees with that reported by Satō (1942). This author indicates the karyotype formula $2n = 16$ (2b) = 2L + 6M + 2M^s + 6S, with a satellited pair in fifth position. For our specimens, we have recorded: $2n = 2x = 16$: 4st + 2t + 2st^s + 2m + 2sm + 2t + 2sm.

Chromosome sizes are big: they vary between 5.1 to 15.4 µm. The fourth pair has satellited chromosomes.

690. *Scilla autumnalis* L. subsp. ***fallax*** (Steinh.) Batt. — $2n = 28$ (Figs. 7, 7a, 7b).

Ma: Olive grooves near Moulay Idriss, 34°04'N, 05°21'W, 21 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 262/1986; *exsicc.* PI, s.n.).

Scilla autumnalis subsp. *fallax* is reported by Maire (1958) as a North-African endemic; it prefers environments modified by man, such as olive grooves, garigues and cultivated fields.

Its karyology is described in many papers (Battaglia 1956, Gimenez Martin 1959, Ruiz Rejon 1978, etc.), reporting different ploidy levels for the whole Mediterranean basin. The base number is $x = 7$, upon which are based several karyotypes, depending on the considered region. Our entity is a tetraploid: $2n = 4x = 28$: 10sm + 2M + 2sm + 2m + 2st + 6sm + 2m + 2sm.

Chromosome sizes vary from 3 to 10 µm, on average. We could not observe any satellited chromosome, in agreement with data shown by Pastor (1985) for Iberian entities but not with the proposal made by Battaglia (1963). Hong (1982) has recorded for Morocco a tetraploid form ($2n = 28$ chromosomes) with two satellited pairs. For detailed bibliographic references on *Scilla autumnalis* caryological aspects, see also Illuminati & al. (1995).

690a. *Scilla autumnalis* L. — $2n = 42$ (Figs. 8, 8a, 8b).

Ma: Garigue with *Chamaerops* and cultivated field at the foot of Mt Zerhoun, 34°03'N, 05°43'W, 650 m, 28 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 216/1986).

Scilla autumnalis is a common species in the whole Mediterranean basin.

The observed chromosome number, $2n = 42$, agrees with that reported by Battaglia (1957) for England and with that reported by Hong (1982) for North-Western Mediterranean basin and for Morocco. In our specimens, we have recorded the following idiogrammatic formula: $2n = 6x = 42$: 6sm + 2m + 4st + 2m + 4st + 2sm + 2st + 8sm + 2m + 2m^s + 4sm + 2m^s + 2M.

The average chromosome sizes vary from 4.2 to 9.2 µm; one of the satellited pairs has type A chromosome, the other has type B chromosome (according to Hong 1982).

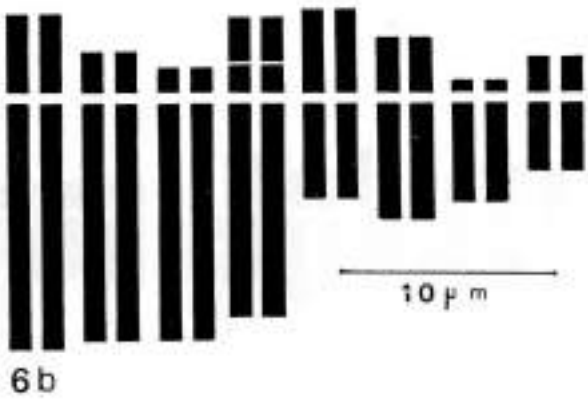


Fig. 6. *Scilla* - metaphase plate (6), scheme (6a) and correspondent idiogram (6b) of *S. lingulata*, $2n = 16$.

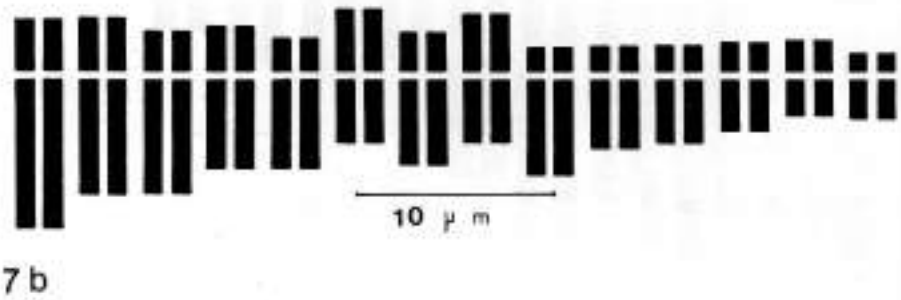
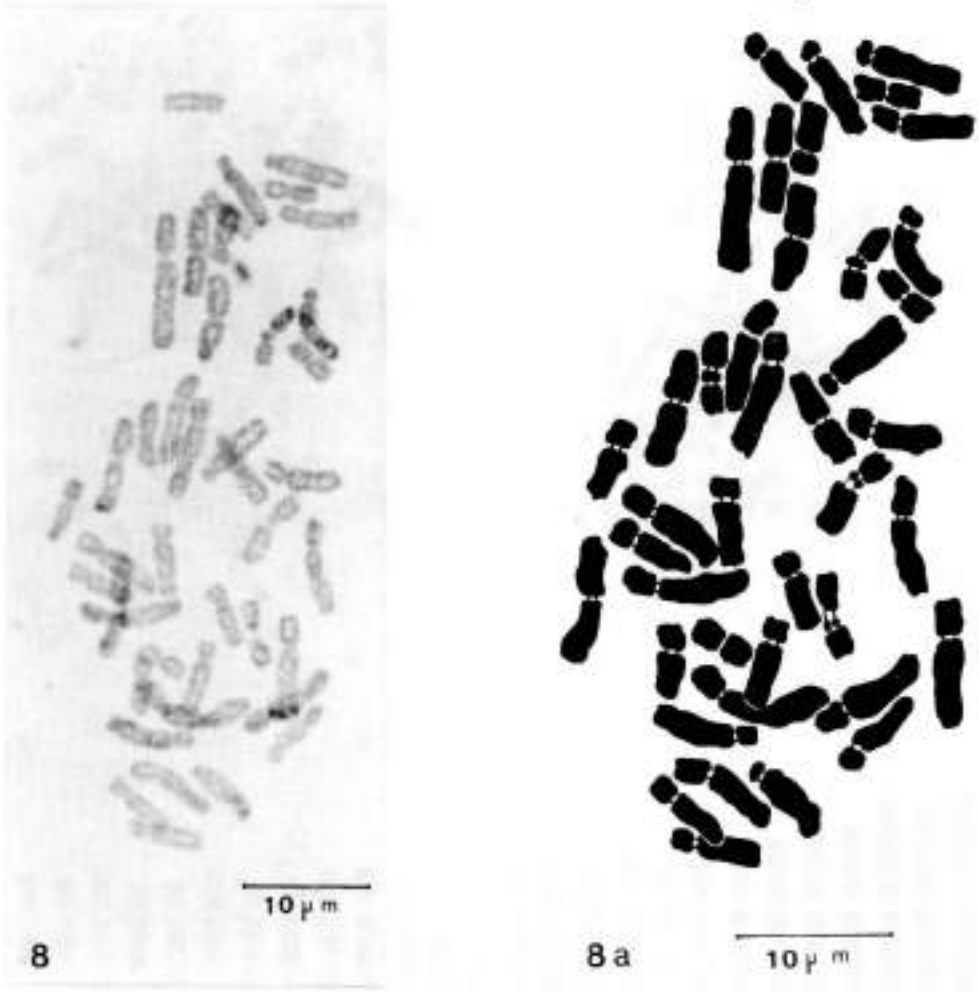


Fig. 7. *Scilla* - metaphase plate (7), scheme (7a) and correspondent idiogram (7b) of *S. autumnalis* subsp. *fallax*, $2n = 28$.



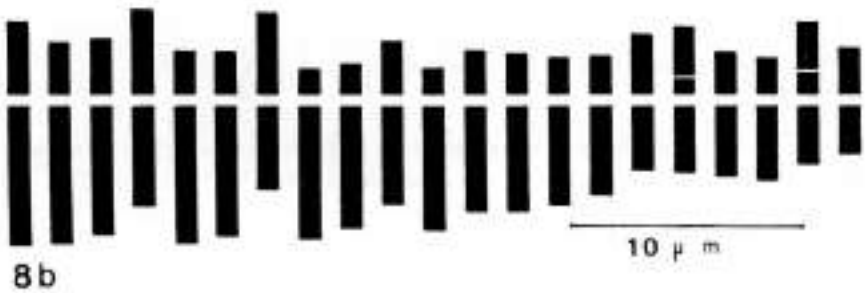


Fig. 8. *Scilla* - metaphase plate (8), scheme (8a) and correspondent idiogram (8b) of *S. autumnalis*, $2n = 42$.

9b

Fig. 9. *Ornithogalum* - metaphase plate (9), scheme (9a) and correspondent idiogram (9b) of *O. algeriense*, $2n = 52$.

To the best of our knowledge, a hexaploid form of *Scilla autumnalis* with four satellited chromosome has never been reported; our data refutes Hong's (1982) statement that only cytotypes with type B satellited chromosomes exist in Morocco. It appears that there are two types of hexaploid forms in Morocco: the first is that described by Hong (1982), with type B satellited chromosomes; the other is the one proposed here, with both type A and type B satellited chromosomes. References on *Scilla autumnalis* also in Illuminati & al. (1995).

691. ***Ornithogalum algeriense*** Jord. et Fourr. — $2n = 52$ (Figs. 9, 9a, 9b).

Ma: Cliffs along the road between Ouezzane and Chechaouen, five km toward Chechaouen, 34°50'N, 05°33'W, 25 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 208/1986; *exsicc.* PI, s.n.).

— *Quercus suber* wood 10 km from Larache, road toward Asillm, 35°06'N, 06°05'W, 28 Apr 1986, *F. Garbari* (*cult.* Hort. Bot. Pisa 238/1986; *exsicc.* PI, s.n.).

This species is restricted to North-Africa and Northern end of the Iberian Peninsula, where it occupies secondary areas. It is strictly related to *O. umbellatum*, of which it is considered as a synonym by some authors. The chromosome number $2n = 52$ agrees with that reported by Moret & Couderc (1986), and by Moret & Galland (1992) for the same Moroccan entities. Fiorini & Raffaelli (1996) refer $2n = 52$ for *Ornithogalum orthophyllum* from Tunisia but, in our opinion, the plant should have been uncorrectly identified.

The karyotype we observed in our material has the following idiogrammatic formula: $2n = 6x = 52$: 10m + 2sm + 2st + 12sm + 2st + 2sm + 2st + $2st^{c}$ + 6sm + 2m + 8sm + 2m.

The average chromosome sizes vary from 3.9 to 9.3 µm. The satellited pair is in seventeenth position.

References

Barros Neves, J. 1973: Contribution à la connaissance cytotaxonomique des spermatophyta du Portugal. VIII. *Liliaceae*. — Bol. Soc. Brot., ser. 2, **47**: 157 - 212.

Battaglia, E. 1956: Filogenesi del cariotipo del genere *Scilla*. V. *Scilla Lilio Hyacinthus* L. — Caryologia **9(1)**: 19-37.

— 1957: *Scilla autumnalis* L.: biotipi $2n$, $4n$, $6n$ e loro distribuzione geografica. — Caryologia **10(1):** 75-95.

— 1963: Una mutazione con B-cromosomi, $2n = 14 + 3B$, in *Scilla autumnalis* L. (*Liliaceae*). — Caryologia **16(3)**: 609-618.

Benzer, B. & Ellmer, M. 1975: A case of stable chromosomal polymorphysm in *Leopoldia comosa* (*Liliaceae*). — Hereditas **81**: 127-132.

Fedorov, A. N. (ed.) 1969: Chromosome numbers of flowering plants. — Leningrad.

Fiorini, G. & Raffaelli, M. 1996: Reports [In Kamari, G., Felber, F. & Garbari, F. (eds.) Mediterranean chromosome number reports- 6]. – Fl. Medit. **6**: 278-288.

Gadella, Th. W., Kliphuis, E. & Mennega, E. A. 1966: Chromosome numbers of some flowering plants of Spain and S France. — Acta Bot. Neerl. **15**: 484-489.

Gimenez Martin, G. 1959: Cariologia de *Scilla*. II. — Phyton **13(2)**: 145-152.

Hong, D. 1982: Cytotype variation and polyploidy in *Scilla autumnalis* L. (*Liliaceae*). — Hereditas **97**: 227-235.

Humphries, C. J., Murray, B. G., Bocquet, G. & Vasadevan, K. 1978: Chromosome numbers of phanerogams from Morocco and Algeria. — Bot. Not. **131**: 391-404.

Illuminati, O., Spinosi, K., Bianchi, G. & Marchi, P. 1995: Numeri cromosomici per la flora italiana: 1371. — Inf. Bot. Ital. **27(2-3)**: 269-273.

Levan, A., Fredga, K. & Sandberg, A. A. 1964: Nomenclature for centromeric position on chromosomes. — Hereditas **52**: 201-220.

Maire, R. 1958: Flore de l'Afrique du Nord. — **5**: 5-304.

Mejías, J. A. & Luque, T. 1987: Numeros cromosomaticos de plantas occidentales, 403-410. — Ann. Jard. Bot. Cav. **43**: 412-416.

Moret, J. & Couderc, H. 1986: Contribution of caryology to the systematic knowledge of the *Ornithogalum* L. genus in north Africa: the *Heliocharmos* Baker sub genus. — Caryologia **39(3-4)**: 259-272.

Moret, J. & Galland, N. 1992: Phenetic, biogeographical, and evolutionary study of *Ornithogalum* subg. *Heliocharmos* (*Hyacinthaceae*) in the western Mediterranean basin. — Pl. Syst. Evol. **181**: 179-202.

Pastor, J. 1985: Numeros cromosomicos para la flora española, 363-434. — Lagascalia **13**: 296 - 299.

Reese, G. 1957: Über die Polyploidiespektren in der nordsaharischen Wüstenflora. — Flora **144(4)**: 598-634.

Ruiz Rejon, M. 1978: Estudios cariologicos en especes españolas del orden *Liliales*. **III.** Familia *Liliaceae*. — Ann. Jard. Bot. Cav. **34**: 733-759.

Satô, D. 1942: Karyotype alteration and phylogeny in *Liliaceae* and allied families. — Jap. Journ. Bot. **12(1-2)**: 57-161.

Addresses of the authors:
Gabriella Corsi & Fabio Garbari, Department of Botanical Sciences, University of Pisa, I-56126 Pisa, Italy.
Alessandro Ghelardi, Via V. Bellini, 18, I-56010 Ghezzano (Pisa), Italy.

Reports (692-699) by Christoph Oberprieler & Robert Vogt

692. *Dianthus cyprius* A. K. Jackson & Turill — $2n = 30$ (Fig. 1).

Cy: North Cyprus, Kyrenia Range (Besparmak Daglari), Kantara Castle, 35°24'N, 33°55'E, S. exposed limestone walls, 600 m, 07 Oct 1994, *Royl 617* (B).

Plants of this species endemic to limestone cliffs of the N. Cyprian Kyrenia Range were studied cytologically by Carolin (1957, cited in Cave 1958) who also found $2n = 30$ chromosomes.

693. *Limonium meyeri* (Boiss.) O. Kuntze — $2n = 18$ (Fig. 2).

Cy: North Cyprus, Famagusta Bay (Gazimaguza Köfezi), 1 km S. Salamis, 35°09'N, 33°55'E, beach and marshes, 06 Oct 1994, *Royl 654* (B).

This species of *Limonium* has been studied from the Northern Caucasus mountains by Magulaev (1976, cited in Goldblatt 1981: 362) who found the diploid chromosome number of $2n = 12$. In the Cyprian plant material we observed $2n = 18$ chromosomes representing a triploid ploidy level. The production of triploid seeds in *Limonium* is known to be an occasional phenomenon being connected with the rather common tendency towards apomictic speciation in this genus (cf. Erben 1978, Kilian & Leyens 1994).

694. *Medicago intertexta* (L.) Miller — $2n = 16$ (Fig. 3).

Cy: North Cyprus, Famagusta (Gazimagusa) - Rizokerpazo (Dipkarpas), 2 km E. Boghaz, 35°19'N, 33°58'E, fields, 24 Oct 1994, *Royl 641* (B).

Our count of $2n = 16$ chromosomes is in agreement with numerous indications for this taxon (e.g. Fernandes & al. 1977, Abdelguerfi & Guittonneau 1979, Schlarbaum & al. 1984). A deviating count was reported from Portugal by Fernandes & Santos (1971) who found the tetraploid chromosome number of $2n = 32$.

695. *Medicago polymorpha* var. ***vulgaris*** (Benth.) Shinners — $2n = 14$.

Cy: North Cyprus, Famagusta Bay (Gazimagusa Körfezi), 5 km N. Salamis, 35°13'N, 33°54'E, beach and phrygana, 03 Oct 1994, *Royl 652* (B).

Our count of $2n = 14$ chromosomes agrees with indications for this species made by several authors (e.g. Dahlgren & al. 1971, Luque & al. 1988). Deviating counts of $2n = 16$ chromosomes reported by others (e.g. Fernandes & al. 1977, Fernandes & Queiros 1978, Labadie 1979, 1980) are considered to be either due to confusion with other *Medicago* species or presumably over-estimations due to the presence of a pair of chromosomes with large satellites.

696. *Medicago scutellata* (L.) Miller — $2n = 32$ (Fig. 4).

Cy: North Cyprus, Famagusta Bay (Gazimagusa Körfezi), 5 km N. Salamis, 35°13'N, 33°54'E, beach and phrygana, 03 Oct 1994, *Royl 626* (B).

Our count is in accordance with indications of tetraploid chromosome numbers made by several other authors (e.g. Nilsson & Lassen 1971, Dahlgren & al. 1971, Colombo & al. 1980). Deviating counts were given by Abdelguerfi & Guittonneau (1979) with $2n = 28$ and Bauchan & Elgin (1984, cited in Goldblatt 1988: 109) with $2n = 30$ chromosomes. Fernandes & al. (1977), Fernandes & Queiros (1978), and Eraç & Tokluoglu (1983, cited in Goldblatt 1988: 109) found this species to occur also as a diploid cytotype.

697. *Prosopis farcta* (Banks & Solander) Macbride — $2n = 28$.

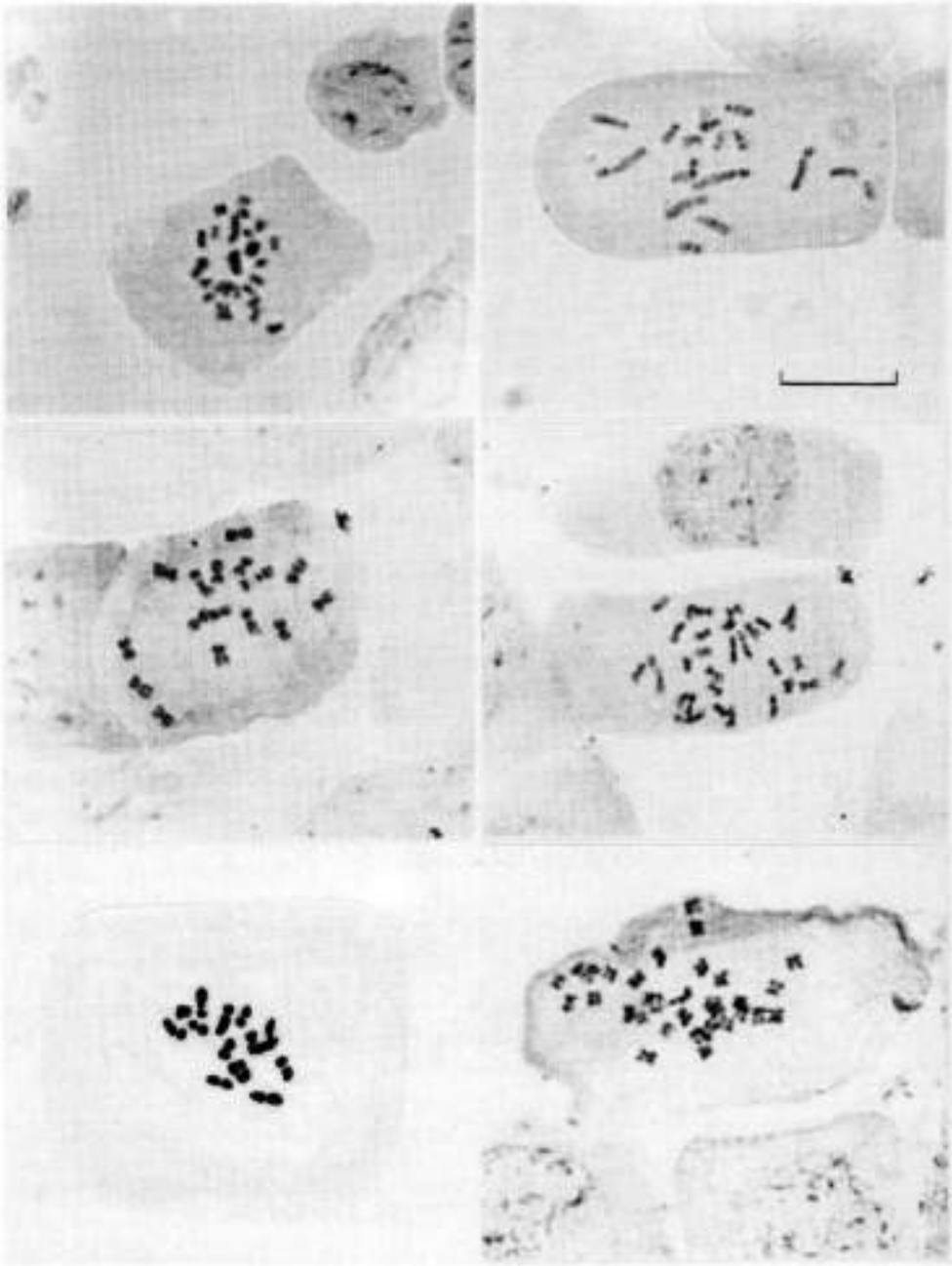
Cy: North Cyprus, Famagusta Bay (Gazimagusa Körfezi), 5 km N. Salamis, 35°13'N, 33°54'E, beach and phrygana, 03 Oct 1994, *Royl 613* (B).

Our count corroborates indications made by Cherubini (1954) for plant material from Northern Iran. In a later publication (Cherubini 1981, cited in Goldblatt 1985: 99) the same author found a chromosome number of $2n = 56$.

698. *Salvia fruticosa* Miller — $2n = 14$ (Fig. 5).

Cy: North Cyprus, Kyrenia Range (Besparmak Daglari), Antiphonitis monastery, 35°19'N, 33°36'E, limestone, 310 m, 13 Oct 1994, *Royl 624* (B).

Our finding of $2n = 14$ chromosomes is in agreement with former reports given by Brullo & al. (1977) for Sicily and Afzal-Rafil (1980) for Turkey.



Figs. 1-6. Metaphases of root-tip mitoses: **1**, *Dianthus cyprius*, $2n = 30$; **2**, *Limonium meyeri*, $2n=18$; **3**, *Medicago intertexta*, $2n = 16$; **4**, *Medicago scutellata*, $2n = 32$; **5**, *Salvia fruticosa*, $2n=14$; **6**, *Sideritis cypria*, $2n = 32$. - Scale bar = 10 µm.

699. ***Sideritis cypria*** Post — $2n = 32$ (Fig. 6).

Cy: North Cyprus, Kyrenia Range (Besparmak Daglari), Buffavento castle, 35°17'N, 33°24'E, basalt and limestone, 920 m, 14 Oct 1994, *Royl 629* (B).

This species has been studied cytologically for the first time.

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References

Abdelguerfi, A. & Guittonneau, G. G. 1979: Reports. [In: Löve, A. (ed.), IOPB chromosome number reports LXIV.] — Taxon **28**: 392-393.

Afzal-Rafii, Z. 1980: Reports. [In: Löve, A. (ed.), Chromosome number reports LXII]. — Taxon **29**: 365-366.

Brullo, S., Majorana, G., Pavone, P. & Terrasi, M. C. 1977: Numeri chromosomatici per la Flora Italiana: 283-298. — Inform. Bot. Ital. **9**: 40-55.

Cave, M. S. (ed.) 1958: Index to plant chromosome numbers for 1957. — Chapel Hill.

Cherubini, C. 1954: Numeros de cromosomas de algunas especies del genero *"Prosopis" (Leguminosae-Mimosoideae)*. — Darwiniana **10**: 637-643.

Colombo, P., Marcenò, C. & Princiota, R. 1980: Numeri cromosomici per la Flora Italiana: 794-805. — Inform. Bot. Ital. **12**: 333-340.

Dahlgren, R., Karlsson, T. & Lassen, P. 1971: Studies on the Flora of the Balearic Islands 1 - Chromosome numbers in Balearic Angiosperms. — Bot. Not. **124**: 249-269.

Erben, M. 1978: Die Gattung *Limonium* im südwestmediterranen Raum. — Mitt. Bot. Staatssamml. München **14**: 361-631.

Fernandes, A. & Queirós, M. 1978: Contribution à la connaissance cytotaxonomique des Spermatophyta du Portugal. IV. *Leguminosae* (Suppl. 3). — Bol. Soc. Brot. **52**: 79-164.

— & Santos, M. F. 1971: Contribution à la connaissance cytotaxonomique des Spermatophyta du Portugal. IV. *Leguminosae*. — Bol. Soc. Brot. **45** (ser. 2): 177-226.

—, — & Queiros, M. 1977: Contribution à la connaissance cytotaxonomique des Spermatophyta du Portugal. *Leguminosae*. — Bol. Soc. Brot. **51**: 137-186.

Goldblatt, P. (ed.) 1981: Index to plant chromosome numbers 1975-1978. — Monogr. Syst. Bot. Missouri Bot. Gard. **5**.

— 1985: Index to plant chromosome numbers 1982-1983. — Monogr. Syst. Bot. Missouri Bot. Gard. **13**.

— 1988: Index to plant chromosome numbers 1984-1985. — Monogr. Syst. Bot. Missouri Bot. Gard. **23**.

Kilian, N. & Leyens, T. 1994: *Limonium lobinii (Plumbaginaceae)*, a new species from Cape Verde Islands, W Africa. — Willdenowia **24**: 59-63.

Labadie, J.-P. 1979: Etude caryosystématique de quelques espèces de la flore d'Algérie. — Naturalia Monspel., Sér. Bot. **32**: 1-11.

— 1980: Reports. [In: Löve, A. (ed.), IOPB chromosome number reports LXV]. — Taxon **28**: 628-629.

Luque, T., Mejías, J. A. & Díaz Lifante, Z. 1988: Números cromosómicos para la flora Espanola. 544-550. — Lagascalia **15**: 130-133.

Nilsson, Ö. & Lassen, P. 1971: Chromosome Numbers of Vascular Plants from Austria, Mallorca and Yugoslavia. — Bot. Not. **124**: 270-276.

Schlarbaum, S. E., Small, E. & Johnson, L. B. 1984: Karyotypic evolution, morphological variability and phylogeny in *Medicago* sect. *Intertextae*. — Pl. Syst. Evol. **145**: 169-181.

Address of the authors:
Ch. Oberprieler & Dr. R. Vogt, Botanischer Garten & Botanisches Museum Berlin-Dahlem, Königin-Luise-Str. 6-8, D-14191 Berlin, Germany.

Reports (700-704) by Federica Del Carratore & Fabio Garbari

700. *Salvia pratensis* L. — $2n = 18$ (Figs. 1a-c; 2a, b).

It: Signayes, 3 km North of Aosta, on the road for Gran S. Bernardo (Aosta Valley), 45°45'10"N, 07°25'03"E, 4 May 1993, *Garbari* (PI; 222/93 H.B.P.).
— Sulcina, on the road from Corfino to Orecchiella (Tuscany), 44°11'30"N, 11°21'58"E, 1000 m, 15 Jun 1993, *Del Carratore & Baldi* (PI; 378/93, 379/93 and 380/93 H.B.P.).
— "S.S. 12 dell'Abetone e del Brennero", 10 km before "Passo dell'Abetone" (Tuscany), 44°07'30"N, 10°42'58"E, 900 m, 19 Jul 1993, *Del Carratore & Borzatti* (451/93 H.B.P.).
— Somp Cornino, foothills of the Carnian Alps (Friuli-Venezia Giulia), 46°13'30"N, 13°0'58"E, 150 m, 03 Oct 1993, *Poldini* (555/93 H.B.P.).
— Precenico di Comeno, in the Trieste Karst (Friuli-Venezia Giulia), 45°46'40"N, 13°41'08"E, 220 m, 02 Oct 1993, *Poldini* (556/93 H.B.P.).

The somatic number $2n = 18$ has been found in all populations of the five localities studied; it agrees with previous counts made on plants both from Italy (Kieft & al. 1978, Van Loon 1980, Löve & Löve 1982) and from other countries of Europe and Asia (Scheel 1931, Yakovleva 1933, Benoist 1938, Delestaing 1954, Afzal Rafii 1980, Frey & al. 1981, Markova & Ivanova 1982).

The plants from Somp Cornino and Precenico di Comeno as other gatherings from Northern-Eastern Italy are usually referred to *S. bertolonii* Vis. In our opinion there are not any caryological nor macromorphological significative differences between these specimens and those from other Italian localities to justify such nomenclature.

In the mitotic metaphase plates (Fig. 1a-c; 2a, b) here reported, the subtelocentric and acrocentric chromosomes are prevailing and there is only one pair of metacentric chromosomes.

On the other hand in the material from Bulgaria, Markova & Ivanova (1982) have found that most chromosomes are submetacentric. Moreover these authors have found the tetraploid number $2n = 32$ in material from Bulgarian localities; the same number has been reported by Scheel (1931) for cultivated material in Hamburg Botanical Garden.

701. *Salvia haematodes* L. — $2n = 18$ (Fig. 3a, b).

It: Tarsia, Crati Valley (Calabria), 39°36'45"N, 16°16'23"E, 100 m, 18 May 1994, *Del Carratore & Bernardo* (757/94 H.B.P.).

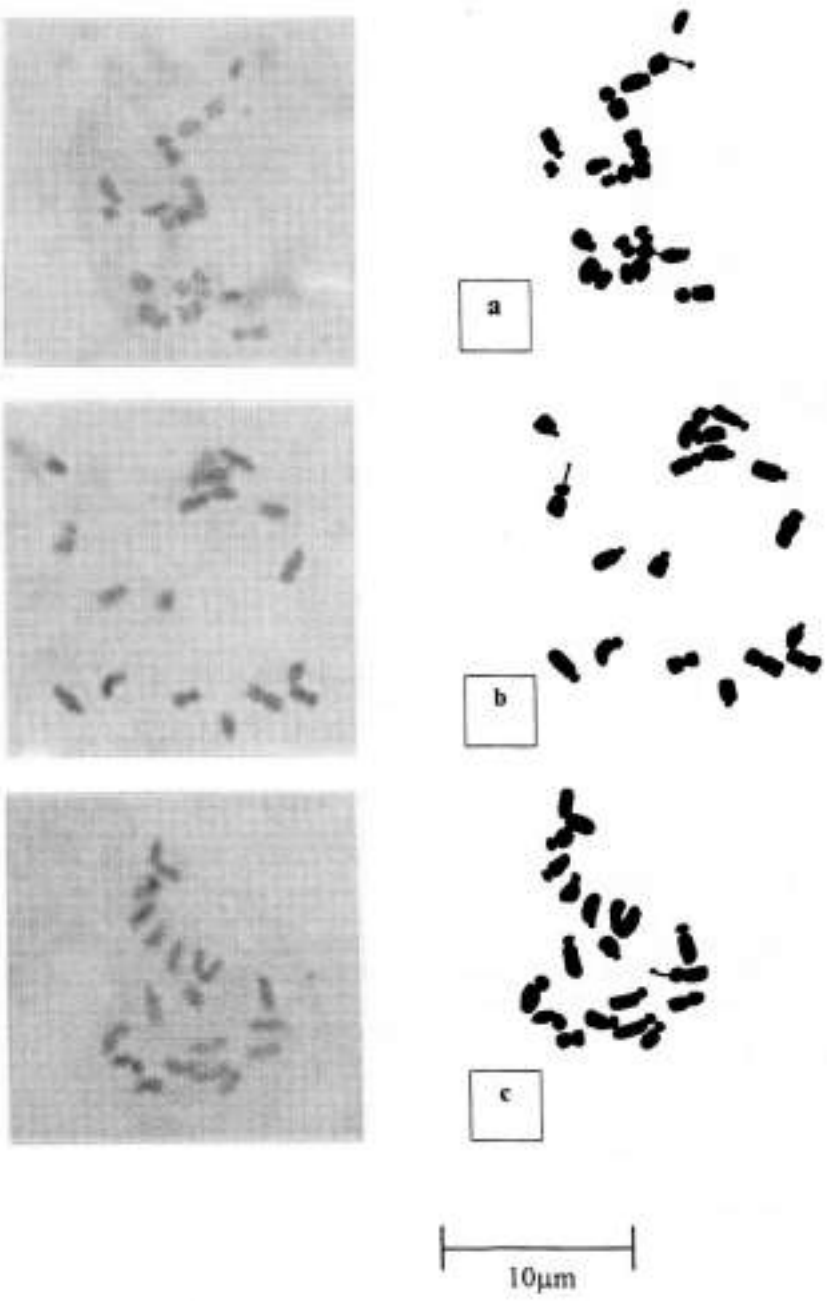

Fig. 1. *Salvia pratensis*, mitotic metaphase plates: photos (left) and drawings (right): **a**, Aosta Valley (222/93 H.B.P.), $2n = 18$; **b**, Sulcina (378/93 H.B.P.), $2n = 18$; **c**, Abetone (451/93 H.B.P.), $2n = 18$.

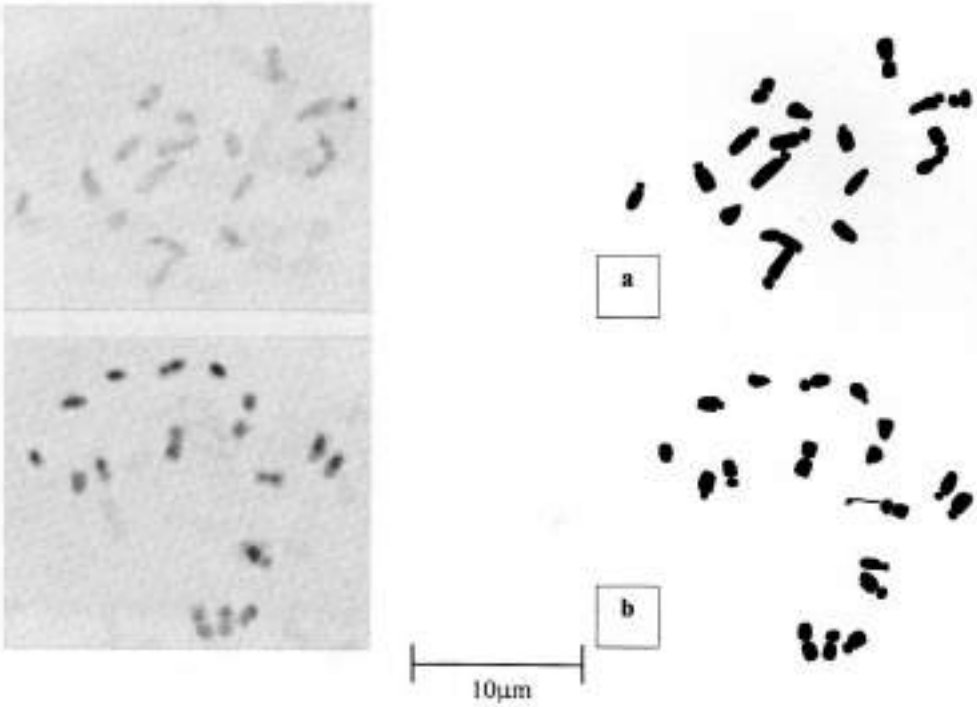

Fig. 2. *Salvia pratensis*, mitotic metaphase plates: photos (left) and drawings (right): **a**, Carnian Alps (555/93 H.B.P.), $2n = 18$; **b**, Trieste Karst (556/93 H.B.P.), $2n = 18$.

It: Cozzo Carbonare, Crati Valley (Calabria), 39°21'30"N, 16°25'08"E, 18 May 1994, *Del Carratore & Bernardo* (758/94 H.B.P.).

The somatic number $2n = 18$ has been found in both populations here investigated. This count is the first cytotaxonomical record for the species, except the results of Scheel (1931) on material of no clearly defined origin.

The chromosome measurements have been made on specimens from Cozzo Carbonare; the following karyotype has been obtained (Levan & al. 1964): $2n = 2x = 18: 2st^s + 2m + 2st + 2sm + 2st + 6m + 2st$ (Fig. 3a, b).

These results have pointed out an almost equal number of isobrachial and heterobrachial chromosomes (one pair satellited). Therefore the chromosome complement, the macromorphological aspect and the distribution permit to well distinguish this species from *Salvia pratensis* L..

702. *Salvia virgata* Jacq. — $2n = 16$ (Fig. 4a-d).

It: Mount S. Lio near Cagnano Varano (Apulia), 41°45'00"N, 15°46'08"E, 08 Feb 1995, *Medagli* (84/95 H.B.P.).

— Rome: uncultivated meadows along the Portuense Way (Latium), 41°49'15"N, 12°21'08"E, 12 Jun 1995, *Del Carratore & Borzatti* (PI; 618/95 H.B.P.).

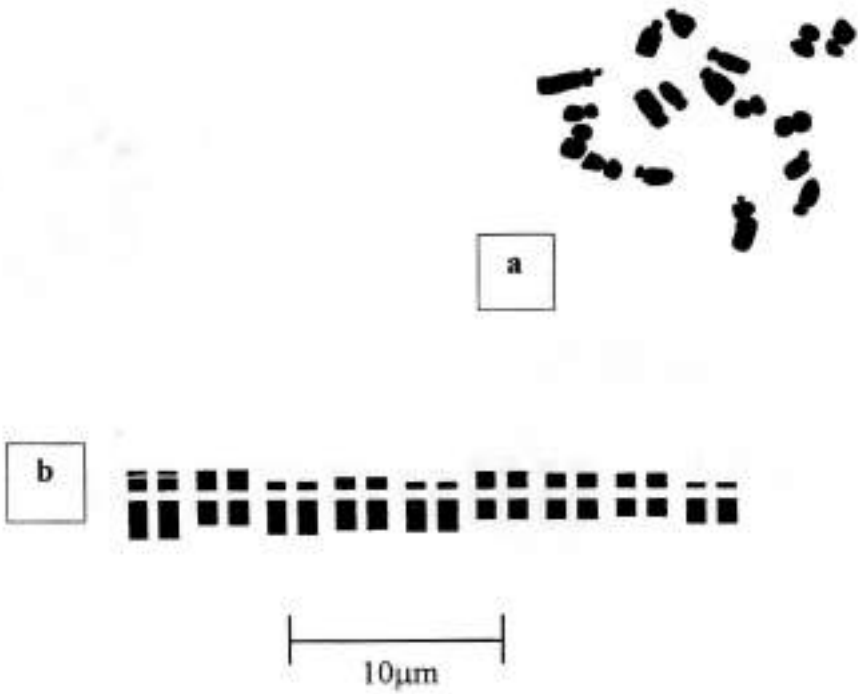

Fig. 3. Mitotic metaphase plate of *Salvia haematodes*, $2n = 18$: **a**, photo (left), drawing (right); **b**, idiogram (down), from Cozzo Carbonare (758/94 H.B.P.).

The somatic number $2n = 16$ has been found in both populations here investigated. This is the first count for Italian plants; it agrees with previous results obtained on material from other countries (Delestaing 1954, Afzal Rafii 1971, 1980, 1981, Markova & Ivanova 1982), whereas only a few records exist for $2n = 32$ (Scheel 1931, Benoist 1938).

The following chromosome measurements have been made on specimens from Cagnano Varano (Levan & al. 1964): $2n = 2x = 16$: 2sm + 2st' + 2st + 2sm + 8m (Fig. 4a, b), whereas this is the karyotype obtained on material from Rome: $2n = 2x = 16$: 2sm + 2sm' + 2 st + 2sm + 2st + 2sm + 4m (Fig. 4c, d).

In both populations only one pair is satellited, but the ratio between longer and shorter arms changes: in the first case these chromosomes are subtelocentric, whereas in the second case they are submetacentric. Moreover in the first karyotype the chromosomes type "m" are prevailing.

This result confirms the previous analysis by Markova & Ivanova (1982), who have put in evidence some chromosome complement variability.

703. *Salvia verbenaca* L. — $2n = 54$, $2n = 56$, $2n = 56 + 1B$, $2n = 56 + 2B$ (Figs. 5a-c; 6a-e; 7a, b).

It: Quercianella, along the turrent Chioma (Tuscany), 43°27'10"N, 10°22'58"E, 01 May 1993, *Del Carratore & Borzatti* (223/93 H.B.P.).

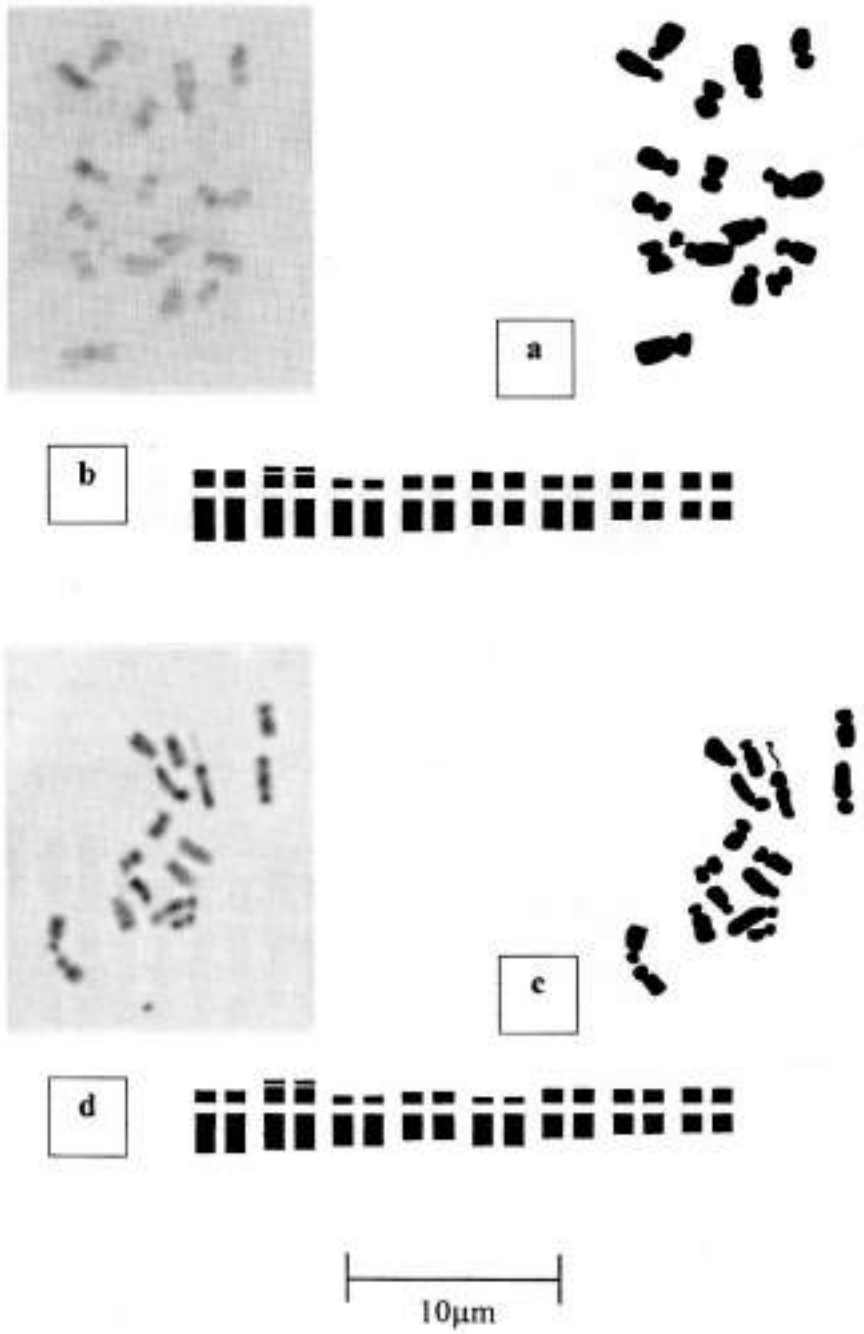

Fig. 4. Mitotic metaphase plates of *Salvia virgata*, $2n = 16$: **a**, photo and drawing and **b**, idiogram from Cagnano Varano (84/95 H.B.P.); **c**, photo and drawing and **d**, ideogram from Rome (618/95 H.B.P.).

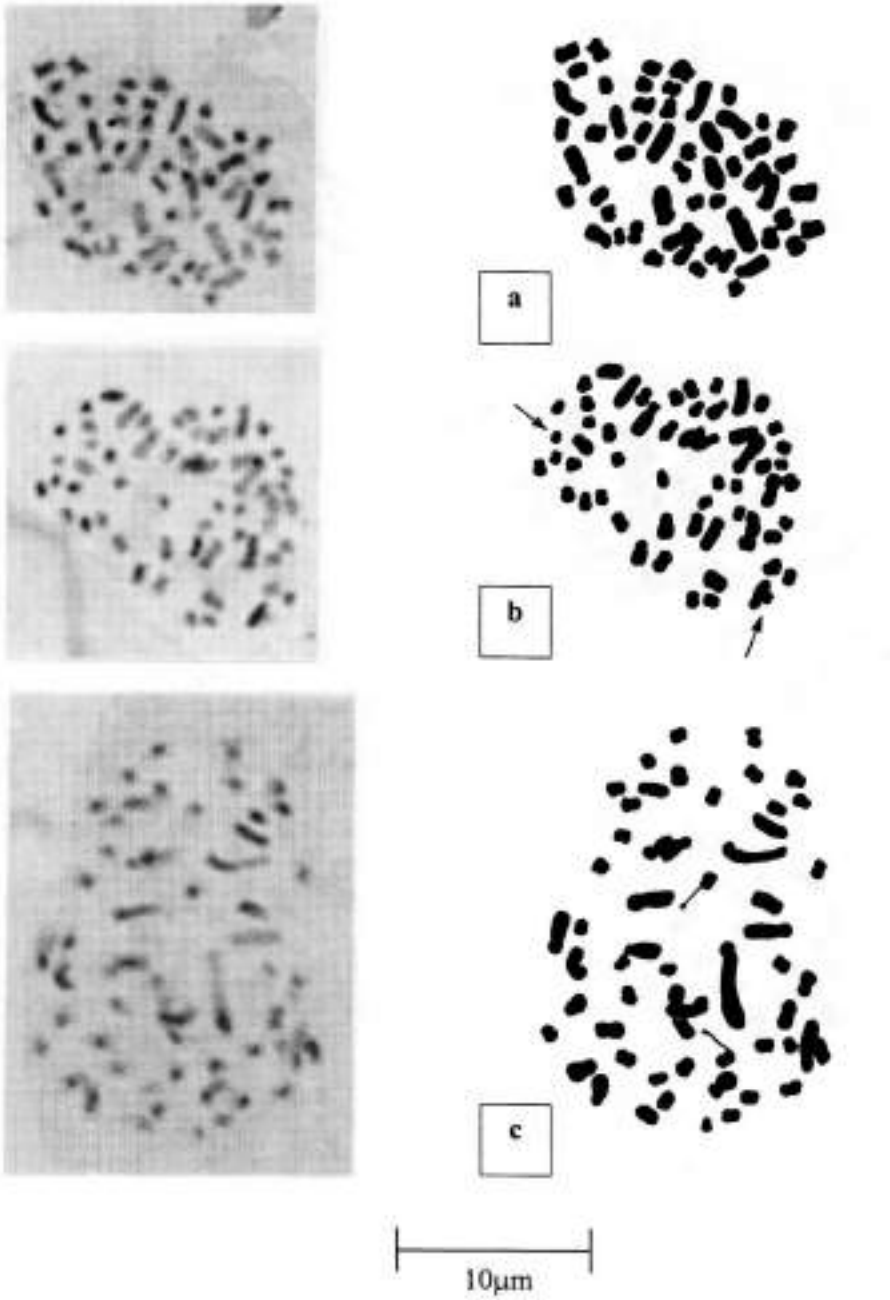

Fig. 5. *Salvia verbenaca*, mitotic metaphase plates: photos (left) and drawings (right): **a**, Quercianella (223/93 H.B.P.), $2n = 56$; **b**, Rome, Terme di Tito (489/93 H.B.P.), $2n = 56 + 2B$; **c**, Parco del Cilento (517/93 H.B.P.), $2n = 56$. - Arrows indicate B-chromosomes.

Fig. 6. *Salvia verbenaca*, mitotic metaphase plates drawings: **a**, Levigliani (233/93 H.B.P.), $2n = 56 + 2B$; **b**, Levigliani (233/93 H.B.P.), $2n = 56 + 1B$; **c**, Rome, Terme di Tito (489/93 H.B.P.), $2n=56$; **d**, Sabaudia (448/94 H.B.P.), $2n = 56 + 1B$; **e**, Colignola (645/93 H.B.P.), $2n = 56$. - Arrows indicate B-chromosomes.

It: Terrinca, along the road (Tuscany), 44°01'00"N, 10°16'18"E, 560 m, 09 May 1993, *Del Carratore & Ghelardi* (232/93 H.B.P.).
— Levigliani, meadow along the road (Tuscany), 44°01'15"N, 10°17'08"E, 600 m, 09 May 1993, *Del Carratore & Ghelardi* (233/93 H.B.P.).
— Capraia Island, foothpath for "La Mortola" (Tuscany), 43°03'25"N, 09°49'18"E, 100 m, 12 May 1993, *Del Carratore* (258/93 H.B.P.).
— Argentario, road for the Monastery (Tuscany), 42°25'00"N, 11°09'38"E, 22 May 1993, *Del Carratore & Borzatti* (274/93 H.B.P.).
— Rome, meadows near the "Terme di Tito" (Latium), 41°53'20"N, 12°14'38"E, 01 Aug 1993, *Borzatti* (PI; 489/93 H.B.P.).
— Rome, meadows near "Porta Maggiore" (Latium), 41°53'30"N, 12°15'58"E, 01 Sep 1993, *Borzatti* (516/93 H.B.P.).
— "Parco del Cilento", Mount Bulgheria (Campania), 40°04'00"N, 15°26'08"E, 20 Jun 1993, *Garbari* (517/93 H.B.P.).
— Colignola, Croce di Mezzana near Pisa, in a traffic island (Tuscany), 43°43'15"N, 10°28'11"E, 05 Nov 1993, *Del Carratore & Giordani* (645/93 H.B.P.).
— C.da Molicelle Botanical Garden, Arcavacata di Rende (Calabria), 39°21'25"N, 16°12'28"E, 230 m., 08 Feb 1994, *Bernardo* (127/94 H.B.P.).
— Circeo National Park, Visitors Centre at Sabaudia, sandy soil (Latium), 41°18'15"N, 13°02'38"E, 11 Mar 1994, *Del Carratore & Baldi* (448/94 H.B.P.).
— "Parco dell'Uccellina", along the "Strada del Mare" (Tuscany), 42°40'00"N, 11°02'48"E, 10 Oct 1994, *Del Carratore & Maffei* (1127/94 H.B.P.).
Sa: road for lake Baratz near Alghero, 40°42'00"N, 8°10'08"E, 10 m, 10 May 1994, *Valsecchi* (742/94 H.B.P.).

These are the first counts for Italian and Sardinian plants of this common species. Different somatic chromosome numbers, i.e. $2n = 56$, $2n = 56 + 1B$ and $2n = 56 + 2B$, have been obtained both between and within the populations: it agrees with the observations of Afzal Rafii (1979), who has seen B-chromosomes and fragments in some mitotic metaphase plates; she has believed that the basic number $x = 8$ is the most frequent too.

Moreover the number $2n = 56$ has been just found by Markova & Ivanova (1982) and Baltisberger & Baltisberger (1995). We found the number $2n = 54$ only in the material from Arcavacata di Rende; this count have been already reported by Benoist (1938), Haque & Ghoshal (1980), Haque (1981) and Markova & Ivanova (1982).

The small chromosome size and the no clearly defined centromeric position prevent from constructing a karyotype.

Many other chromosome numbers exist in literature: i.e. $2n = 48, 59, 60, 62, 64, 72$ (Scheel 1931, Yakovleva 1933, Delestaing 1954, Gadella & al. 1966, Van Loon & al. 1971, Dahlgren & al. 1971, Afzal Rafii 1979, Natarajan 1981, 1988).

The macromorphological aspect and the polyploid chromosome number obtained have been shown that the Sardinian population can be referred to *Salvia verbenaca* L. and not to *Salvia virgata* Jacq. as did Valsecchi (1974).

Some mitotic metaphase plates are reported in Figs. 5a-c; 6a-e; 7a, b.

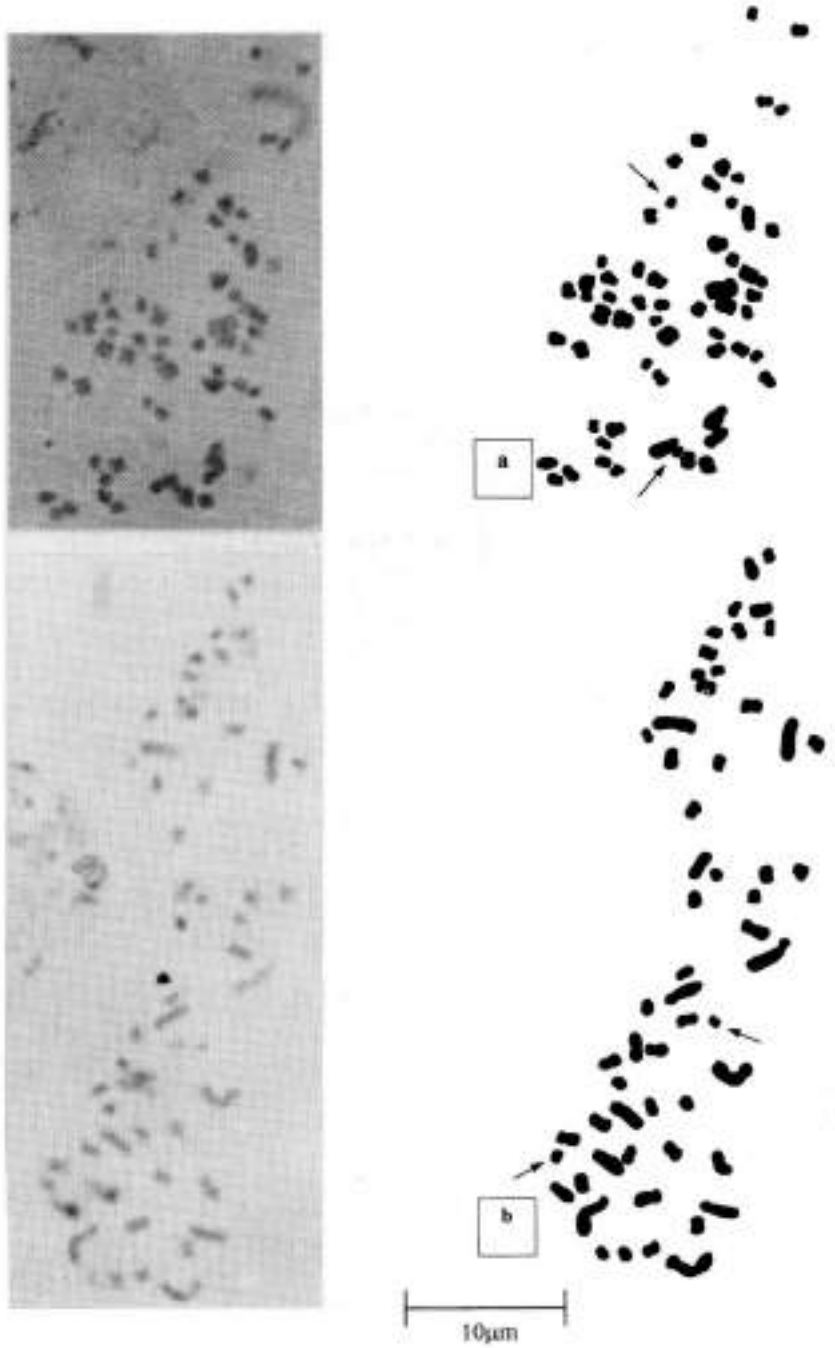

Fig. 7. *Salvia verbenaca*, mitotic metaphase plates: photos (left) and drawings (right): **a**, Rome, Porta Maggiore (516/93 H.B.P.), $2n = 56 + 2B$; **b**, Algbero (742/94 H.B.P.), $2n = 56 + 2B$. - Arrows indicate B-chromosomes.

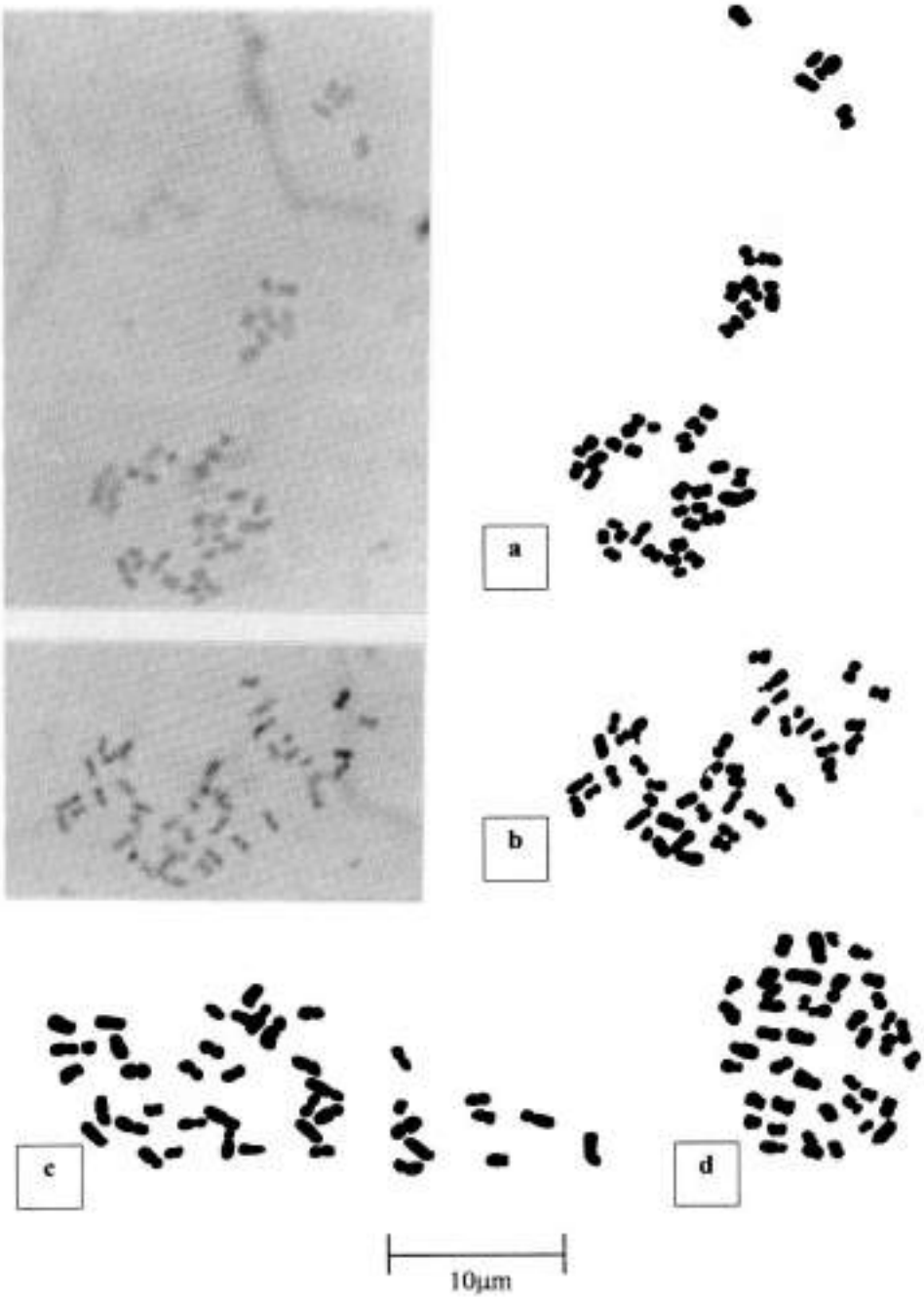

Fig. 8. Mitotic metaphase plates, photos and drawings of *Salvia clandestina*, $2n = 42$: **a**, from Marina di Massa (231/93 H.B.P.); **b**, from Lecce (82/95 H.B.P.); **c**, from S. Rossore (828/94 H.B.P.); **d**, from Parco dell'Uccellina (1128/94 H.B.P.).

704. ***Salvia clandestina*** L. — $2n = 42$ (Fig. 8a-d).

It: Marina di Massa, park along the shore, sandy soil (Tuscany), 44°00'10"N, 10°07'28"E, 09 May 1993, *Del Carratore & Ghelardi* (228/93, 231/93 H.B.P.).
— S. Rossore, sandy soil (Tuscany), 43°41'50"N, 10°20'23"E, 21 Jun 1994, *Vangelisti* (PI; 828/94 H.B.P.).
— "Parco dell'Uccellina", road for "Le Grotte" (Tuscany), 42°39'00"N, 11°03'38"E, 10 Oct 1994, *Del Carratore & Maffei* (1128/94 H.B.P.).
— Road from Piombino to S. Vincenzo, sandy soil under a pine-wood (Tuscany), 42°59'55"N, 10° 31'53"E, 05 Mar 1995, *Del Carratore & Borzatti* (295/95 H.B.P.).
— Castel Fusano, park near the railway station, on sandy soil (Latium), 41°43'25"N, 12°18'53"E, 12 Jun 1995, *Del Carratore & Borzatti* (617/95 H.B.P.).
— Outskirts of Lecce (Apulia), 40°21'00"N, 18°11'08"E, 08 Feb 1995, *Medagli* (82/95 H.B.P.).

The species is distributed along the coast belts of the whole Italian peninsula, preferably on sandy soil.

The cytotaxonomic investigations have been very important, because throughout these results we had the opportunity to connect a morphotype with a peculiar chromosome number. In fact *Salvia clandestina* L. is commonly included or confused with *Salvia verbenaca* L. The two species live together particularly in the sandy areas, for example in Parco dell'Uccellina (Tuscany), but they are different both for macromorphological and phenological character and chromosome number.

The somatic number $2n = 42$ has been found in all six populations studied; some mitotic metaphase plates are reported in Fig. 8a-d. The small chromosome size and the no clearly defined centromeric position prevent from constructing a karyotype.

Earlier studies about this species do not exist; sometimes the number $2n = 42$ has been done for *Salvia verbenaca* L. on plants from other Mediterranean countries (Reese 1957, Kramer & al. 1972, Queiros 1983, Galland 1988). Finally Afzal Rafii (1979) has believed that the polyploid number $2n = 42$ could be understood like a polysomic number of the pentaploid $2n = 40$, so that the basic number is $x = 8$. In this way a closely relationship would exist between *Salvia clandestina* and *Salvia verbenaca*.

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References

Afzal, Z. 1971: Contribution à l'étude cytotaxonomique des *Salvia* de Turquie. — Bull. Soc. Bot. Fr. **118(1-2):** 69-76.
Afzal Rafii, Z. 1979: Contribution à l'étude cytotaxonomique du groupe *Salvia verbenaca* L. — Bull. Soc. Bot. Fr. **126(1):** 79-86.
— 1980: Reports [In: Löve, A. (ed.), IOPB Chromosome Number Reports LXVII.] — Taxon **29**: 365-366.
— 1981: Reports [In: Löve, A. (ed.), IOPB Chromosome Number Reports LXX.] — Taxon **30**: 73-74.
Baltisberger, M. & Baltisberger, E. 1995: Cytological data of Albanian plants. — Candollea **50**: 457-493.

Benoist, E. 1938: Recherches caryologiques sur quelques espèces du genre *Salvia*. — Rev. Cyt. et Cytophys. Veg. **2**: 415-439.

Dahlgren, R., Karlsson, T. & Larsen, P. 1971: Studies on the Flora of Balearic Islands. I. Chromosome numbers in Balearic Angiosperms. — Bot. Notiser **124**: 249-269.

Delestaing, N. 1954: Contribution à l'étude cytologique du genre *Salvia*. — Rev. Cyt. Biol. Veg. **15**: 195-221.

Frey, L., Mizianty, M. & Mirek, Z. 1981: Chromosome numbers of Polish vascular plants. — Frag. Flor. et Geobot. **27(4)**: 581-590.

Gadella, W. J., Kliphuis, E. A. & Mennega, E. A. 1966: Chromosome numbers of some flowering plants of Spain and France. — Acta Bot. Neerl. **15**: 484-489.

Galland, N. 1988: Recherches sur l'origine de la flore du Maroc, étude caryologique et cytogéographique. — Trav. Inst. Sci. Univ. Mohammad V, sér. Bot. (Rabat) **35**: 1-168.

Haque, M. S. 1981: Chromosome numbers in the genus *Salvia* L. — Proc. Indian Natn. Sci. Acad., B. **47(3)**: 419-426.

Haque, M. S. & Ghoshal, K. K. 1980: Karyotypes and chromosome morphology in the genus *Salvia* L. — Cytologia **45(4)**: 627-640.

Kieft, B. & Van Loon, J. C. 1978: Reports [In: Löve, A. (ed.), IOPB Chromosome Number Reports LXIII.] — Taxon **27**: 524-525.

Kramer, K. U., Westra, L. Y. Th., Kliphuis, E. & Gadella, T. W. J. 1972: Floristic and cytotaxonomic notes on the flora of Maltese Islands. — Acta Bot. Neerl. **21(1)**: 54-66.

Levan, A., Fredga, K. & Sandberg, A. A. 1964: Nomenclature for centromeric position on chromosomes. — Hereditas **52**: 201-220.

Löve, A. & Löve, D. 1982: Reports [In: Löve, A. (ed.), IOPB Chromosome Number Reports LXXVI.] — Taxon **31**: 586.

Markova, M. L. & Ivanova, P. S. 1982: Karyological study of the genus *Salvia* in Bulgaria. — Fitologija **19**: 24-42.

Natarajan, G. 1981: Reports [In: Löve, A. (ed.), IOPB Chromosome Number Reports LXXII.] — Taxon **30**: 698-699.

— 1988: Étude caryosystématique de quelques dicotylédones de la garigue Languedocienne. — Naturalia Monspeliensia, sér. Bot. **52**: 85-123.

Queiros, M. 1983: Notas cariologicas em *Labiatae* Portuguesas. — Bol. Soc. Brot., ser. 2 **56**: 71-77.

Reese, G. 1957: Über die Polyploidiespektren in der nordsaharischen Wüstenflora. — Flora **144**: 598-634.

Scheel, M. 1931: Karyologische Untersuchung der Gattung *Salvia*. — Bot. Archiv. **32**: 148-208.

Valsecchi, F. 1974: Ad Floram Notulae Taxonomicae et Geobotanicae 13. *Stachys cretica* L. ssp. *salvifolia* (Ten.) Reich. et *Salvia virgata* Jacq. in Sardegna. — Webbia **29(1)**: 303-307.

Van Loon, J. C. 1980: Reports [In: Löve, A. (ed.), IOPB Chromosome Number Reports LXIX.] — Taxon **29**: 719-720.

—, Gadella, T. W. J. & Kliphuis, E. 1971: Cytological studies in some flowering plants from Southern France. — Acta Bot. Neerl. **20(1)**: 157-166.

Yakovleva, S. V. 1933: Karyological investigation of some *Salvia* species. — Bull. Appl. Bot., ser. 2, **5**: 207-213.

Address of the authors:
Federica Del Carratore & Fabio Garbari, Department of Botanical Sciences, University of Pisa, I-56126 Pisa, Italy.

Reports (705-715) by Graziana Fiorini & Mauro Raffaelli

705. ***Emex spinosa*** (L.) Campd. — $2n = 20$ (Fig. 1A).

Tu: Between Sfax and Bir-Ali-Ben-Khalifa, 14 km before the village, 34°40'N, 10°03'E, 30-50 m, bushes and scrubs, 10 May 1988, *M. Raffaelli & C. Ricceri 20146/104* (FI).

The somatic chromosome number of this taxon, $2n = 20$, agrees with Putievsky & al. (1980) from naturalized populations of Australia, Queiros (1983, 1991) from Portugal and Dalgaard (1986) from the Canary Islands; this count also agrees with the bibliographic citations recorded in their papers. The present study confirms the karyological uniformity of this taxon.

706. ***Biscutella maritima*** Ten. — $2n = 16$ (Fig. 1B).

Tu: Beja: Téboursouk Mounts, 36°22'N, 9°15'E, calcareous rocks between Thibar and Téboursouk, 700 m, 12 May 1988, *M. Raffaelli & C. Ricceri 20146/124* (FI).

The somatic chromosome number from Tunisia was hitherto unknown. It agrees with $2n = 16$ reported by Raffaelli & Fiorini (1985) from Italy.

707. ***Eruca loncholoma*** (Pomel) O.E. Schultz — $2n = 22$ (Fig. 1C).

Tu: Maknassy: road n°14 Sfax - Gafsa, 34°33'N, 9°30'E, open dry places near Col du Hoddege, 200-300 m, 10 May 1988, *M. Raffaelli & C. Ricceri 20146/122* (FI).

The somatic chromosome number from the Mediterranean area was hitherto unknown. Baksay (1961) reported the same number ($2n = 22$) for *Eruca sativa* (Miller) Thell., from Hungarian populations.

708. ***Medicago ciliaris*** (L.) All.— $2n = 18$ or $2n = 16 + 2B$ (Fig. 2A).

Tu: Mendjez-el Bab, along the road GR 5, 36°38'N, 9°37'E, follow fields, 12 May 1988, *M. Raffaelli & C. Ricceri 20146/129* (FI).

The somatic chromosome number of this taxon, $2n = 18$ may be also interpreted as $2n=16 + 2B$, because of the presence of one pair of small metacentric cromosomes readable as supernumerary chromosomes (Fig. 2A, arrows).

This hypotesis suggested by Heyn (1956) accounts for the incongruities found in literature: $2n = 18$ or $2n = 16 + 2B$ (Heyn 1956): Israel; $2n = 18$ (Abdelguerfi & Guittonneau 1980): Algérie; $2n = 16$ (Fernandez & al. 1977): Portugal; $2n = 16$ (Scrugli & Bocchieri 1977): Sardinia (Italy).

Further investigations on the meiotic behaviour of this pair of small chromosomes are necessary in order to ascertain their true nature.

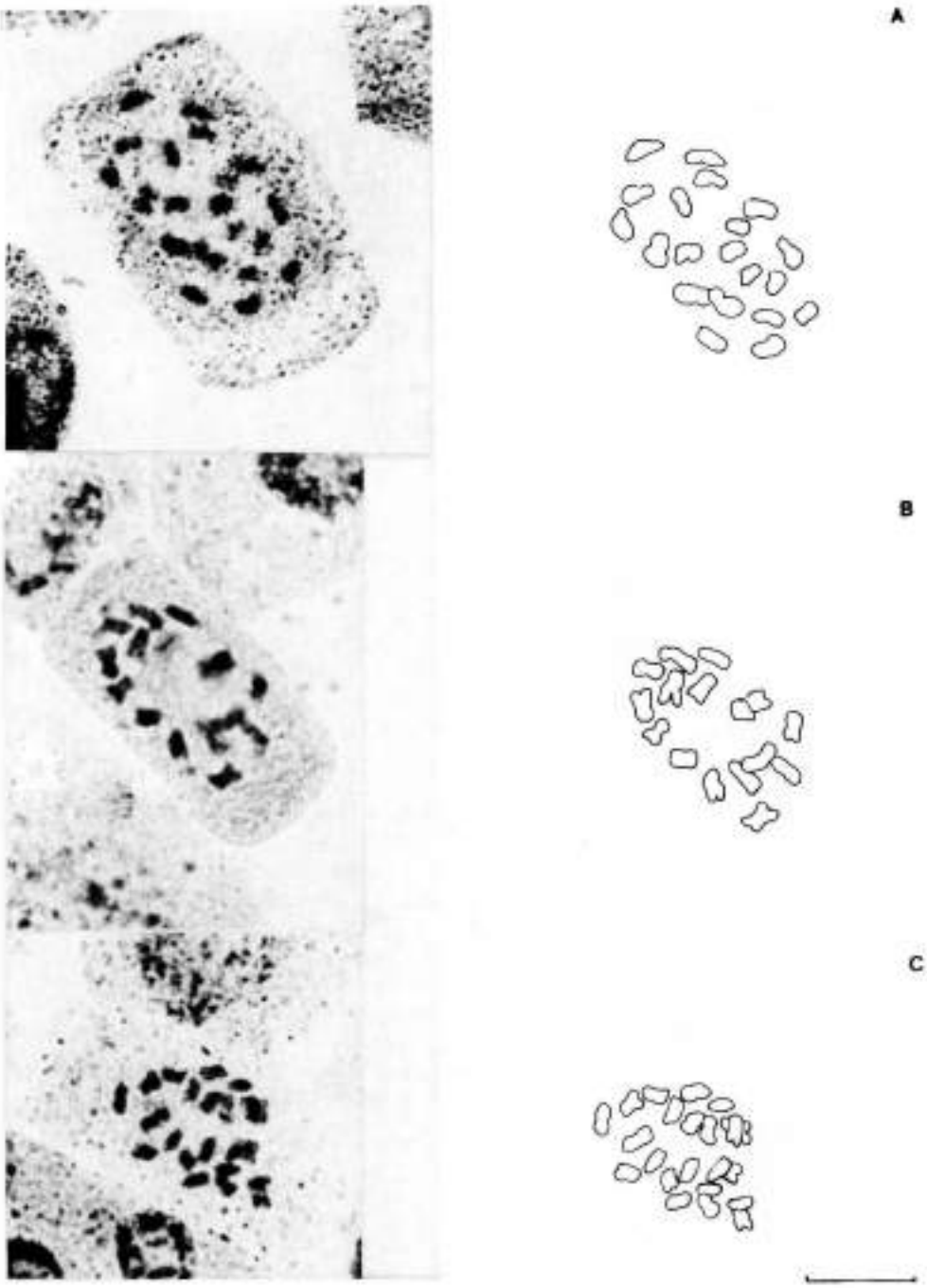

Fig. 1. Mitotic metaphase plates of: **A**, *Emex spinosa*, $2n = 20$; **B**, *Biscutella maritima* $2n = 16$; **C**, *Eruca loncholoma* $2n = 22$. - Scale bar = 10 µm.

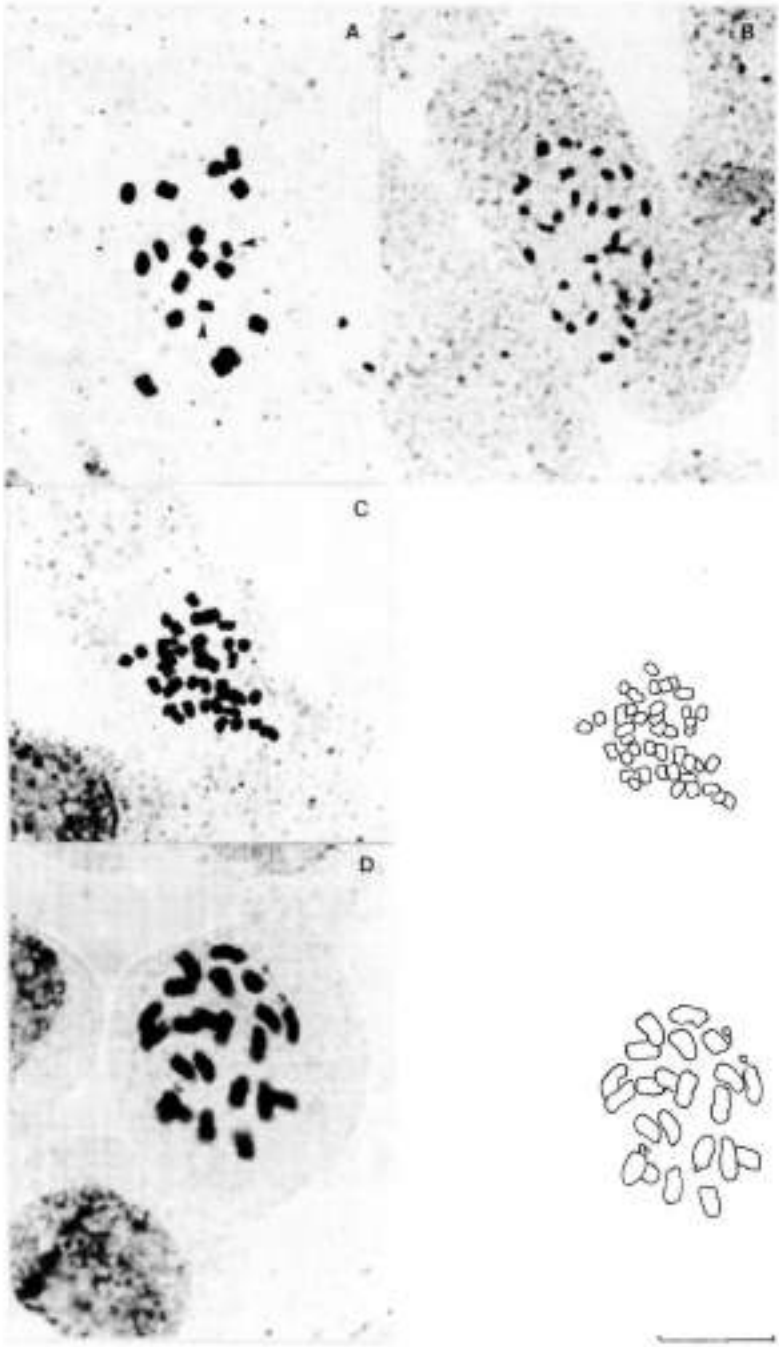

Fig. 2. Mitotic metaphase plates of: **A**, *Medicago ciliaris*, $2n = 18$; **B**, *Ononis serrata*, $2n = 30$; **C**, *Euphorbia helioscopia*, $2n = 42$; **D**, *Centaurea sphaerocaephala*, $2n = 22$. - Scale bar = 10 µm.

709. ***Ononis serrata*** Forssk. var. ***minor*** Lange — $2n = 30$ (Fig. 2B).

Tu: Between Sfax and Bir-Ali-Ben-Khalifa, 14 km before the village, 34°40'N, 10°03'E, 30-50 m, bushes and scrubs, 10 May 1988, *M. Raffaelli & C. Ricceri 20146/132* (FI).

The somatic chromosome number of this taxon, $2n = 30$ agrees with that given by Bartolo & al. (1979) from Linosa (Sicily), but differs from $2n = 32$ reported by Fernandes & Queiros (1971) from Portugal. Both numbers, $2n = 30$ and $2n = 32$, occur in this genus; therefore the populations with $2n = 30$ may be interpreted as aneuploid. Of the same opinion are Fernandes & Queiros (1971) as regards *Ononis mitissima* L.

710. ***Euphorbia helioscopia*** L. — $2n = 42$ (Fig. 2C).

Tu: Béja, road between Mendjez-El-Bab and Béja, 36°43'N, 9°10'E, near the ouadi located 3 Km from Beja, 12 May 1988, *M. Raffaelli & C. Ricceri 20146/127* (FI).

The somatic chromosome number of this taxon, $2n = 42$ agrees with most previous records: India: Bhalla (1942), Gill & al. (1973) as $n = 21$, Sarkar & al (1976), Krishnappa & Reshme (1980) as $n = 21$, Gill & al. (1973) as $n = 21$; Western Himalayas: Koul & al. (1976) and Mehra & Choda (1978) as $n = 21$; Europe: Shimoyama (1958) and Bauer (1971); Scandinavia: Löve & Löve (1944); Sweden: Lövkvist (1963), also $2n = 38$; Netherlands: Gadella & Kliphuis (1968); Portugal: Perry (1943) and Queiros (1975); Spain: Löve & Kjellqvist (1974) and Garcia & Valdes (1981); Sicily (Italy): Pavone & al. (1981); Greece: Strid & Franzén (1981). Our count confirms the karyological uniformity of this taxon.

711. ***Centaurea sphaerocephala*** L. — $2n = 22$ (Fig. 2D).

Tu: Between Sfax and Bir-Ali-Ben-Khalifa, 14 km before the village, 34°40'N, 10°03'E, 30-50 m, bushes and scrubs, 10 May 1988, *M. Raffaelli & C. Ricceri 20146/118*(FI).

The somatic chromosome number of *Centaurea sphaerocephala* L., $2n = 22$ was hitherto unknown from Tunisia. Four sat-chromosomes always occur in our plates. This count agrees with numbers reported by Gallego & Aparicio (1990) from Cadiz (S. Spain) and Luque & Diaz Lifante (1991) from S.E. Spain. Other localities for Spain, Portugal and Morocco are reported in literature. On the other hand, $2n = 44$ which may be interpreted as tetraploid, was recorded by Damboldt & Matthäs (1975) from France and by Bartolo & al. (1977) from Sicily (Italy).

712. ***Allium pallens*** L.— $2n = 16$ (Figs. 3A, 3a).

Tu: Beja: Téboursouk Mounts, 36°22'N, 9°15'E, calcareous rocks between Thibar and Téboursouk, 700 m, 12 May 1988, *M. Raffaelli & C. Ricceri 28240/180* (FI).

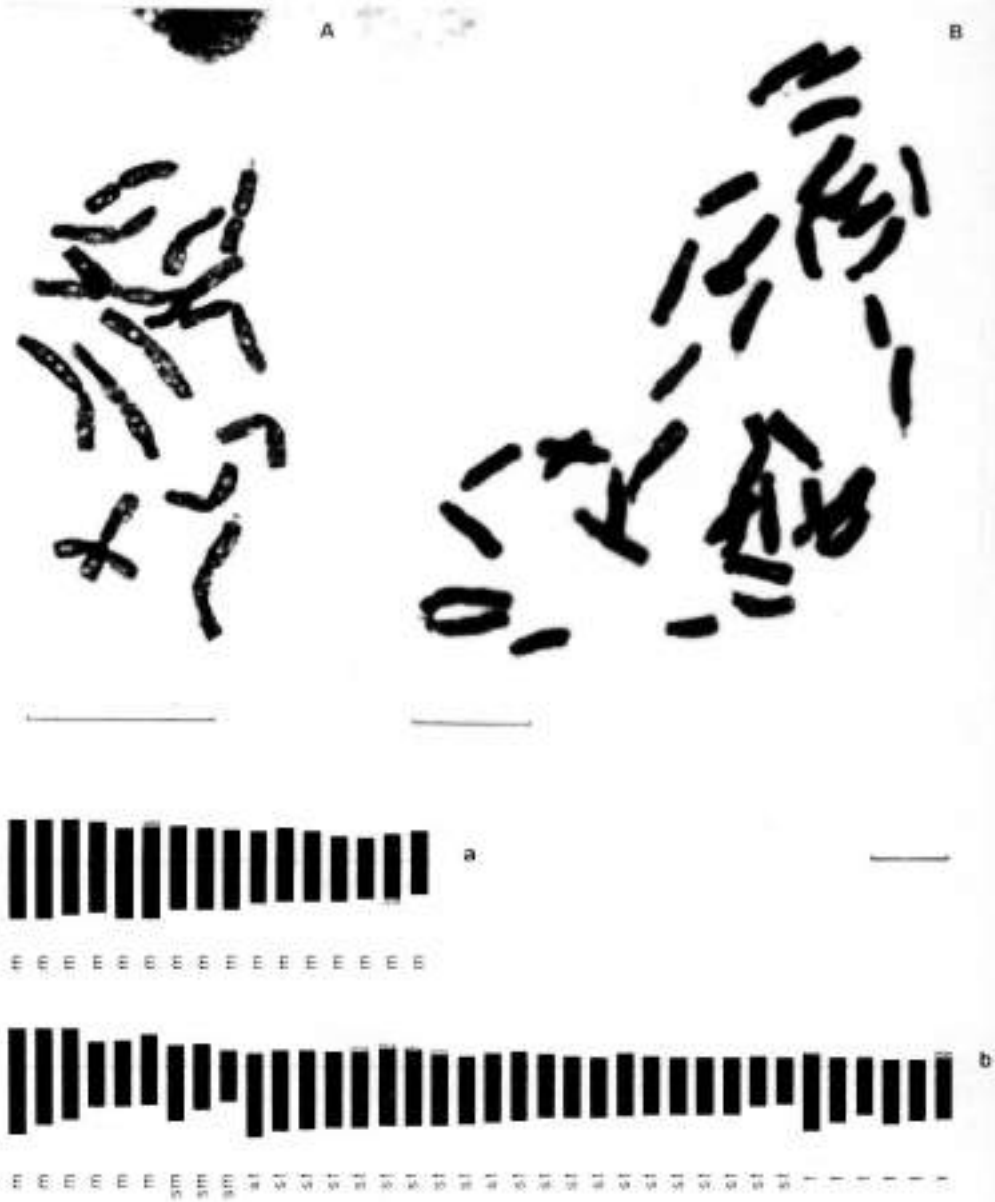

Fig. 3. Mitotic metaphase plates of: **A**, *Allium pallens*, $2n = 16$; **B**, *Dipcadi serotinum*, $2n = 36$. Karyograms of : **a**, *Allium pallens*; **b**, *Dipcadi serotinum*. - Scale bars = 10 µm.

The somatic chromosome number of this taxon, $2n = 16$ is the first count from Tunisia. The following records are resumed from the literature: $2n = 16$ (Dietrich 1967): cultivated material; $n = 8$ (Feinbrun 1950): Palestine; $2n = 32$ (Contandriopoulos 1957): Corsica; $2n = 32$ (Marchi & al. 1974): Latium (Italy); $2n = 24$ (Tornadore 1981): Apulia (Italy);

$2n$= 16 (Vosa 1976): Israel; $2n$ = 16 (Fernandes & Queiros 1970, Pastor 1982, Ruiz Rejon & al. 1980, 1986): from numerous localities of the Iberian Peninsula and Morocco; $2n$=16, $2n$ = 32 (Strid & Franzén 1981, Karavokyrou & Tzanoudakis 1991): from continental Greece and the Aegean Islands; $2n$ = 16 + 1B (Özhatay 1986): Northern-Anatolia; $2n$ = 16 + 0-1B (Puizina & al. 1995): Croatia; n = 8, $2n$ = 16, $2n$ = 32 (Brat 1965a, 1965b, Özhatay 1984, 1990): Turkey.

This count adds a new record to our knowledge of the cytogeographic distribution of *A. paliens*. Tetraploid populations occur in Corsica, Italy, Greece, the Aegean Islands and Anatolia, while diploid populations spread from the Iberian Peninsula to Northern Africa and Eastern Mediterranean area. A triploid population occurs in S.E. Italy, while in Anatolia both diploids and tetraploids seem to be present.

Karyotype analyses show that the apparent overall length of chromosomes varies from 7 to 13 µm; the width is about 1.5 to 2.5 µm. The karyotype formula (Levan & al. 1964) is: $2n$ = 14m + 2m-SAT = 16 chromosomes; the asymmetry index (Arano & Saito 1980) is: AsK% = 57.5

713. *Dipcadi serotinum* (L.) Medicus — $2n$ = 36 (Figs. 3B, 3b).

Tu: Between Sfax and Bir-Ali-Ben-Khalifa, 14 km before the village, 34°40'N, 10°03'E, 30-50 m, bushes and scrubs, 10 May 1988, *M. Raffaelli & C. Ricceri 20146/195* (FI).

The somatic chromosome number of this taxon, $2n$ = 36 is new to Tunisia and differs from the counts reported up to now by several authors: Gadella & al. (1966) counted $2n$=8, $2n$ = 8 + 1-4B, $2n$ = 16, $2n$ = 16+2B, $2n$ = 32 from Eastern Spain and mentioned the following counts: $2n$ = 8, $2n$ = 16 from Portugal, $2n$ = 64/68 from Sahara (Algeria). Other records are resumed from the literature: $2n$ = 8 (Loon & al. 1971): Pyrenées (France); $2n$ = 64 (Borgen 1974): Canary Islands; $2n$ = 32 (Humphries & al. 1978): Algeria; $2n$ = 8 + 0-1B (Queiros 1983): Portugal. Other records are referred to localities of Spain: $2n$ = 8 (Löve & Kjellqvist 1973); n = 4, $2n$ = 8, n = 14, $2n$ = 28 (Ruiz Rejon 1974, 1978); $2n$ = 8 (Valdes-Bermejo & al. 1978); $2n$ = 8, $2n$ = 8 + 0-4B (Ruiz Rejon & al. 1980, 1981); $2n$ = 8 (Mejias & Luque 1987 and Luque & Diaz Lifante 1991). See also Corsi & al. (1996) for further data.

Ruiz Rejon & al. (1981) investigated the meiotic behaviour of PMCs of *D. serotinum* and revealed an unusual high frequency of several types of abnormalities: irregular anaphase segregations, chromosome bridges, micronuclei at telophases I and II, pairing failure and spontaneous breakage of chromosomes. These irregularities were interpreted by these authors as a consequence of the genetically unbalanced nature of the chromosome level $2n$ = 8. Karyotype analyses show that the apparent overall length of chromosomes varies from 4.5 to 12 µm; the width is about 1.5-2.5 µm. Chromosomes can be grouped as follows: $2n$ = 6m + 3sm + 17st + 4st-SAT +3t + 3t-SAT = 36. The asymmetry index is: AsK%=76.4. We point out that disploidy and high level of ploidy are to be found only in the N. African populations while B-chromosomes seem to be associated to a lower degree of ploidy ($2n$ = 8, 16); in fact in our counts we never found B-chromosomes. The asymmetric karyotype, B-chromosomes, the meiotic abnormalities, polyploidy and disploidy, need further investigations in order to evaluate the taxonomic relations inside of the *Dipcadi serotinum*-complex.

Fig. 4. Mitotic metaphase plates of: **A**, *Scilla lingulata*, $2n = 16$; **B**, *Ornithogalum orthophyllum*, $2n = 52$; **a**, karyogram of *Scilla lingulata*. - Scale bars = 10 µm.

714. ***Scilla lingulata*** Poir. — $2n = 16$ (Figs. 4A, 4a).

Tu: Médénine-Matmata, 10 km from Metameur, 33°20'N, 10°30'E, 100-150 m, dry places, 9 May 1988, *M. Raffaelli & C. Ricceri 28240/190* (FI).
— Beja: Téboursouk Mounts, 36°22'N, 9°15'E, calcareous rocks between Thibar and Téboursouk, 700 m, 12 May 1988, *M. Raffaelli & C. Ricceri 28240/197* (FI).

The somatic chromosome number of this taxon, $2n = 16$ was hitherto unknown for Tunisia. Karyotype analyses were made on both populations, while the karyogram refers to the Médénine population. The apparent overall length of chromosomes varies from 3 to 9 µm; the width is about 2.5 µm. The chromosomes may be grouped as follows: $2n = 4m + 10sm + 2st\text{-}SAT = 16$. The karyotype asymmetry index is: AsK% = 76.2. Two macrosatellites occur on st-chromosomes and occasionally two microsatellites on other chromosomes were observed. See also Corsi & al. (1996) for other data.

715. ***Ornithogalum orthophyllum*** Ten. — $2n = 52$ (Fig. 4B).

Tu: Beja: Téboursouk Mounts, 36°22'N, 9°15'E, calcareous rocks between Thibar and Téboursouk, 700 m, 12 May 1988, *M. Raffaelli & C. Ricceri 28240/196* (FI).

The somatic chromosome number, $2n = 52$ agrees with that given by Moret (1984, 1987) from Morocco. This taxon belongs to the *Ornithogalum umbellatum* complex which is made up of a polyploid series ranging from $2x$ to $12x$ ($x = 9$), including also dysploid chomosome numbers (Garbari & Tornadore 1972, Raamsdonk 1985, 1986, Moret & Couderc 1986). Therefore $2n = 52$ may be interpreted as aneuploid. See also Corsi & al. (1996) for further considerations.

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References

Abdelguerfi, A. & Guittonneau, G. G. 1980: Reports [In Löve, Á. (ed.), IOPB Chromosome number reports LXIV]. — Taxon **28**: 392-393. 1979.
Arano, H. & Saito, H. 1980: Cytological studies in Family *Umbelliferae* V. Karyotypes of seven species in Subtribe *Seselinae*. — La Kromosomo **2**: 17.
Baksay, L. 1961 — In Moore, D. M. (ed.), 1982: Flora Europaea check-list and chromosome index. — Cambridge.
Bartolo, G., Brullo, S., & Pavone, P. 1979: Numeri cromosomici per la flora Italiana: (617-631). — Inform. Bot. Ital. **11**: 149-159.
—, —, Majorana, G. & Pavone, P. 1977: Numeri cromosomici per la Flora Italiana: (315-328). — Inform. Bot. Ital. **9**: 71-87.
Bauer, Z. 1971: Karyological studies in the genus *Euphorbia* L. II. — Acta Biol. Cracov., Ser Bot. **14**: 159-178.
Bhalla, V. 1942: Life-history of *Euphorbia helioscopia*. — Linn. Proc. Ind. Sci. Congr. **28**: 161-162.
Borgen, L. 1974: Chromosome numbers of Macaronesian flowering plants II. — Norvegian J. Bot. **21**: 195-210.

Brat, S. V. 1965a: A genetic system in *Allium*. 1. Chromosome variation. — Chromosoma **16(4)**: 486-499

— 1965b Genetic system in *Allium*, 3. Meiosis and breeding systems in cultivated material. — Heredity **20(3)**: 325-339

Contrandriopoulos, J. 1957: Nouvelle contribution à l'étude caryologique des endémiques de la Corse. — Bull.Soc.Bot. France **104(7-8)**: 533-538.

Corsi, G., Garbari, F. & Ghelardi, A. 1996: Reports 684-691 [In Kamari, G., Felber, F. & Garbari, F. (eds). Mediterranean chromosome number reports - 6]. — Fl. Medit. **6**: 249-262.

Dalgaard, V. 1986: Chromosome studies in flowering plants from Macaronesia. — Anales Jard. Bot. Madrid **43**: 83-111.

Damboldt, J. & Matthäs, U. 1975: Chromosome numbers of some Mediterranean and C. European *Centaurea* species (*Asteraceae*). — Pl. Syst. Evol. **123**: 107-115.

Dietrich, J. 1967: Genre *Allium*. Caryotypes de 46 espèces en culture (Jardin botanique de Strasbourg). — Inf. Ann. Caryosyst. et Cytogénét. **1**: 23-26.

Feinbrun, N. 1950: Chromosome counts in Palestinian "*Allium*" species. — Palestine Jour. Bot. **5(1)**: 13-16.

Fernandes, A & Queiros, M. 1970: Sur la caryologie de quelques plantes récoltées pendant la IIIème réunion de botanique péninsulaire. — Mem. Soc. Brot. **21**: 343-385.

— & — 1971: Contribution à la connaissance cytotaxonomique des Spermatophyta du Portugal. IV. *Leguminosae*. — Bol. Soc. Brot. **45:** 189.

—, Santos, M. F. & Queiros, M. 1977: Contribution à la connaissance cytotaxonomique des Spermatophyta du Portugal. IV. *Leguminosae*. — Bol. Soc. Brot., ser 2, **51**: 137-186.

Gadella, T. W. J. & Kliphuis, E. 1968: Chromosome numbers of flowering plants in the Netherlands IV. — Proc. Roy. Netherlands Acad. Sci., ser. C., **71**: 168-183.

—, — & Mennega, E. A. 1966: Chromosome numbers of some flowering plants of Spain and S. France. — Acta Bot. Neerland. **15(2)**: 484-489.

Gallego, M. J. & Aparicio, A. 1990: Números cromosómicos para la flora Española. 603-617. — Lagascalia **15**: 288-295.

Garbari, F. & Tornadore, N. 1972: The genus *Ornithogalum* L. (*Liliaceae*). II. Taxonomy of some Italian entities. — Nuovo Giorn.Bot. Ital. **106**: 285.

Garcia, I. & Valdes, B.1981: Números cromosómicos para la flora Española. 182-256. — Lagascalia **10**: 225-256.

Gill, B. S., Chawla, A. & Kanwal, R. 1973: Cytological studies in North-West Indian *Euphorbiaceae*. — Cytologia **38**: 393-401.

Heyn, C. 1956: Some chromosome count in the genus *Medicago*. — Caryologia **9**: 160-165.

Humphries, C. J., Murray, B. G., Bocquet, G. & Vasudevan, K. N. 1978: Chromosome numbers of phanerogams from Morocco and Algeria. — Bot. Not. **131**: 391-406.

Karavokyros, E. & Tzanoudakis, D. 1991: The genus *Allium* in Greece: II. A cytotaxonomical study of the E Aegean species. — Bot. Chron. **10**: 777-784

Koul, A. K., Wakhlu, A. K. & Karihaloo, J. L. 1976: Chromosome numbers of some flowering plants of Jammu (Western Himalayas). I.-II. — Chromosome Information Service **20**: 30-33.

Krishnappa, D. G. & Reshme, R. V. 1980: Reports [In Löve, Á. (ed.), IOPB Chromosome number reports LXVIII]. — Taxon **29**: 536-537.

Löve, Á & Kjellqvist, E. 1973: Cytotaxonomy of Spanish plants. II. *Monocotyledons*. — Lagascalia **3**: 147-182.

— & — 1974: Cytotaxonomy of spanish plants. IV. *Dicotyledons: Cesalpiniaceae-Asteraceae*. — Lagascalia **4**: 153-211.

— & Löve, D. 1944: Cytotaxonomical studies on boreal plants. III. Some new chromosome numbers of scandinavian plants. — Ark. Bot. **31(12)**: 1-22.

Lövkvist, B. 1963: In: Weimarck, G.: Skånes Flora.

Loon, J. C. van, Gadella, T. W. J. & Kliphuis, E. 1971: Cytological studies in some flowering plants from southern France. — Acta Bot. Neerl. **20**: 156-166.

Luque, T. & Diaz Lifante, Z. 1991: Chromosome numbers of plants collected during Iter Mediterraneum I in the SE of Spain. — Bocconea **1**: 303-364.
Marchi, P., Capineri, R. & D'Amato, G. 1974: Numeri cromosomici per la Flora Italiana: (1821-1897). — Inform. Bot. Ital. **6**: 303-312.
Mehra, P. N. & Choda, S. P. 1978: Cyto-taxonomical studies in the genus *Euphorbia* L. — Cytologia **43**: 217-235.
Mejías, J. A. & Luque, T. 1987: Números cromosomáticos de plantas occidentales: (403-410). — Anales Jard. Bot. Madrid **43**: 412-416.
Moret, J. 1984: Reports [In Löve, Á. (ed.), IOPB Chromosome number reports LXXXIV]. — Taxon **33**: 536-539.
— 1987: Apport de la taxonomie numérique à la connaissance du genre *Ornithogalum* L. au Maroc: relations entre les sous-espèces d'*Ornithogalum umbellatum* L. — Bull. Soc. Bot. France, Lett. Bot. **134**: 155-163.
— & Couderc, H. 1986: Contribution of karyology to the systematic knowledge of the *Ornithogalum* L. genus in North Africa: the *Heliocharmos* Baker subgenus. — Caryologia **39**: 259-272.
Özhatay, N. 1984: Cytotaxonomic studies on the genus *Allium* in European Turkey and around Istanbul II. Sect *Codoprasum*. — Istanbul Univ. Eczacilik Fak. Mecmuasi (J. Fac. Pharm. Istanbul) **20**: 29-43.
— 1986: *Allium* species in North Anatolia and their chromosome numbers. — Doga, Turk Biyol. Dergisi (Turkish J. Biol.) **10**: 452-458 (In Turkish).
— 1990: The genus *Allium* in European Turkey and around Istanbul. — Ann. Mus. Goulandris **8**: 115-128.
Pastor, J. 1982: Karyology of the *Allium* species from the Iberian Peninsula. — Phyton (Horn) **22**: 171-200.
Pavone, P., Terrasi, C. M. & Zizza, A. 1981: Reports [In Löve, Á. (ed.), IOPB Chromosome number reports LXXII]. — Taxon **30**: 695-696.
Perry, B. A. 1943: Chromosome number and phylogenetic relationships in the *Euphorbiaceae*. — Amer. J. Bot. **30**: 527-543.
Puizina, J., Solic, M. E. & Papes, D. 1995: Reports 526. [In Kamari, G., Felber, F. & Garbari F. (eds). Mediterranean chromosome number reports — 5]. — Fl. Medit. **5**: 261-373.
Putievsky, E., Weiss, P. W. & Marshall, D. R. 1980: Interspecific hybridization between *Emex australis* and *Emex spinosa*. — Austral. J. Bot. **28**: 323-328.
Queiros, M. 1975: Contribuicao para o conhecimento citotaxonomico das *Spermatophyta* de Portugal. XI. *Euphorbiaceae*. — Bol. Soc. Brot. **49**: 143-161.
— 1983: Números cromossómicos para a Flora Portugesa (64-85). — Bol. Soc. Brot., Sér. 2, **56**: 79-98.
— 1991: Números cromossómicos para a Flora Portugesa (104-105). — Bol. Soc. Brot., Sér. 2, **64**: 135-142.
Raamsdonk, L. W. D. van 1985: Pollen fertility and seed formation in the *Ornithogalum umbellatum/ angustifolium* complex (*Liliaceae/Scilloideae*). — Pl. Syst. Evol. **149**: 287-297.
— 1986: Biosystematic studies on the *umbellatum/ angustifolium* complex in the genus *Ornithogalum* L. II. Genome characterization and evolution. — Nordic J. Bot. **6**: 525-544.
Raffaelli, M. & Fiorini, G. 1985 Numeri cromosomici per la Flora Italiana (1049-1051). — Inform. Bot. Ital. **17**: 99-101.
Ruiz Rejon, C., Lozano, R. & Ruiz Rejon, M. 1986: Números cromosómicos para la Flora Española (479-484). — Lagascalia **14**: 292-296.
Ruiz Rejon, M. 1974: Reports [In Löve, Á. (ed.), IOPB Chromosome number reports XLVI]. — Taxon **23**: 801-812.
— 1978: Estudios cariológicos en especies espanolas del orden *Liliales*. III. Familia *Liliaceae*. — Anal. Inst. Bot. Cavanilles **34**: 739-759.

—, Ruiz Rejon, C & Pascual, L. 1981: The chromosome system of *Dipcadi serotinum* (*Liliaceae*): a natural species with unusual cytogenetic characteristics. — Caryologia **34**: 419-426.
—, Oliver, J. L., Ruiz Rejon, C., Pascual, L., Soto, J. & Tejero, E. 1980: Números cromosómicos para la flora española (121-126). — Lagascalia **9**: 249-254.
Sarkar, A. K., Datta, N., Mallick, R. & Chatterjee, U. 1976: Reports [In Löve Á. (ed.), IOPB Chromosome number reports LIV]. — Taxon **25**: 648-649.
Scrugli, A. & Bocchieri, E. 1977: Numeri cromosomici per la Flora Italiana (348-357). — Inform. Bot. Ital. **9**: 127-133.
Shimoyama, S. 1958: Cytological studies in the genus *Euphorbia* II. Chromosome numbers of twenty European species. — Natl. Inst. Genet. (Japan), Ann. Rep. **8**: 49.
Strid, A. & Franzén, R. 1981: Reports [In Löve Á. (ed.), IOPB Chromosome number reports LXXIII]. — Taxon **30**: 829-842.
Tornadore, N. 1981: Numeri cromosomici per la Flora Italiana: (806-813). — Inform. Bot. Ital. **13**: 151-157.
Valdes-Bermejo, E., Pastor, J. & Ubera, J. 1978: Números cromosómicos para la flora espanola (1-44). — Lagascalia **7**: 191-216.
Vosa, C. G. 1976: Heterochromatic banding patterns in *Allium*. II. Heterochromatin variation in species of the *Paniculatum* group. — Chromosoma **57**: 119-133.

Address of the authors:
Dott. Graziana Florini & Prof. Mauro Raffaelli, Dipartimento di Biologia Vegetale dell'Università, Via G. La Pira 4, I-50121 Firenze.

Reports (716-748) by M. G. Pimenov, Ju. V. Daushkevich, M. G. Vasil'eva & E. V. Kljuykov

716. *Angelica pachyptera* Lallem. — $n = 11$ (Fig. 1).

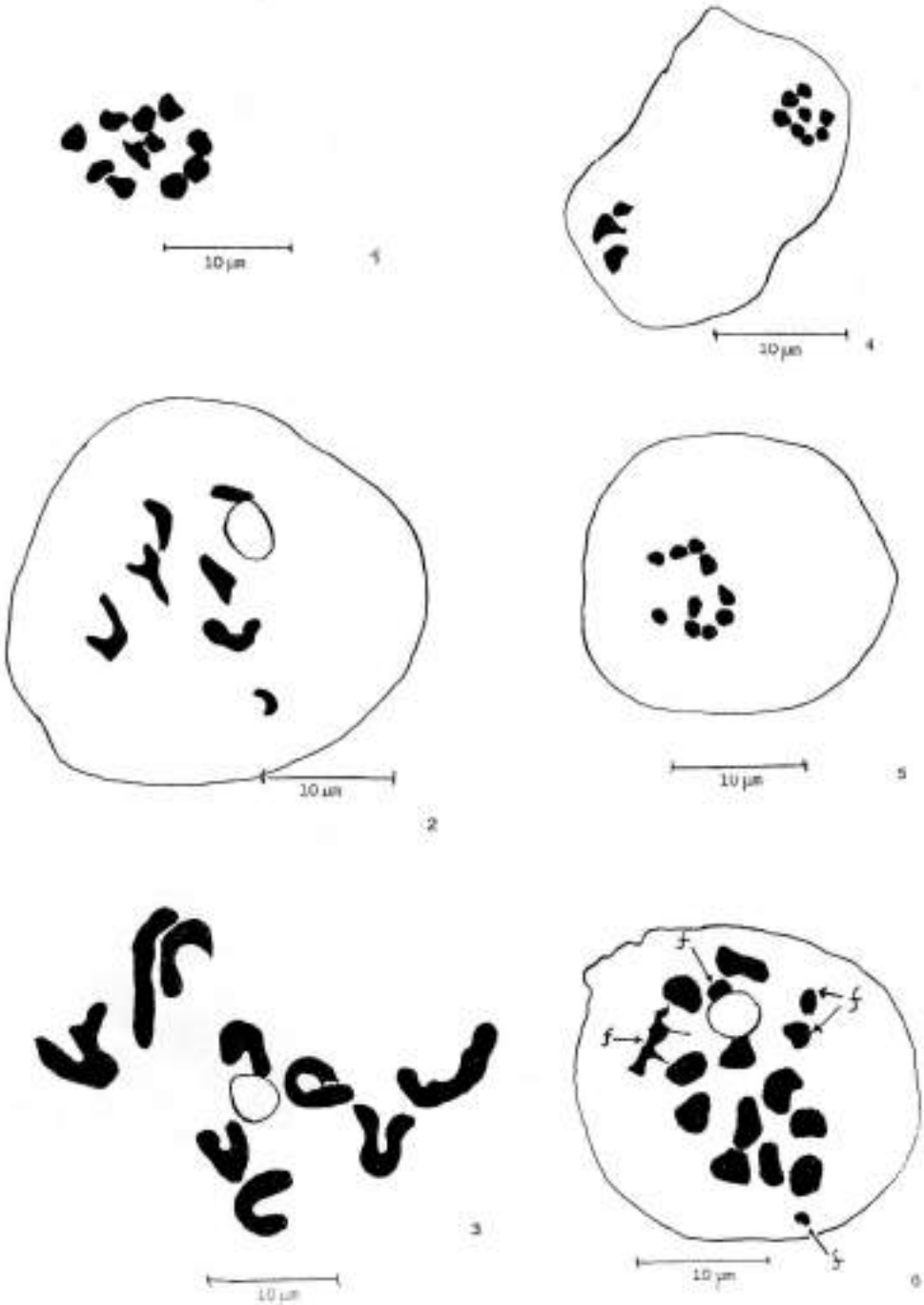
Tu: A8 Trabzon, Black Sea shore between Arakli and Of, 40°55'N, 40°10'E, *Pimenov & Kljuykov 973* (MW).

This species is closely related to *A. sylvestris* L.; it was regarded in "Flora of Turkey" (Chamberlain 1972) as a variety, var. *stenoptera* Lallem., of the latter. Previously chromosome number ($2n = 22$) has been determined (Vasil'eva & al. 1981a) for material from Krasnodar Terr. of Russia (N.W. Caucasus); then, morphometric description of *A. pachyptera* karyotype was published (Vasil'eva & Pimenov 1991). The new determination, first for Turkey, confirms these data.

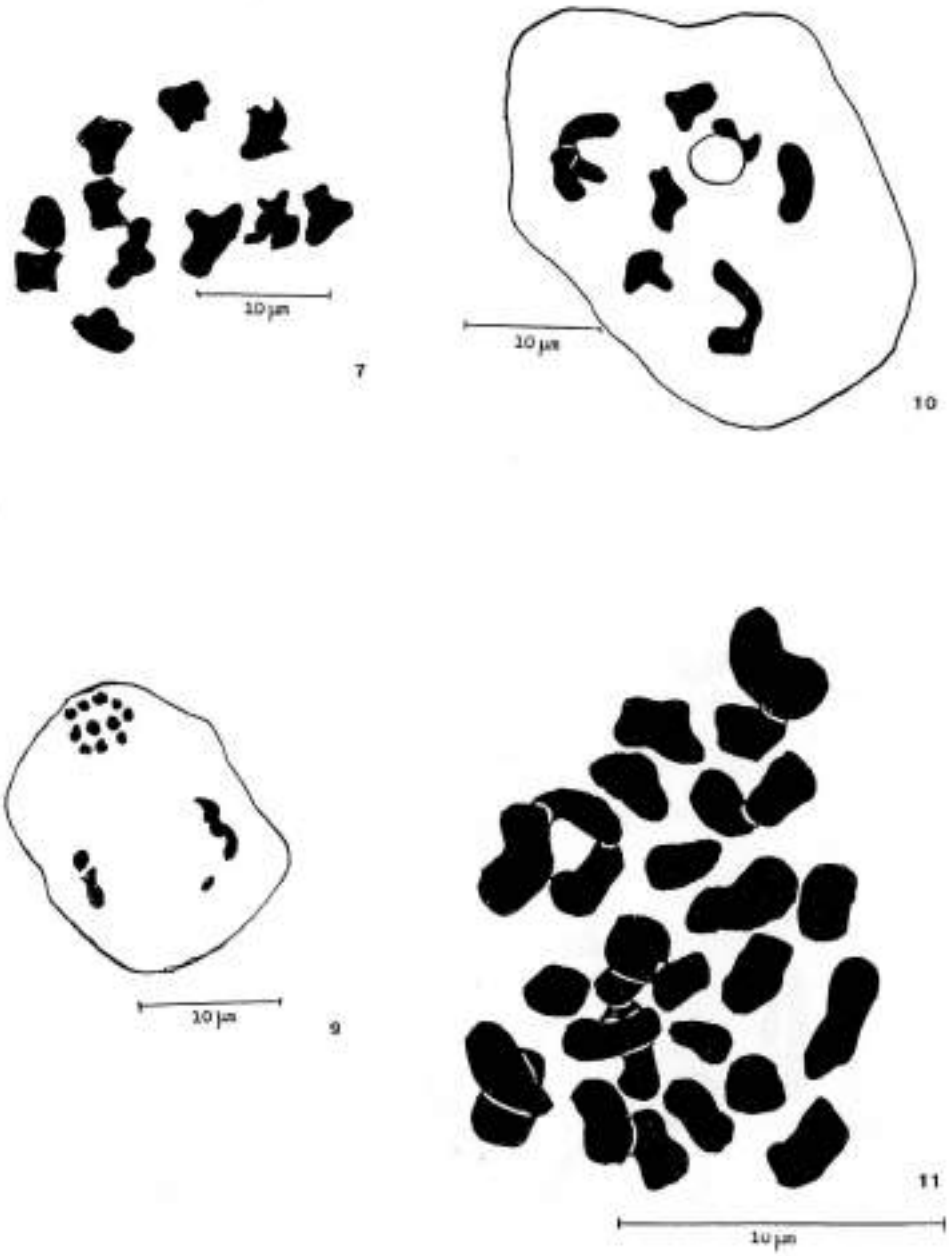
717. *Astrantia maxima* Pall. — $n = 7$ (Fig. 2).

Tu: A9 Çoruh, Yalnizçam Daglari, W. slope near Yalnizçam Geç, 41°04'N, 42°11'E, 1994, *Pimenov & Kljuykov 250* (MW).

Chromosome number ($2n = 14$) has been determined three times: for cultivated plants of uncertain origin (Wanscher 1932), from Central Caucasus Mts (Sokolovskaja & Strelkova 1948), and from Georgia (Gvinianidze & Avazneli 1982). Turkish population from Yalnizçam Daglari has the same number of chromosomes.



Figs.1-6. **1**, *Angelica pachyptera*, *n* = 11; **2**, *Astrantia maxima*, *n* = 7; **3**, *Bunium simplex*, *n* = 9; **4**, *Bupleurum brachyatix*, *n* = 8; **5**, *Carum meifolium*, *n* = 10; **6**, *Chaerophyllum macrospermum*, *n*=11 + fragments.



Figs. 7, 9-11. **7**, *Cnidiocarpa grossheimii*, $n = 11$; **9**, *Eleutherospermum cicutarium*, $n = 11$; **10**, *Eryngium billardieri*, $n = 8$, **11**, *E. campestre* var. *virens*, $2n = 28$.

718. *Bunium simplex* (C. Koch) Kljuykov — $n = 9$ (Fig. 3).

Tu: A8 Erzurum, the pass from the valley of the river Tortum to Karasu valley, Dumlu Dagi, 40°13'N, 41°28'E, 1994, *Pimenov & Kljuykov 462* (MW).

Previously this species was studied only once, on the basis of material from Armenia (Vasil'eva & al. 1985); the chromosome number of the Turkish population studied is the same.

719. *Bupleurum brachyatis* C. Koch — $n = 8$ (Fig. 4).

Tu: A9 Çoruh, Yalzinçam Daglari, Akar Sükül over Ardahuç, 41°06'N, 42°07'E, 1994, *Pimenov & Kljuykov 213* (MW).

The chromosome number is determined for the first time. It corresponds to the numbers of the majority of the annual *Bupleurum* species of Mediterranean region.

720. *Bupleurum exaltatum* Bieb. — $n = 8$, 8+1-2 fragments, 9.

Tu: A8 Gümüshane, the valley of Çoruh Negri between Maden and Bayburt, 40°11'N, 40°22'E, 1994, *Pimenov & Kljuykov 819* (MW).

The species is a member of a very complicated cycle of taxa (*B. falcatum* L. s. ampl.); in "Flora of Turkey" (Davis 1972) it was treated as *B. falcatum* subsp. *cernuum* (Ten.) Arc. Earlier chromosome number determinations demonstrated a moderate karyological variability within *B. exaltatum*; besides those from cultivated material (Cauwet 1976, Cauwet-Marc 1979), three basic numbers have been revealed ($x = 6$, 7 and 8).

The cytotype with $2n = 12$ has been shown to be distributed in Iran (Küpfer 1980), Uzbekistan and Tadzhikistan (Daushkevich & al. 1993), with $2n = 14$ in Tadzhikistan and S.W. Kazakhstan (Vasil'eva & al. 1981b, Daushkevich & al. 1993), and with $2n = 16$ in Greece (Strid & Franzen 1981), Georgia and Crimea (Daushkevich & al. 1993). The determination from Turkey corresponds to the latter race, in agreement with a biogeographic point of view.

721. *Bupleurum polyphyllum* Ledeb. — $n = 8$.

Tu: A8 Erzurum, the pass from the valley of the river Tortum to Karasu valley, Dumlu Dagi, 40°13'N, 41°28'E, 1994, *Pimenov & Kljuykov 479* (MW).

The species belongs to the same taxonomic cycle, as the previous one, being treated in "Flora of Turkey" (Davis 1972) as *B. falcatum* L. subsp. *polyphyllum* (Ledeb.) H. Wolff. In general, the species has larger leaf blades than *B. exaltatum*.

Most of the previous determinations characterize the species as having $2n = 6$ (Cauwet 1976, Cauwet-Marc 1978, 1979, Daushkevich & al. 1993), on the basis of materials from Armenia, Adygea, Georgia, and Abkhasia.

Different counts were determined only twice, $n = 7$ (North Ossetia), and $n = 16$ (Krasnodar Terr.) (Daushkevich & al. 1993).

A population from Dumlu Dagi, the first one investigated from Turkey, has the chromosome number usual for the species.

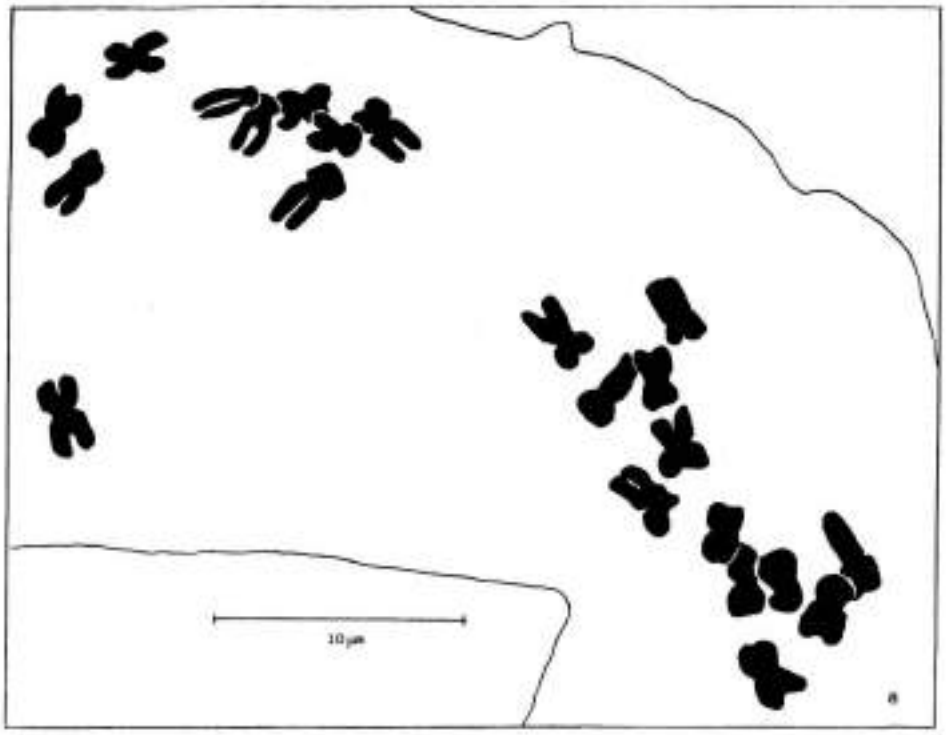


Fig. 8. *Cymbocarpum wiedemanii*, $2n = 22$.

722. *Carum meifolium* (Bieb.) Boiss. — $n = 10$ (Fig. 5).

Tu: A7 Gümüshane/Trabzon, Zigana Geç, 40°38'N, 39°23'E, 1994, *Pimenov & Kljuykov 933* (MW).

This is the second determination of chromosome number of the species; it confirms the previous one from Georgia (Daushkevich & al. 1991).

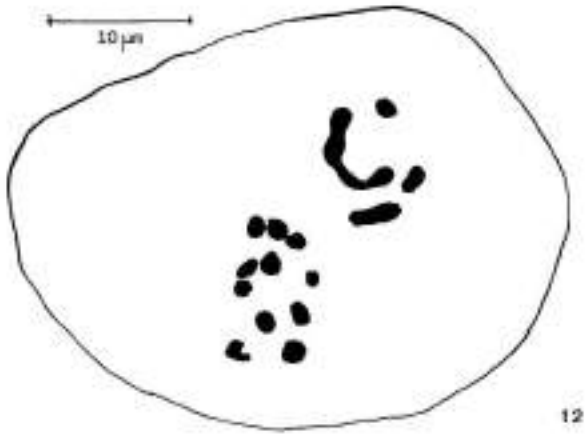
723. *Chaerophyllum macrospermum* (Spreng.) Fisch. — $n = 11$+fragments (Fig. 6).

Tu: B8 Erzurum/Gümüshane, Kop Dagi, Kop Geç, 40°04'N, 40°26'E, 1994, *Pimenov & Kljujkov 797* (MW).

The chromosome number is determined for the first time; it corresponds to the counts known for the genus.

724. *Cnidiocarpa grossheimii* (Manden.) Pimenov — $n = 11$ (Fig. 7).

Tu: A9 Çoruh,Yalnizçam Daglari, W. slope near Yalnizçam Geç, 41°04'N, 42°11'E, 1994, *Pimenov & Kljuykov 231* (MW).



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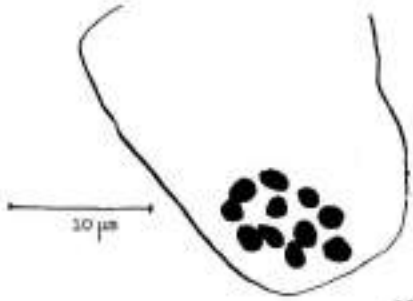

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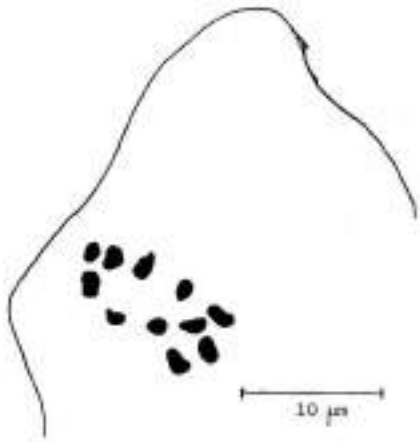

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Figs. 12-14. **12**, *Ferulago armena*, $n = 11$; **13**, *F. platycarpa*, $n = 11$; **14**, *Gongyloscíadium falcarioides*, $n = 11$.

This species is indicated for the first time for Turkish flora; formerly it was regarded as a narrow endemic of S.W. Transcaucasia. In Turkey it is distributed at least up to Bingöl. Our new chromosome number determination confirms the previous one made on the basis of plants collected near Bakuriani, the species' classical locality (Pimenov & Vasil'eva 1981a).

725. *Cymbocarpum wiedemanii* Boiss. — $2n = 22$ (Fig. 8).

Tu: A8 Erzurum, the valley of the river Tortum 14 km S. of Uzundere, 40°28'N, 41°32'E, 1994, *Pimenov & Kljuykov 424* (MW).

This is the first chromosome determination for the species, and for the genus *Cymbocarpum* as a whole.

726. *Eleutherospermum cicutarium* (Bieb.) Boiss. — $n = 11$ (Fig. 9).

Tu: A8 Çoruh, upper part of the valley of the river Murgul, between Kabaca and Gül Dagi, 41°08'N, 41°31'E, 1994, *Pimenov & Kljuykov 89* (MW).

This is the second chromosome number determination for the species (first for Turkish material), confirming the previous one made on the basis of Daghestan material (Vasil'eva & al. 1983).

727. *Eryngium billardieri* Delar. — $n = 8$ (Fig. 10).

Tu: A8 Erzurum, the pass from the valley of the river Tortum to Karasu valley, Dumlu Dagi, 40°13'N, 41°28'E, 1994, *Pimenov & Kljuykov 455* (MW).

Five previous determinations (from Iran, India, and of uncertain origin) all showed $n=8$ or $2n = 16$ (Matveeva & Tichonova 1969, Koul & Wakhlu 1976, Ahmad & Koul 1980, Perdigo i Ariso 1981, Hamal & al. 1986); the only exception being $n = 7$ for the cultivated *E. billardieri* var. *nigromontanum* (Boiss. et Buhse) H. Wolff (Constance & al. 1971). Our determination from Karadeniz Daglari corresponds to the usual species counts.

728. *Eryngium campestre* L. var. ***virens*** Link — $2n = 28$ (Fig. 11).

Tu: A8 Çoruh, near Borçka, the mouth of the river Murgul, 41°19'N, 41°39'E, 1994, *Pimenov & Kljuykov 16* (MW).

There are at least 22 determinations of chromosome number for *E. campestre*; two cytotypes - diploid ($2n = 14$) and tetraploid ($2n = 28$) - were shown with approximately the same frequency.

In special investigation by G. Reese (1969) geographical differenciation of diploid and tetraploid cytotypes has been demonstrated; in particular, a Turkish population was shown to be tetraploid. *E. campestre* var. *virens* was not investigated as separated entity. Our study allows to characterize this variety as tetraploid.

729. *Ferulago armena* (DC.) Bernardi — $n = 11$ (Fig. 12).

Tu: A8 Erzurum, the valley of the river Tortum 14 km S. of Uzundere, 40°28'N, 41°32'E, 1994, *Pimenov & Kljuykov* 428 (MW).
— B8 Erzurum, the valley of the river Karasu 5 km E. of Askale, 39°56'N, 40°46'E, 1994, *Pimenov & Kljuykov 661* (MW).

This is a prior name (Bernardi 1979) for the species known in "Flora of Turkey" as *F. pauciradiata* Boiss. et Heldr. (Pesmen 1972).

Its chromosome number is determined for the first time, being the same as the counts of all *Ferulago* species studied before.

730. *Ferulago platycarpa* Boiss. — $n = 11$ (Fig. 13).

Tu: A8 Erzurum, the pass from the valley of the river Tortum to Karasu valley, Dumlu Dagi, 40°13'N, 41°28'E, 1994, *Pimenov & Kljuykov 488* (MW).

The chromosome number has been determined for the first time.

731. *Gongylosciadium falcarioides* (Bornm. et H. Wolff) Rech. f. — $n = 11$ (Fig. 14).

Tu: A8 Gümüshane, the valley of Çoruh Negri between Maden and Bayburt, 40°11'N, 40°22'E, 1994, *Pimenov & Kljuykov 809* (MW).

Gongylosciadium is a comparatively new monotypic genus separated in the Umbelliferae treatment of "Flora Iranica" (Rechinger 1987); formerly the species was regarded as a member of the genus *Falcaria*.

Our determination of chromosome number is the first both for the species and the genus.

732. *Heracleum apiifolium* Boiss. — $n = 11$ (Fig. 15).

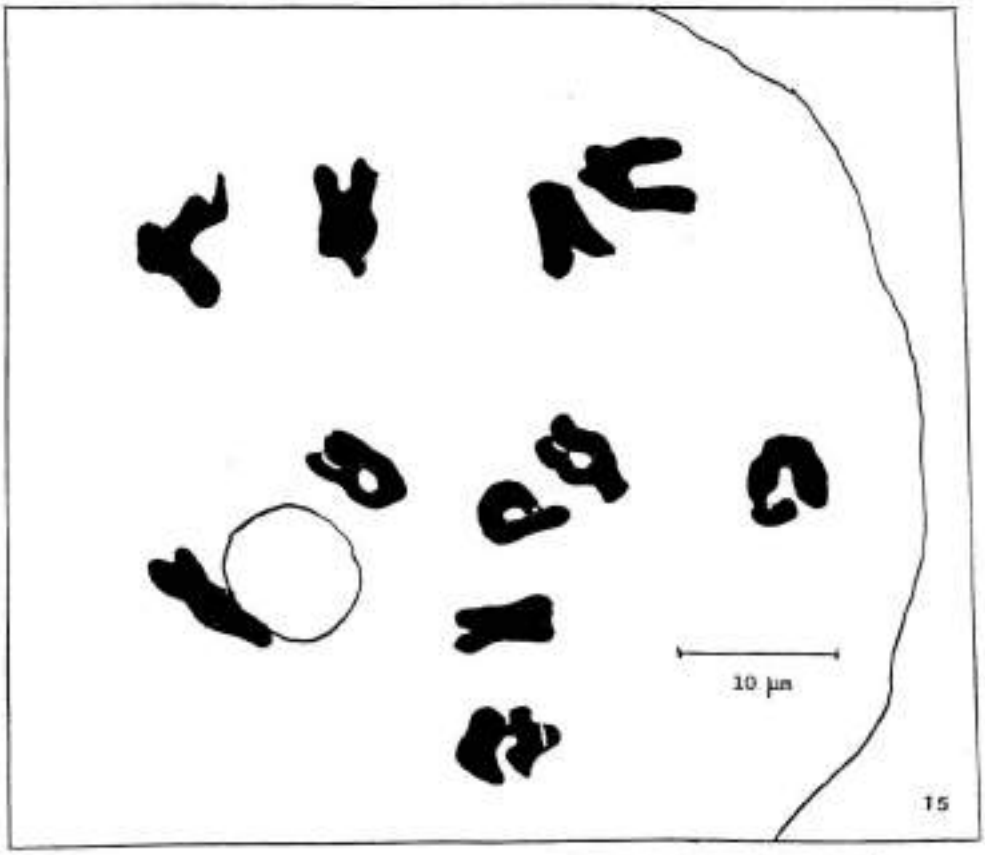
Tu: A8 Çoruh, upper part of the valley of the river Murgul, between Kabaca and Gül Dagi, 41°08'N, 41°31'E, 1994, *Pimenov & Kljuykov 81* (MW).

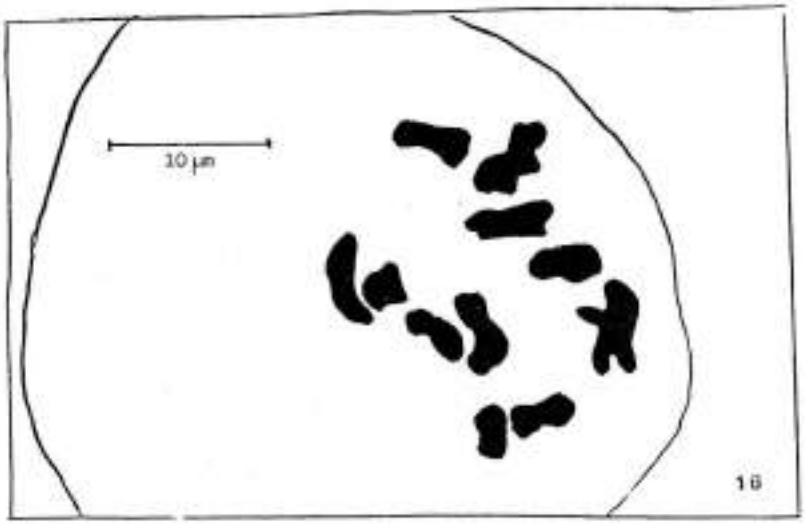
This is the second chromosome number record for the species; it confirms the previous one (Alexeeva & al. 1994), made on Caucasian (Adygeya) material.

733. *Heracleum cyclocarpum* C. Koch — $n = 11$ (Fig. 16).

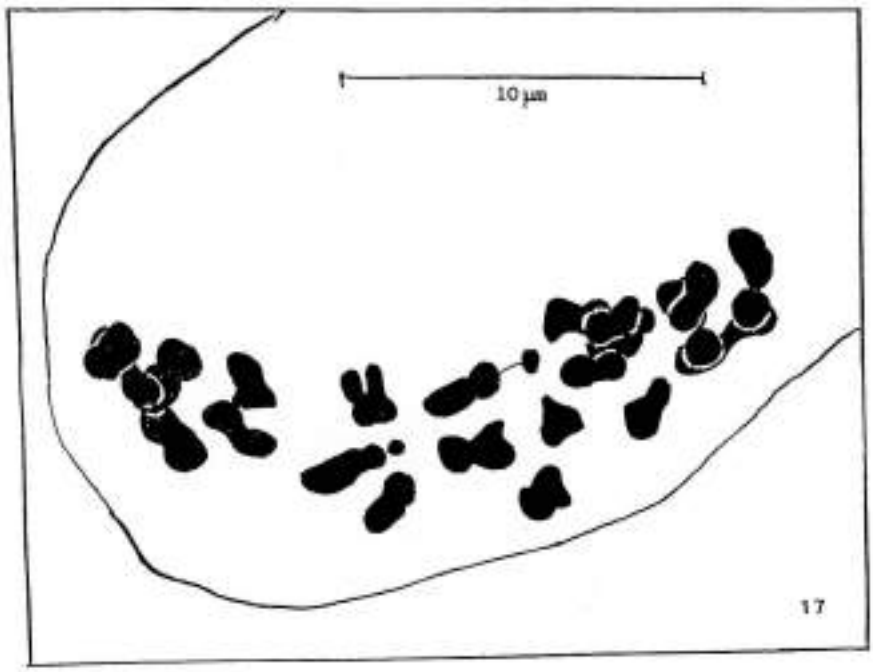
Tu: A8 Çoruh, upper part of the valley of the river Murgul, between Kabaca and Gül Dagi, 41°08'N, 41°31'E, 1994, *Pimenov & Kljuykov 77* (MW).

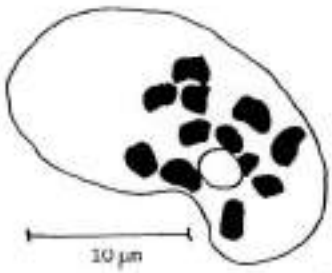
There has been known only one determination of chromosome number ($2n = 22$) for this species, made on plants cultivated in Botanical garden (Rostovtzeva 1979).

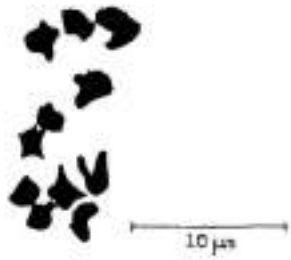




Figs. 15-16. **15**, *Heracleum apiifolium*, $n = 11$; **16**, *H. cyclocarpum*, $n = 11$.







Figs. 17-19. **17**, *Heracleum platytaenium*, $2n = 22$; **18**, *Hydrocotyle ramiflora*, $n = 12+1-3B$; **19**, *Johreniopsis seseloides*, $n = 11$.

734. *Heracleum platytaenium* Boiss. — $2n = 22$ (Fig. 17).

Tu: A7 Gümüshane, between Torul and Zigana Geç.,40°34'N, 39°18'E, 1994, *Pimenov & Kljuykov* 929 (MW).

This is the first determination of the chromosome number for the species. All the Caucasian representatives of the genus show the same number, $2n = 22$.

735. *Hydrocotyle ramiflora* Maxim. — $n = 12+1-3B$ (Fig. 18).

Tu: A8 Çoruh, between Hopa and Cankartaran Geç, 41°24'N, 41°33'E, 1994, *Pimenov & Kljuykov 7* (MW).

This is a naturalized species connected with tea plantations on the Black Sea coast; it is widely distributed in Georgia, but in Turkey it has rather limited area in Çoruh vilajet. We collected the material near Hopa, the only region noted in "Flora of Turkey". Formerly the chromosome count ($2n = 24$) was determined only for the population of Kunashir (Kuril Isles) from the natural area of the species (Gursenkov & Gorovoy 1971). The same number has been revealed for Turkish population; additionally 1-3 B-chromosomes were observed.

736. *Johreniopsis seseloides* (C. A. Mey.) Pimenov — $n = 11$ (Fig. 19).

Tu: A9 Çoruh, near Ardanuç. 41°07'N, 42°24'E, 1994, *Pimenov & Kljuykov 316* (MW).

The genus *Johreniopsis* has been separated from *Peucedanum* in "Flora Iranica" (Pimenov 1987); its volume is not definitely circumscribed. The present chromosome number determination corresponds to three previous ones made on Caucasian material (Vasil'eva & al. 1981, Solovieva & al. 1985, Daushkevich & al. 1991).

737. *Pastinaca pimpinellifolia* Bieb. — $2n = 44$ (Fig. 20).

Tu: B8 Erzurum, the valley of river Karasu 6 km W. of Askale, 39°56'N, 40°40'E, 1994, *Pimenov & Kljuykov 665* (MW).

Being investigated for the first time, this species surprisingly appears to be tetraploid. This is the first case of polyploidy in *Pastinaca*: all formerly investigated species are diploids with $2n = 22$.

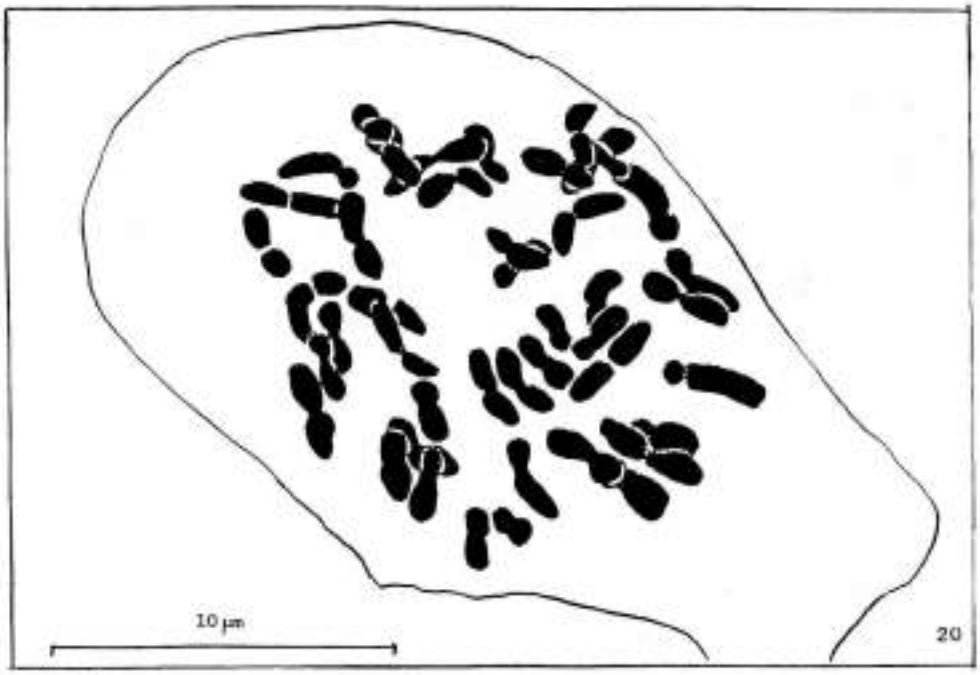
738. *Pastinaca umbrosa* Stev. ex DC. — $n = 11$ (Fig.21).

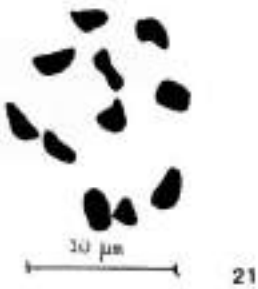
Tu: A8 Gümüshane, the valley of Çoruh Negri between Maden and Bayburt, 40°11'N, 40°22'E, 1994, *Pimenov & Kljuykov 810* (MW).

All previous determinations - from France (Vasart 1950), Bulgaria (Peev & Andreev 1978, Ceshmedjiev 1983), Crimea (Pimenov & Vasil'eva 1983), as well as those based on cultivated plants (Rostovtzeva 1982) - characterize this taxon as diploid with $2n = 22$; that has been confirmed by our record from Turkey.

739. *Peucedanum palimbioides* Boiss. — $2n = 22$ (Fig. 22).

Tu: A8 Çoruh, the valley of the river Tortum near Sekale, 40°39'N, 41°39'E, 1994, *Pimenov & Kljuykov 357* (MW).





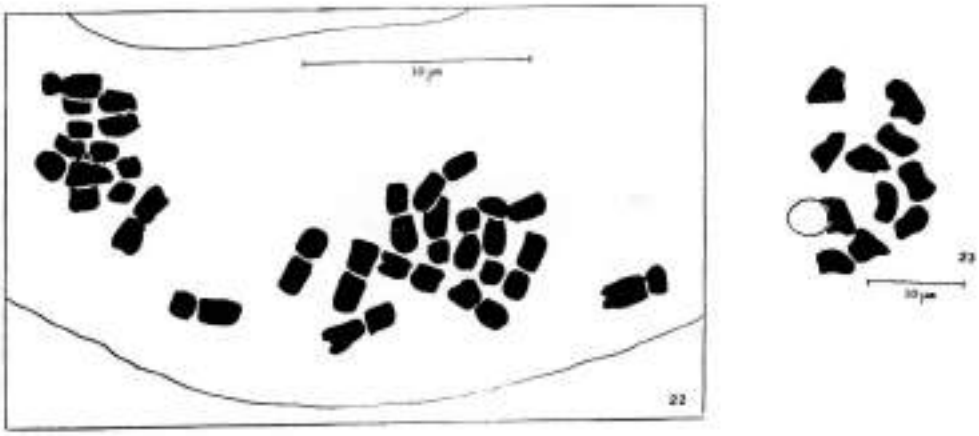
Figs. 20-21. **20**, *Pastinaca pimpinellifolia*, $2n = 44$; **21**, *P. umbrosa*, $n = 11$.

739a. *Peucedanum palimbioides* Boiss. — $n = 11$ (Fig. 23).

Tu: A8 Gümüshane, the valley of Çoruh Negri between Maden and Bayburt, 40°11'N, 40°22'E, 1994, *Pimenov & Kljuykov 820* (MW).

The species has been investigated for the first time. It has a chromosome number most frequent in *Apioideae*, including *Peucedaneae*.

Its taxonomic position within *Peucedanum* is dubious. Probably its closest relative is *Johreniopsis seseloides*; the change of generic attribution of *P. palimbioides* seems to be necessary in the future.



Figs. 22-23. *Peucedanum palimbioides:* **22**, mitotic metaphase plate, $2n = 22$ (N 357); **23**, meiotic metaphase plate, $n = 11$ (N 820).

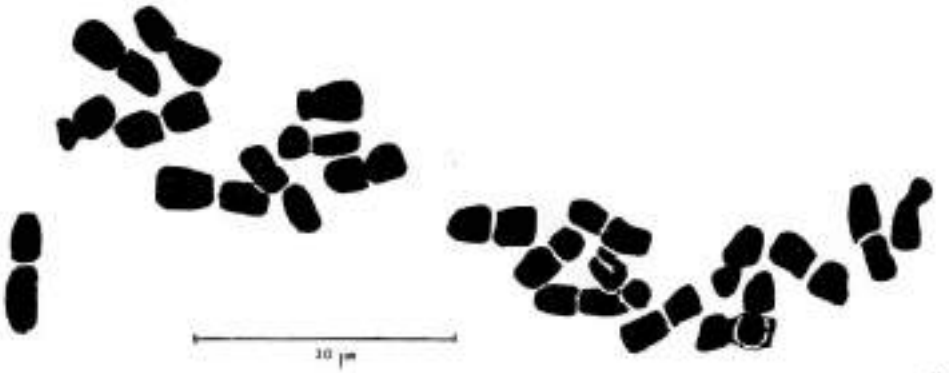


Fig. 24. *Peucedanum zedelmeyreanum*, $2n = 22$.

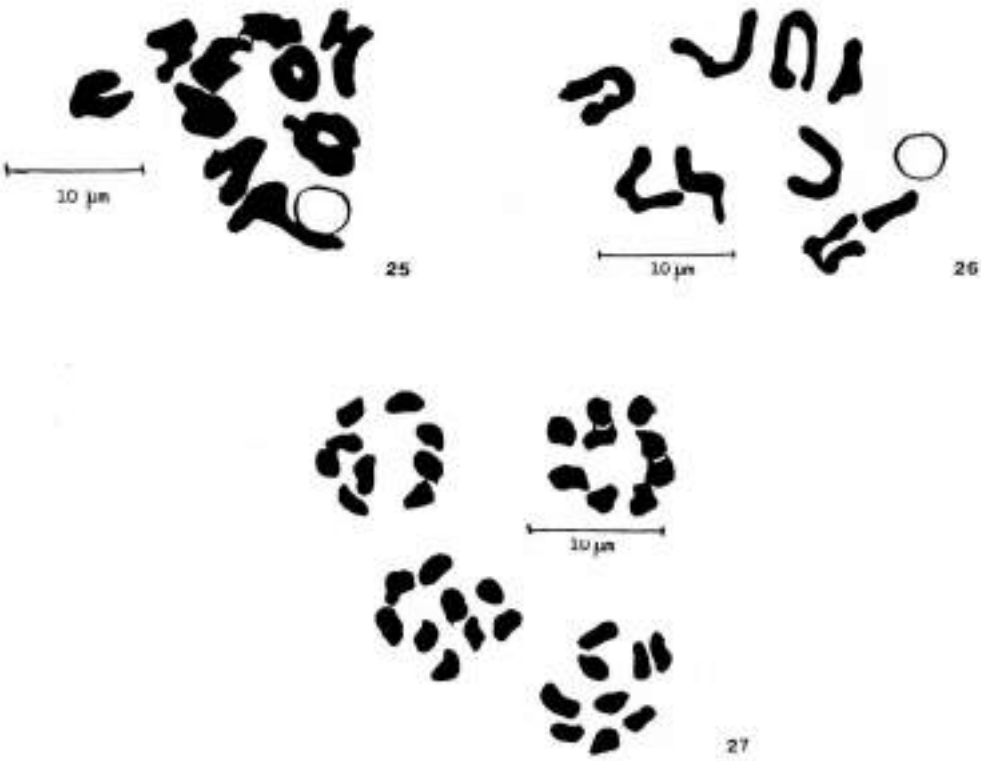
740. *Peucedanum zedelmeyreanum* Manden. — $2n = 22$ (Fig. 24).

Tu: A8 Erzurum, the pass from the valley of the river Tortum to Karasu valley, Dumlu Dagi, 40°13'N, 41°28'E, 1994, *Pimenov & Kljuykov 449* (MW).

This rare species, probably extinct in Armenia, has been investigated karyologically at the first time. It occupies rather isolated position within *Peucedanum* s.l. having, in particular, the leaves of "angelicoid" type with large obtuse lobes. Its critical revision seems to be of use, and it should be extracted from *Peucedanum*, being very distinct from the core (type) section of the latter.

741. *Pimpinella corymbosa* Boiss. — $n = 10$ (Fig. 25).

Tu: A8 Erzurum, the valley of the river Tortum 14 km S. of Uzundere, 40°28'N, 41°32'E, 1994, *Pimenov & Kljuykov 420* (MW).



Figs. 25-27. **25**, *Pimpinella corymbosa*, $n = 10$; **26-27**, *P. peregrina*, $n = 9$.

This species is treated here sensu lato, including *P. cappadocica*, because of overlapping variation of diagnostic features. Our determination does not differ from the only previous existing ($2n = 20$), made on the basis of Jordan material (Al-Eisawi 1989).

742. *Pimpinella peregrina* L. — $n = 9$ (Figs. 26, 27).

Tu: A8 Çoruh, between Hopa and Cankartaran Geç, 41°24'N, 41°33'E, 1994, *Pimenov & Kljuykov 11* (MW). (Fig. 26).

— A8 Çoruh, upper part of the valley of the river Murgul, between Kabaca and Gül Dagi, 41°08'N, 41°31'E, 1994, *Pimenov & Kljuykov 75* (MW). (Fig. 27).

P. peregrina (incl. *P. affinis*) is a widespread, usual, frequently ruderal species. There are at least 14 chromosome number records for wild and cultivated plants of this species. The counts ($2n$) vary from 16 to 20, with 18 being the most frequent. Among determinations based on wild material of clear geographical origin we would like to note those with $2n = 18$ from Greece (Engstand 1970), Italy (Capineri & al. 1978), Turkmenistan (Geldykhanov 1986), and Bulgaria (Cheshmedziev 1994).

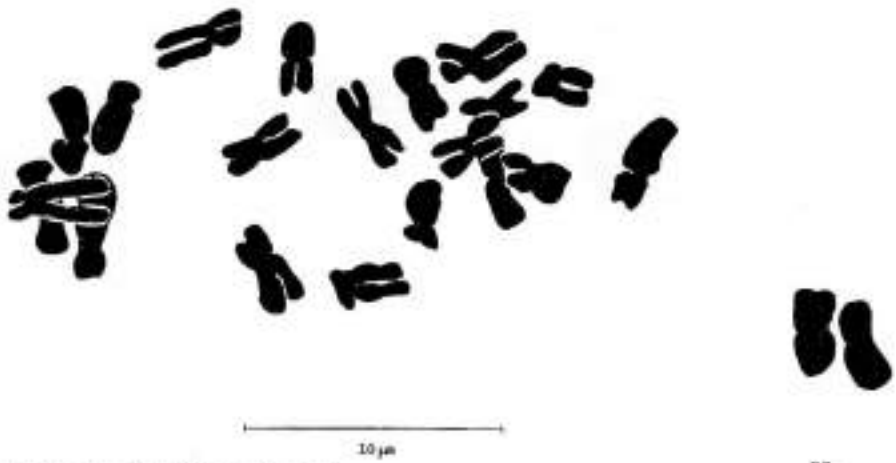


Fig. 28. *Prangos lophoptera*, $2n = 22$.

Our determinations from Turkey (Coruh) belong to this cytotype. $2n = 16$ has been determined from Turkmenistan, Azerbaidjan, Crimea, and Romania (Jurtzeva 1988); the only record with $2n = 20$ being that by Bartolo & al. (1977) from Italy. It is obvious that the cytotypes in this species have no clear geographical differentiation.

743. *Prangos lophoptera* Boiss. — $2n = 22$ (Fig. 28).

Tu: A8 Erzurum, the valley of the river Tortum near Tortum, 40°18'N, 41°33'E, 1994, *Pimenov & Kljuykov 431* (MW).
— B8 Erzurum, Bozburun between Askale and Kop Geç, 40°03'N, 40°30'E, 1994, *Pimenov & Kljuykov 685* (MW).

This is the second chromosome number record for the species, confirming the previous one from Armenia (Vasil'eva & al. 1981a). We regard *P. lophoptera* as closely related but independent species in relation with *P. pabularia*, distributed easternmore.

744. *Scandix iberica* Bieb. — $2n = 18$.

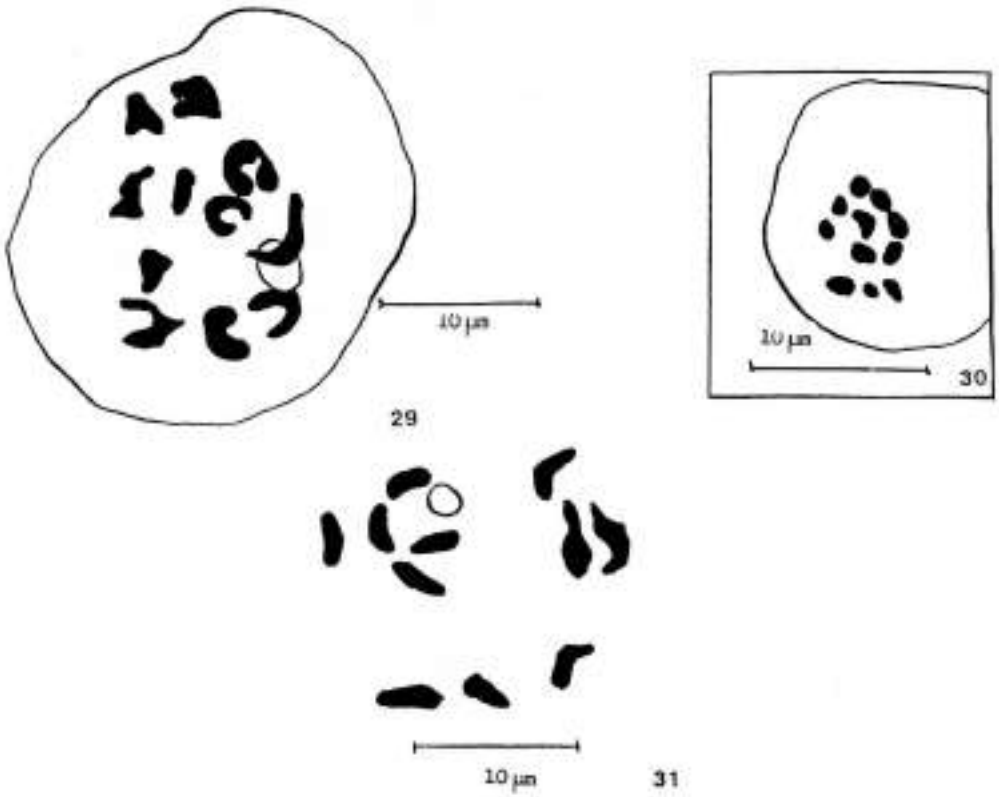
Tu: A8 Gümüshane, the valley of Çoruh Negri between Maden and Bayburt, 40°11'N, 40°22'E, 1994, *Pimenov & Kljuykov 811* (MW).

Up to now the chromosome numbers of this species were determined only on the basis of cultivated material (Bell & Constance 1957, Kord'um 1967); our record based on wild material confirms these data.

745. *Seseli andronakii* Woron. ex Schischk. — $n = 11$ (Fig. 29).

Tu: A7 Gümüshane, Vaudagi Geç, 40°22'N, 39°49'E, 1994, *Pimenov & Kljuykov 894* (MW).

The chromosome number has been determined for the first time.



Figs. 29-31. **29**, *Seseli andronakii*, $n = 11$; **30**, *S. libanotis*, $n = 11$; **31**, *Sium sisaroideum*, $n = 11$.

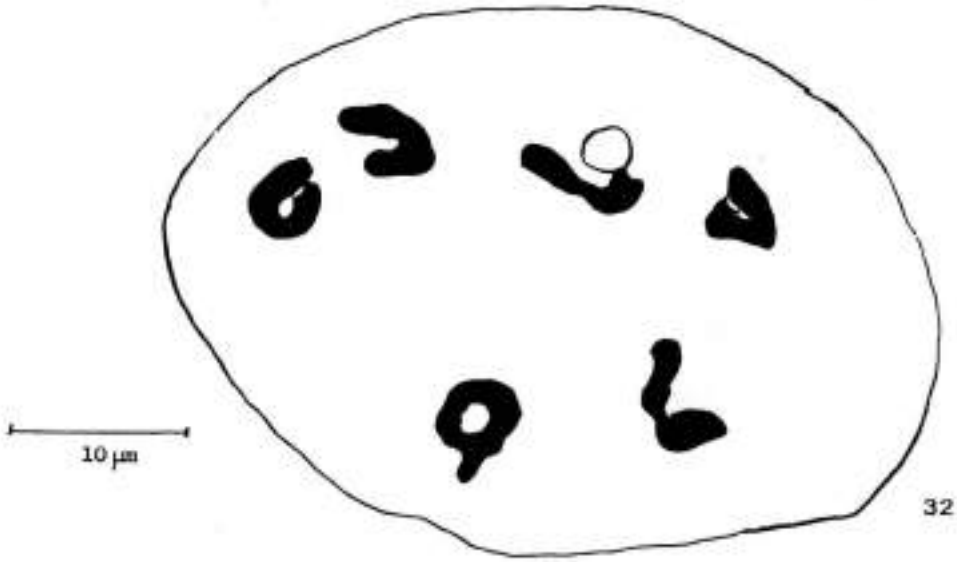
746. *Seseli libanotis* (L.) W. D. J. Koch — $n = 11$ (Fig. 30).

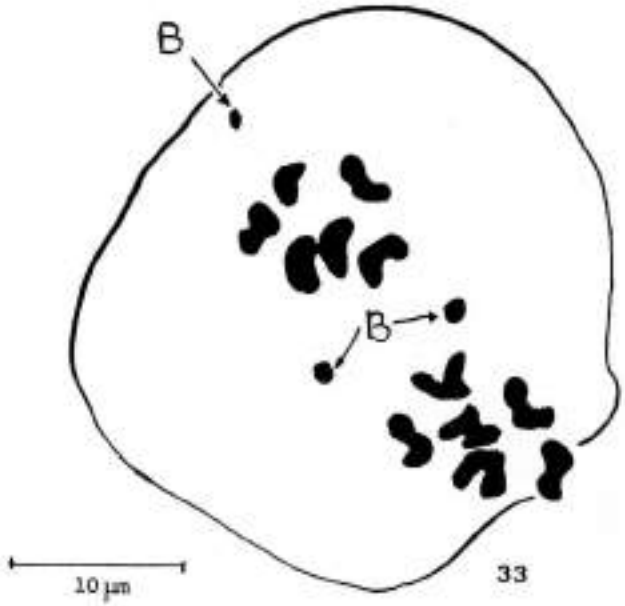
Tu: A8 Erzurum, the pass from the valley of the river Tortum to Karasu valley, Dumlu Dagi, 40°13'N, 41°28'E, 1994, *Pimenov & Kljuykov 466* (MW).

There are at least 31 records of chromosome numbers for this species; the majority of them showed $2n = 22$ (Fedorov 1969). However, sometimes polyploid race with $2n = 44$ was revealed - in Czechia (Dvorak & Dadakova 1977, Dvorak 1979), Byelorussia (Semerenko 1985), and Austria (Vitek & al. 1992). Markova & Robeva (1972, 1973) showed also aneuploid series with $2n = 20$ and 22 in *S. libanotis* var. *leiocarpa* Heuff.

747. *Sium sisaroideum* DC. — $n = 11$ (Fig. 31).

Tu: A9 Çoruh, near Ardanuç, 41°07'N, 42°03'E, 1994, *Pimenov & Kljuykov 324* (MW).





Figs. 32-33. **32**, *Torilis arvensis* subsp. *neglecta*, $n = 6$; **33**, T. *arvensis* subsp. *neglecta*, $n = 6+1-2B$. - Arrows indicate B-chromosomes.

It is rather surprising that this widely distributed species only twice was an object of chromosome number determination, including an early record by Wanscher (1931) without indicated origin , and our recent determination for Kazakhstan material (Vasil'eva & al. 1993).

All records, including that adduced here, show $n = 11$.

748. ***Torilis arvensis*** (Huds.) Link subsp. ***neglecta*** (Spreng.) Thell. — $n = 6$, 6+1-2B (Fig. 32, 33).

Tu: A8 Çoruh, near Murgul, Alaki Dagi, 41°16'N, 41°34'E, 1994, *Pimenov & Kljuykov 44* (MW).

T. arvensis is a widely distributed polymorphic ruderal species. There are at least 36 chromosome number records for this species, all, with two exclusions, showing $2n = 12$ (or $n = 6$). Seven of them relate to subsp. *neglecta* (= *T. neglecta* Schult., *T. infesta* (L.) Spreng.). All records for the subspecies, both for cultivated material (Tamamschjan 1933, Delay 1948, Gardé & Malheiros-Gardé 1948) and for wild plants (Queiros 1972, 1978, Silvestre 1976, 1978) are the same ($2n = 12$). Our determination corresponds to these data, but B-chromosomes in some cells seem to be noted for the first time.

Acknowledgements

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References

Ahmad I., Koul A. K. 1980: In: IOPB chromosome number reports LXVIII. — Taxon **29(4):** 533-547.

Al-Eisawi, D. M. H. 1989: Chromosome counts of *Umbelliferae* of Jordan. — Annali Bot. **47**: 201-214.

Alexeeva, T. V., Vasil'eva, M. G., Daushkevich, Ju. V. & Pimenov, M. G. 1994: Apiaceae. — In: IOPB Chromosome Data. — IOPB Newsletter (in press.).

Bartolo, G., Brullo, S., Majorana, G. & Pavone, P. 1977: Numeri cromosomici per la Flora Italiana: 315-328. — Inform. Bot. Ital. **9(1)**: 71-87.

Bell, C. R. & Constance, L. 1957: Chromosome numbers in *Umbelliferae*. — Amer. J. Bot. **44(7)**: 565-572.

Bernardi, L. 1979: Tentamen revisionis generis Ferulago. — Boissiera **30**: 1-182.

Capineri, R., d'Amato, G. & Marchi, P. 1978: Numeri cromosomici per la Flora Italiana: 534-583. — Inform. Bot. Ital. **10**: 421-465.

Cauwet, A.-M. 1976: Biosystématique des espèces vivaces de *Bupleurum* L. *(Umbelliferae)* du bassin Méditerranéen occidental. — These D. Perpignan.

— 1978: In: IOPB Chromosome Number Reports LXI. — Taxon **27(4):** 385-386.

— 1979: Connaissances caryologiques actuelles sur le genre *Bupleurum* L. *(Umbelliferae)*: nombres chromosomiques et nombres de base. — Bull. Mus. Nat. Hist. Natur. Bot. **1(3)**: 191-211.

Ceschmedjiev, J. V. 1983: In: IOPB Chromosome Number Reports. LXXX. — Taxon **32(3)**: 506.

Chamberlain, D. F. 1972: *Angelica*. — In: Flora of Turkey **4**: 431-432.

Cheshmedziev, I. V. 1994: Reports (313-366). [In: Kamari, G., Felber, F. & Garbari, F. (ed.): Mediterranean Chromosome Number Report - 4. — Fl. Medit. **4**: 269-279].

Constance, L., Chuang Tsan-iang & Bell, C. R. 1971: Chromosome numbers in *Umbelliferae*. IV. — Amer. J. Bot. **58(6)**: 577-587.

Daushkevich, J. V., Alexeeva, T. V. & Pimenov, M. G. 1991: In: IOPB Chromosome Data 3. — IOPB Newsletter **17**: 8-9.

—, Vasil'eva, M. G. & Pimenov, M. G. 1993: Chromosome numbers and their variation in some *Bupleurum* species *(Umbelliferae)* (in Russ.). — Bot. Zhurn. **78(11)**: 93-100.

Davis, P. H. 1972: *Bupleurum* (perennial). — In: Flora of Turkey **4**: 416-418.

Delay, C. 1948: Recherches sur la structure des noyaux quiescents chez les Phanérogames. Deuxième partie. (1). — Rev. Cytol. Cytophysiol. Veg. **10(1-4)**: 103-228.
Dvorak, F. 1979: Morphology of chromosomes of the genus *Seseli* L. — Scripta Fac. Sci. Nat. Univ. J. E.Purkyne, Brun. Biol. **9(1)**: 19-42.
— & Dadakova, B. 1977b: In: IOPB Chromosome Number Reports LVIII. — Taxon **26(5-6)**: 564-565.
Engstrand, L. 1970: Studies in the Aegean flora. 18. Notes and chromosome numbers in Aegean *Umbelliferae*. — Bot. Notiser. **123(3-4)**: 384-393.
Fedorov, A. A. 1969: Chromosome numbers of flowering plants. (Ed. An. A. Fedorov). — Leningrad 1969. 926 p.
Gardé, A. & Malheiros-Gardé, N. 1949: Contribuicao para o estudo cariologico da familia *Umbelliferae*. I. — Agron. Lusit. **11(2)**: 91-140.
Geldykhanov, A. M. 1986: Chromosome numbers in some species of the family *Apiaceae* from Turkmenia (in Russ.). — Bot. Zhurn. **71(8)**: 1144.
Gurzenkov, N. N. & Gorovoy, P. G. 1971: Chromosome numbers of *Umbelliferae* of the Far East (in Russ.). — Bot. Zhurn. **56(12)**: 1805-1815.
Gvinianidze, Z. I. & Avazneli, A. A 1982: The chromosome numbers of some representatives of alpine floristic complexes of the Caucasus (in Georg., res. Eng., Russ.). — Bull. Acad. Sci. Georg. SSR **106(3)**: 577-580.
Hamal, I. A., Langer, A. & Koul, A. K. 1986: Nucleolar organizing region in the *Apiaceae (Umbelliferae)*. — Plant Syst. Evol. **154(1)**: 11-30.
Jurtzeva, O. V. 1988: Cytological study in some species of *Pimpinella (Umbelliferae-Apioideae)* (in Russ.). — Biol. Nauki (Moscow) **11**: 78-85.
Kord'um, E. L. 1967: Data on the study of the chromosome numbers in *Umbelliferae* (in Ukr.). — Acta Acad. Sci. Ukr., ser. B, **1**: 89-93.
Koul, A. K. & Wakhlu, A. K. 1976: Chromosome numbers of 52 dicot species of Kashmir. — CIS (Chromosome Information Service) **21**: 4-6.
Küpfer, P. 1980: Contribution à la cytotaxonomie de quelques orophytes Iraniens. — Biol.-Ecol. Méditerran. **8(1)**: 37-48.
Markova, M. & Robeva, P. N. 1972: In: IOPB Chromosome Number Reports. XXXVI. — Taxon **21(2-3)**: 340.
— & — 1973: Karyological study of three Bulgarian taxa of the genus *Seseli*. — Bull. Inst. Bot. Bulg. Acad. Sci. **24**: 199-213.
Matveeva, T. S. & Tikhonova, A. D. 1969: In: Chromosome numbers of flowering plants. — Leningrad, Nauka: 38.
Peev, D. & Andreev, N. 1978: In : IOPB Chromosome Number Reports LXII. — Taxon **27(5-6)**: 534-535.
Perdigo i Ariso, M.-T. 1981: Contribution à l'étude cytotaxinomique du genre *Eryngium* L. — Biol.-Ecol. Méditerran. **8(1)**: 3-12.
Pesmen, H. 1972: *Ferulago*. — In: Flora of Turkey **4**: 453-471.
Pimenov, M. G. 1987: *Johreniopsis*. — In: Flora Iranica **162**: 454-457.
— & Vasil'eva, M. G. 1983: In: IOPB Chromosome Number Reports LXXXI. — Taxon **32(4)**: 663-664.
Queiros, M. 1972: Contribuicao para o conhecimento citotaxonomico das Spermatophyta de Portugal. VII. *Umbelliferae*. — Anuario Soc. Brot. **38**: 293-314.
— 1978: Sur la caryologie des Ombellifères du Portugal. — Actes 2e Symp. Intern. Ombellif.(Perpignan, 1977) "Contribationes pluridisciplinaries à la Systématique", Paru: 325-334.
Rechinger, K. H. 1987: *Gongylosciadium*. — In: Flora Iranica **162**: 308.
Reese, G. 1969: Cytotaxonomische Untersuchungen an di- und tetraploiden Sippen von *Eryngium campestre* L. und einem Artbastard mit $2n = 15$. — Österr. Bot. Zeitschr. **117(3)**: 223-247.

Rostovtzeva, T. S. 1979: Chromosome numbers of some species of the family *Apiaceae* Lindl. II (in Russ.). — Bot. Zhurn. **64(2)**: 227-230.
— 1982: The chromosome numbers of some species of the family *Apiaceae*. III (in Russ.). Bot. Zhurn. **67(2)**: 206-210.
Semerenko, L. V. 1985: Chromosome numbers in some species of flowering plants of Byelorussian flora (in Russ.). — Bot. Zhurn. **70(7)**: 992-994.
Silvestre, S. 1976: Contribution al estudio cariologico de la familia *Umbelliferae* en la peninsula Iberica. I. — Lagascalia **6(1)**: 23-32.
— 1978: Contribucion al estitudo cariologico de la familia *Umbelliferae* en la peninsula Iberica. II. — Lagascalia **7(2)**: 163-172.
Sokolovskaja, A. P. & Strelkova, O. S. 1948: Geographical distribution of the polyploids. III. Investigation of alpine region of the Central Caucasus (in Russ.). — Proc. Leningr. Teach. Inst. Gertzen **66**: 195-216.
Solov'eva, N. M., Pimenov, M. G., Vasil'eva, M. G., Zhigareva, N. N. & Turkov, V. D. 1985: Karyotaxonomic study of some species of *Peucedanum (Umbelliferae)*. — Plant Syst. Evol. **151**: 89-101.
Strid, A. & Franzén R. 1981: In : IOPB Chromosome Number Reports LXXIII. — Taxon **30(4)**: 829-842.
Tamamschjan, S. 1933: Materials for the karyosystematics of the cultivated and wild growing species of the family *Umbelliferae* (in Russ.). — Bull. Appl. Bot. Genet. Plant Breed. **2(2)**: 137-164. 832.
Vasil'eva, M. G. & Pimenov, M. G. 1991: Karyotaxonomical analysis in the genus *Angelica (Umbellifeae)*. — Plant Syst. Evol. **177**: 117-138.
—, Retina, T. A. & Pimenov, M. G. 1981a: Chromosome numbers of some *Umbelliferae* of the Caucasus and the south of Europaean part of the USSR (in Russ.). — Biol. Nauki (Moscow) **3**: 60-65.
—, Kljujkov, E. V. & Pimenov, M. G. 1985: Karyotaxonomic analysis of the genus *Bunium (Umbelliferae)*. — Plant Syst. Evol. **149**: 71-88.
—, Pimenov, M. G., Solov'eva, N. M. & Kljuykov, E. V. 1981b: Chromosome numbers of the *Umbelliferae* of Middle Asia. II (in Russ.). — Biol. Nauki (Moscow) **12**: 58-62.
—, Daushkevich, J. V., Alexeeva, T. V. & Pimenov, M. G. 1993: In: IOPB Chromosome Data. — IOPB Newsletter **20**: 7-9.
Vazart, J. 1950: Nouvelles observations sur les noyaux à calotte. Étude caryologique comparée de *Hordeum vulgare* L., *Capsicum annuum* L., *Pastinaca urens* Req. et *Solanum ovigerum* l. Noyau interphasique et mitose. — Rev. Gén. Bot. **57(679)**: 517-553.
Vitek, E., Kiechn M. & al. 1992: Beitrage zur Flora von Österreich: weitere Chromosomonzahlungen. — Verh. Zool.-bot. Ges. Österr. **129**: 215-226.
Wanscher, J. H. 1931: Studies on the chromosome numbers of the *Umbelliferae*. — Hereditas **15(2)**: 179-184.
— 1932: Studies on the chromosome numbers of some *Umbelliferae*. II. — Bot. Tidsskr. **42(1)**: 49-58.

Note: All the pictures are made on the base of microphotographs. The scale's lenght is 10 µm.

Address of the authors:
M. G. Pimenov, Ju.V. Daushkevich, M. G. Vasil'eva & E. V. Kljuykov, Botanical Garden, Moscow State University, Moscow, 119899, Russia.

Reports (749-753) by Theophanis Constantinidis

749. *Biebersteinia orphanidis* Boiss. — $2n = 10$ (Figs. 1a, b, c).

Gr: Peloponnisos, mountain area close to Mt Killini, c. 1400 m, 12 Jun 1994, *Constantinidis & Vassiliades 4809* (UPA).

The remarkable rediscovery of *Biebersteinia orphanidis*, a species considered extinct from Greece and Europe for 143 years, was recently reported by Yannitsaros & al. (1996). Its exact locality is not given here for conservation reasons. Root tips collected from young seedlings gave the chromosome number $2n = 10$, reported here for the first time. The chromosomes (Figs. 1a, b, c) are of medium size, c. 7.8-9.2 µm, with 3 clearly submetacentric (sm) and 2 submetacentric to acrocentric (sm-st) pairs. Conspicuous, large satellites are present on the long arms of the three submetacentric chromosome pairs. The karyogram of the species is presented in Fig. 1b.

To our knowledge, this is the second chromosome report of a member of the genus *Biebersteinia*. Aryavand (1975) found $2n = 10$ in *B. multifida* DC. in material from Iran, and subsequently commented on the placement of the genus in *Geraniaceae*. The basic chromosome number $x = 5$ seems to be exceptional in the *Geraniaceae*, being found exclusively in *Biebersteinia*. The even lower chromosome number $2n = 8$ was also reported in the family for *Pelargonium elongatum* (Cav.) Salisb. from South Africa (Gibby & Westfold 1983, 1986), while $2n = 9$ was recorded in the horticultural variety "Kleine Liebling" of *Pelargonium* (Daker 1969). All other basic chromosome numbers in the *Geraniaceae* are greater than 5, namely $x = 8, 9, 10, 11, 12, 13, 14, 16$ (Darlington & Wylie 1961).

750. *Cerinthe retorta* Sm. — $2n = 18$ (Fig. 2).

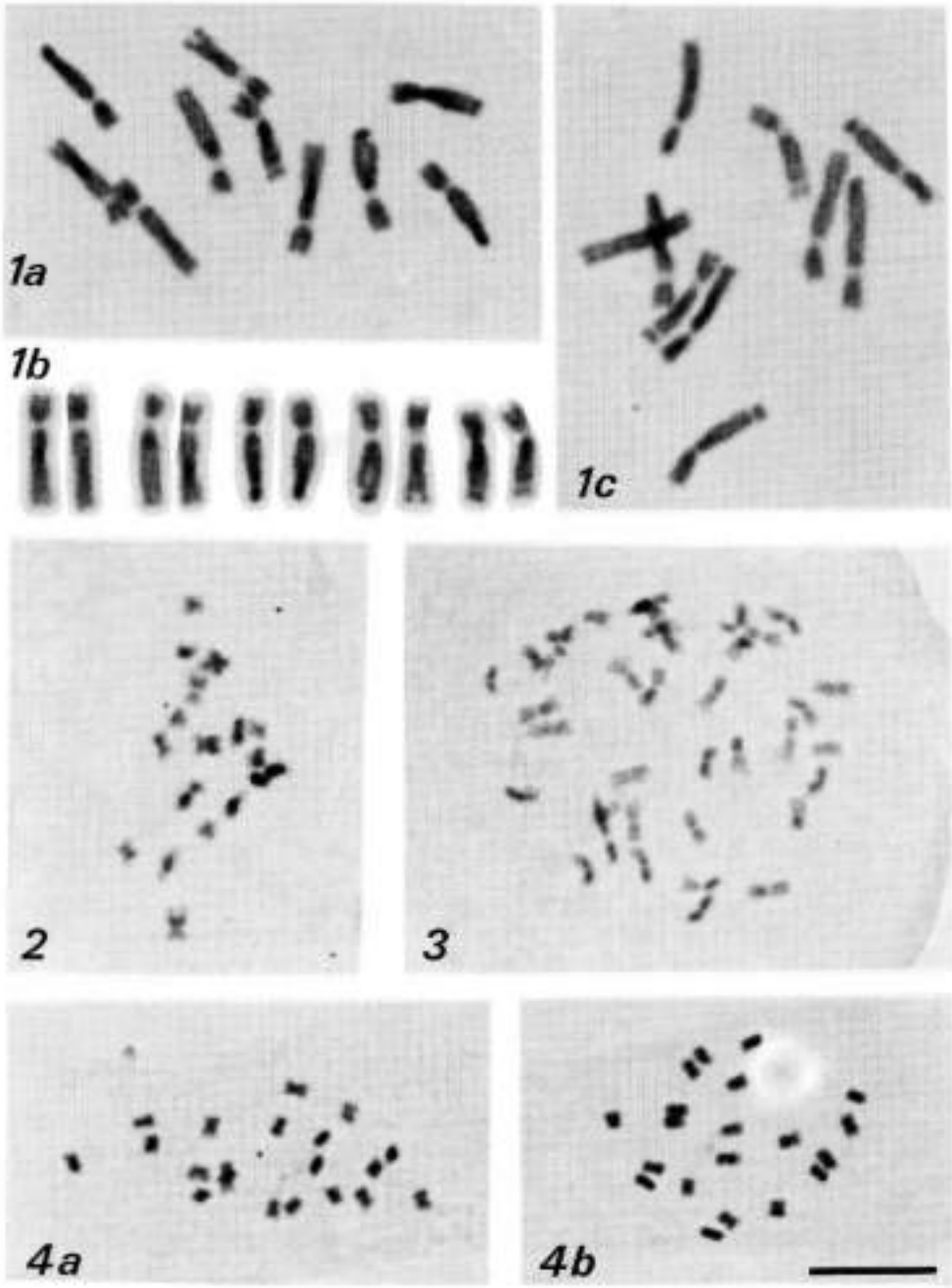
Gr: Sterea Ellas, Nomos Viotias, Mt Pastra, c. 8 km east-northeast of the village of Erithres, limestone rocks, c. 450 m, 38°14′N, 23°23′E, 16 Apr 1994, *Constantinidis 4408* (UPA).

An annual species with a distribution in the Balkan Peninsula, Kriti and Anatolia. A previous count of $2n = 16$ was given by Strey (1931) from garden material of unknown origin. Our count of $2n = 18$ is a new number for *Cerinthe retorta*, although both basic numbers $x = 8$ and $x = 9$ seem to exist in the genus *Cerinthe* (Fedorov 1969). The chromosomes in our material are small, c. 1.5 to 2.7 µm in size, and appear to be mostly metacentric (m) and submetacentric (sm); two of them bear small satellites (Fig. 2).

751. *Erodium chrysanthum* L'Hér. — $2n = 36$ +0-3B (Fig. 3).

Gr: Sterea Ellas, Nomos Attikis, Mt Pateras, the summit Megali Kolosoura, open calcareous slopes, c. 1000-1100 m, 38°06′N, 23°17′E, 28 May 1994, *Constantinidis 4711* (UPA).

An endemic species of southern Greece. The chromosome number $2n = 36$ was reported for this species (Warburg 1938) in material of unknown origin.



Figs. 1-4. Mitotic metaphase plates of: **1**, *Biebersteinia orphanidis*, $2n = 10$ (**a**, **c**: karyotypes; **b**: karyogram); **2**, *Cerinthe retorta*, $2n = 18$; **3**, *Erodium chrysanthum*, $2n = 36+3B$; **4**, *Nonea obtusifolia*: **a**, $2n = 20+1B$ and **b**, $2n = 20$. - Scale bar = 10µm.

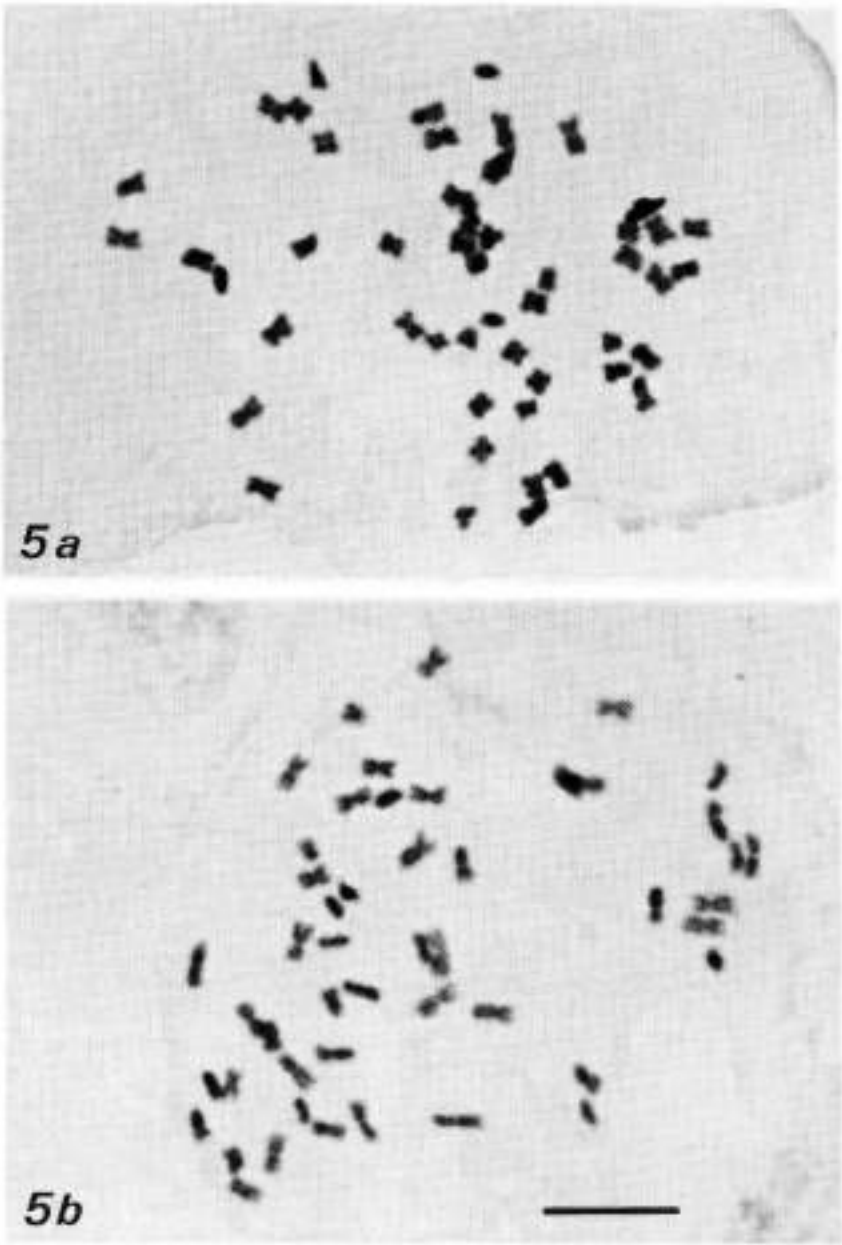


Fig. 5. Mitotic metaphase plates of *Onosma kaheirei*: a, $2n = 51$; b, $2n = 50$ (one chromosome missing). - Scale bar = 10µm.

More recently, Kentzinger (1974, 1976) counted the different number of $2n = 54$, in material from the mountains Killini and Chelmos. She also observed supernumerary

chromosomes ($2n$ = 55, 56) and suggested that the species is a palaeoendemic palaeopolyploid. Our results confirm the earlier (Warburg l.c.) chromosome number of $2n$= 4x = 36. Additionally, we also observed in same karyotypes one to three B-chromosomes, smaller than the rest of the complement (Fig. 3). The chromosomes are predominantly metacentric (m) with the rest submetacentric (sm), c. 2.0 to 3.8 µm in size. Four of the smallest chromosomes bear satellites. The largest submetacentric chromosome pair differs considerably in size from the rest of the complement (Fig. 3).

The existence of two ploidy levels, a tetraploid with $2n$ = 36 from Mt Pateras and an hexaploid with $2n$ = 54-56 from Mts Killini and Chelmos, points strongly to the presence of polyploidy and aneuploidy in *Erodium chrysanthum*. Further examination of material is desirable in order to clarify the relationship between ploidy level and geographical distribution, as well as to ascertain whether the diploid cytotype exists.

752. *Nonea obtusifolia* (Willd.) DC. — $2n$ = 20 + 0-2B (Figs. 4a, b).

Gr: Sterea Ellas, Nomos Viotias, foothills of Mt Pastra, between the villages of Panakton and Inoi, slopes with phrygana, schist, c. 400 m, 38°11′N, 23°28′E, 29 Mar 1995, *Constantinidis 5894* (UPA).

Nonea obtusifolia, an annual member of the tribe *Boragineae*, was previously examined cytologically by Grau (1971). He reports the chromosome number $2n$ = 20, together with a drawing of the karyotype on material from Peloponnisos, Greece. This number is confirmed in our material. The chromosomes are all relatively small, c. 1.2 to 2.2 µm in size and predominantly metacentric (m); one pair of them bears small satellites on its short arm (Fig. 4a, b). Up to two B-chromosomes appear in some individuals.

According to Luque (1995), the genus *Nonea* appears to have several different basic chromosome numbers, forming a dysploid series with x = 7, 8, 9, 10, 11 and 15. Apart from *N. obtusifolia*, $2n$ = 20 is also reported for *N. pulla* (L.) DC. (Luque l.c.).

753. *Onosma kaheirei* Teppner — 2n = 50, 51 (Figs. 5a, b).

Gr: Sterea Ellas, Nomos Attikis, Mt Pateras, the summit Mikri Kolosoúra, calcareous slopes, c. 950-1040 m, 38°07′N, 23°17′E, 28 May 1994, *Constantinidis 4703* (UPA).

Onosma kaheirei is a recently described Greek endemic species (Teppner 1988), known from a few localities only in northern Peloponnisos, Attiki, Evvia and Ikaria. Teppner (l.c.) examined two populations cytologically, from Mt Imittos and the island of Evvia and found the chromosome numbers $2n$ = 50 and $2n$ = 38, respectively. The former was confirmed in our material from Mt Pateras (Figs. 5a, b).

Moreover, one supernumerary chromosome of similar size as the rest of the complement was observed in metaphase plates of the examined population (Fig. 5a).

Most of the chromosomes in the complement appear to be metacentric (m) while the rest are submetacentric (sm), c. 1.8 to 3.5 µm in size. In some metaphase plates up to four conspicuous satellites were observed.

References

Aryavand, A. 1975: Contribution à l'étude cytotaxonomique de *Biebersteinia multifida* DC. (*Geraniacees*). — Compt. Rend. Hebd. Séances Acad. Sci., Sér. D: **280:** 1551-1554.

Daker, M. G. 1967: Cytological studies on a haploid cultivar of *Pelargonium*, and its colchicine-induced diploids. — Chromosoma **21:** 250-271.

Darlington, C. D. & Wylie, A. P. 1961: Chromosome atlas of flowering plants. — London.

Fedorov, A. N. (ed.) 1969: Chromosome numbers of flowering plants. — Leningrad [In Russian].

Gibby, M. & Westfold, J. 1983: A new basic chromosome number in *Pelargonium* (*Geraniaceae*). — Caryologia **36:** 79-82.

— & — 1986: A cytological study of *Pelargonium* sect. *Eumorpha* (*Geraniaceae*). — Pl. Syst. Evol. **153:** 205-222.

Grau, J. 1971: Cytologische Untersuchungen an *Boraginaceen* II. — Mitt. Bot. Staatssamml. München **9:** 177-194.

Kentzinger, M. 1974: Contribution à l'étude cytotaxinomique des *Geraniacées* du bassin méditerrannéen oriental. — Biol. Gallo-Hell. **5:** 191-208.

— 1976: Contribution à l'étude cytotaxinomique des *Geraniacées* du bassin méditerrannéen oriental. — Biol. & Ecol. Medit. **3:** 9-12.

Luque, T. 1995: Karyology of *Nonea* Medicus (*Boraginaceae*) in Spain; relationships between genera of *Boragineae* Barbier & Mathez (*Anchuseae* DC.). — Bot. J. Linn. Soc. **117:** 321-331.

Strey, M. 1931: Karyologische Studien an *Boraginoideae*. — Planta **14:** 682-730.

Teppner, H. 1988: *Onosma kaheirei* spec. nova und *O. erectum* (*Boraginaceae*) aus Griechenland. — Phyton (Horn) **28:** 115-131.

Warburg, E. F. 1938: Taxonomy and relationship in the *Geraniales* in the light of their cytology. — New Phytol. **37:** 189-210.

Yannitsaros, A. G., Constantinidis, T. A. & Vassiliades, D. D. 1996: The rediscovery of *Biebersteinia orphanidis* Boiss. (*Geraniaceae*) in Greece. — Bot. J. Linn. Soc. **120:** 239-242.

Address of the author:
Theophanis Constantinidis, Botanical Institute, University of Patras, GR-265 00 Patras, Greece.

Reports (754-756) by Dessislava Dimitrova

754. *Crepis conyzifolia* (Guan) A. Kerner — $2n = 8$ (Figs. 1A, B, C).

Bu: Western Stara Planina Mt, Petrohan Pass, at Malina hut, above village Ginci, 43°06'N, 23°06'E, calcareous grassy places, 1994, *Dimitrova DD4457* (SOM).

— Vitosha Mt, above Aleko hut, along the path to Černi vrăh, 42°35'N, 23°18'E, open grassy places, 1994, *Dimitrova DD4463* (SOM).

— Vitosha Mt, on the ski-track Konjarnika, 43°36'N, 23°16'E, open grassy places, 1994, *Dimitrova DD4464* (SOM).

Distributed in the mountains of Europe, from S.C. France to Carpathians, southwards to the Pyrenees and S.W. Bulgaria.

The chromosome number $2n = 8$ confirms the previous counts by Kuzmanov & al. (1981) in material from Bulgaria, as well as by Babcock (1947a, b), Schweizer (1973), Siljak-Yakovlev & Cartier (1979) and Dvorak & al. (1979) from elsewhere.

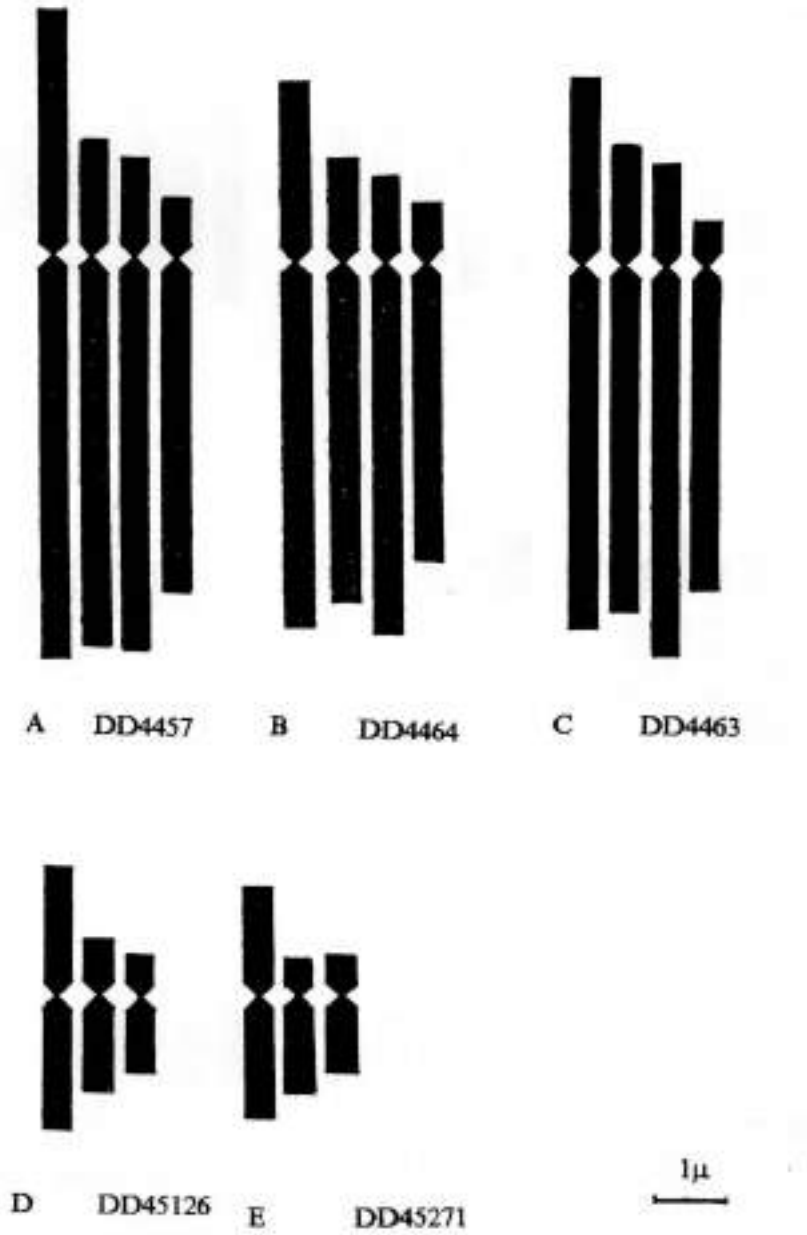


Fig. 1. Idiograms of: **A-C**, *Crepis conyzifolia*, $2n = 8$; **D, E**, *C. zacinthia*, $2n = 6$.

The karyotype of the population DD4457 consists of $2n = 2x = 2m\text{-}sm + 6st = 8$ chromosomes; the karyotype of the pop. DD4463 consists of $2n = 2x = 2sm + 2sm\text{-}st + 2st + 2st\text{-}t = 8$ chromosomes and the pop. DD4464 with $2n = 2x = 2sm + 6st = 8$ chromosomes. No SAT-chromosomes were visible in our material. The centromere position in the chromosome pairs varies considerably.

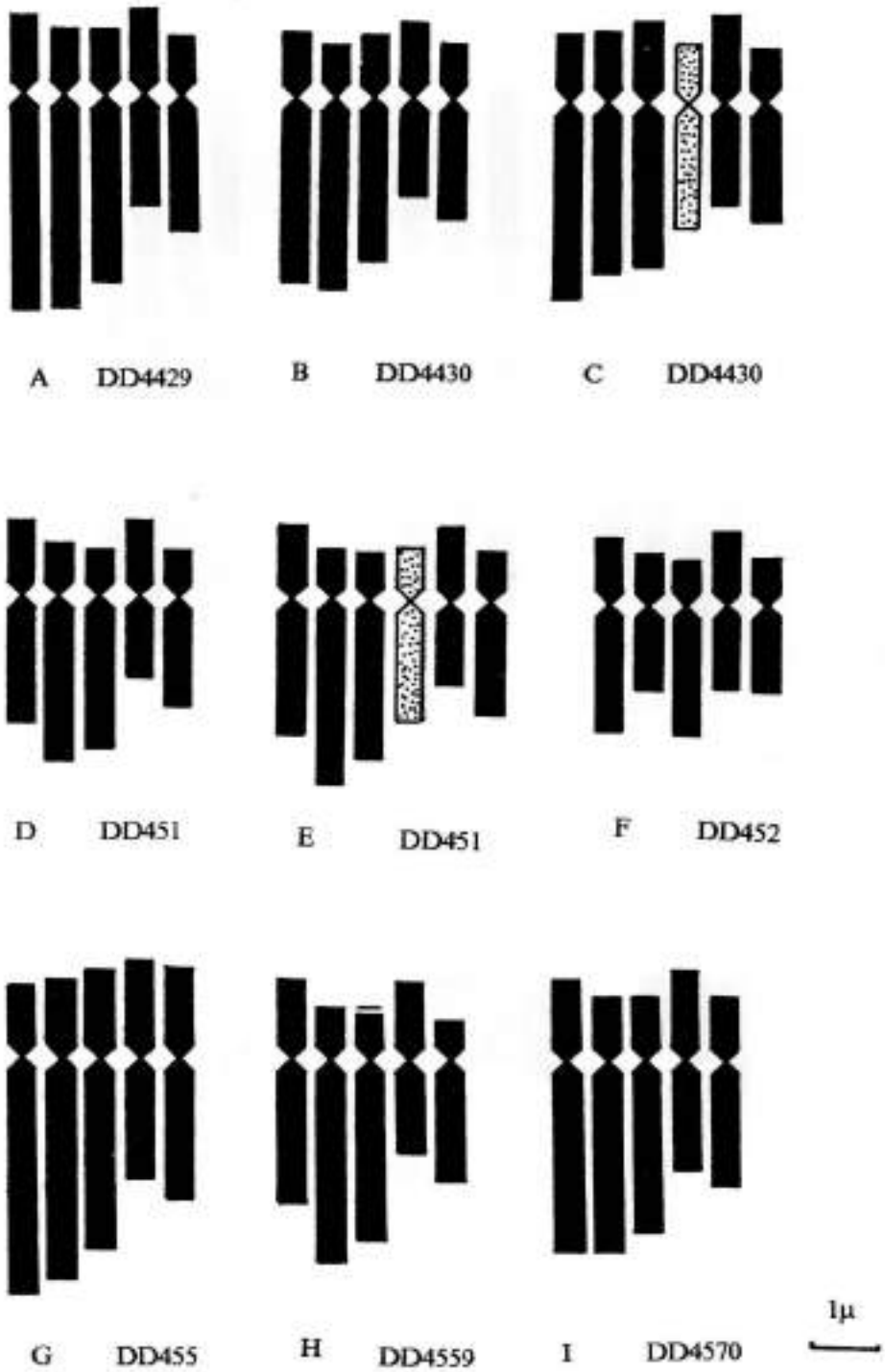


Fig. 2. Idiograms of: **A**, **B**, **D**, **F-I**, *Crepis suncta*, $2n = 10$; **C** & **E**, *C. suncta* $2n = 10 + 1\text{-}2$. – The dotted chromosome is the additional one.

755. *Crepis zacintha* (L.) Babcock — $2n = 6$ (Figs. 1 D, E).

Bu: Southern Black Sea Coast, along the shore near Carevo, 42°07'N, 27°52'E, dry, grassy places facing the sea, 1995, *Dimitrova DD45126* (SOM).
— Southern Black Sea Coast, along the shore near Sinemorec, 42°04'N, 27°56'E, grassy places facing the sea, 1995, *Dimitrova DD45271* (SOM).

Distributed in the Mediterranean region.

The chromosome number $2n = 6$ confirms the counts given by Kuzmanov & Kožuharov (1970) and Kuzmanov (1975) in material from Bulgaria, by van Loon & Snelders (1979) and Snogerup (1995) in material from Greece, as well as by Babcock (1947b) in material of unknown origin. The karyotypes of the two populations are very similar and consist of $2n = 2x = 2m + 4sm = 6$ chromosomes. The metacentric chromosome pair is the longest one and differs considerably in its length from the other two chromosome pairs. The other two pairs of chromosomes are similar in size and morphology.

756. *Crepis sancta* (L.) Babcock — $2n = 10$ (Figs. 2 A, B, D, F, G, H, I) &
$2n = 10+1-2$ (Figs. 2C, E).

Bu: Western Stara Planina Mt, after village Beledie han, along the road Sofia - Petrohan Pass, 43°54'N, 23°11'E, calcareous grassy places, 1994, *Dimitrova DD4429* (SOM).
— Znepole region, locality Dragomaski Čepan, 43°59'N, 22°51'E, calcareous, stony, grassy places, on shallow soil, 1994, *Dimitrova DD4430* (SOM).
— Southern Pirin Mt, opposite the motel "Soluniki", near village Strumjani, 41°40'N, 23°13'N, calcareous grassy places along the road, 1995, *Dimitrova DD451* (SOM).
— Southern Pirin Mt, above village Ilindenci, 41°41'N, 23°15'E, dry, stony, calcareous places along the road, 1995, *Dimitrova DD452* (SOM).
— Znepole region, at village Ezdimirci, 42°51'N, 22°42'E, open, calcareous, grassy places, 1995, *Dimitrova DD455* (SOM).
— Pirin Mt, at town Kresna, on the slope above the rail way track, 41°45'N, 23°10'E, calcareous, open, grassy places, 1995, *Dimitrova DD4559* (SOM).
— Slavjanka Mt, the foothills of Stargač massif at village Ilinden, 41°29'N, 23°49'E, calcareous, stony places, 1995, *Dimitrova DD4570* (SOM).

Distributed in E. Mediterranean region and S.E. Europe.

The chromosome number $2n = 10$ confirms the counts of Kuzmanov & Jurukova (1977), Kuzmanov & al. (1981) in material from Bulgaria. References from elsewhere see in Kamari & Anagnostopoulos (1991). The karyotype formula is $2n = 2x=2m+4sm+2sm-st+2st$. The centromere position varies considerably in the karyotypes of the studied populations. Only the metacentric and the shortest submetacentric chromosome pairs are present in all karyotypes and are of similar size. In most of the karyotypes the longest chromosome pair is metacentric, but in pop. DD451 (Fig. 2D) it is the transitional sm-st pair and in DD4559 (Fig. 2H) it is the st-pair of chromosomes. The karyotypes of most of the populations are very heterogeneous but show similar tendencies when the size and morphology of the chromosomes are concerned. Only in the karyotype of the pop. DD455

(Fig. 2G) the chromosome morphology differs from this of the other populations; the chromosomes are longer as a whole and the karyotype is more symmetrical. This is the only examined population in which a SAT-chromosome pair is visible. The absence of SAT-chromosomes in the karyotypes of most populations from Bulgaria shows that they are different from those given by Babcock (1947b) in cultivated material and Kamari & Anagnostopoulos (1991) from Greek populations.

In some cases in the pops. DD4430 and DD451 we observed 1 to 2 additional chromosomes. In the karyotype of the pop. DD4430 we counted $2n = 2x = 2m + 7sm + 2st=11$ chromosomes, while in the pop. DD451 $2n = 2x = 2m + 5sm + 4st=11$ and $2n = 2x = 2m + 6sm + 4st = 12$ chromosomes.

The additional chromosomes are always of similar size and morphology; they are submetacentric, shorter than the metacentric ones and a little longer than the shortest submetacentric chromosomes.

These additional chromosomes take part in the mitotic division of the cells and for that reason they cannot be regarded as B-chromosomes. Probably, they are polysomic type of the shortest submetacentric chromosomes. Strid & Franzén (1981) also reported $2n = 10 + 0\text{-}2B$, but since no karyotype morphology was given the data cannot be compared.

Aknowledgements

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References

Babcock, E. B. 1947a: The genus *Crepis*. 1: Taxonomy, phylogeny, distribution and evolution of *Crepis*. — Univ. Calif. Publ. Bot. (Berkeley, Los Angeles) **21:** 1-197.

— 1947b: The genus *Crepis*. 2: Systematic treatment. — Univ. Calif. Publ. Bot. (Berkeley, Los Angeles) **22:** 199-1030.

Dvorak, F., Grull, F., Ruzicka, L. & Dadakova, B. 1979: Reports [In Löve, Á. (ed.), IOPB chromosome number reports, LXIV]. — Taxon **28**: 391-392.

Kamari, G. & Anagnastopoulos, A. 1991: Reports 1-6 [In Kamari, G., Felber, F. & Garbari, F. (eds.), Mediterranean chromosome number reports-1]. — Fl. Medit. **1**: 223-229.

Kuzmanov, B. 1975: Karyological study of Bulgarian *Compositae*. III. — In: In Honour of Academician Daki Jordanov, 59-66.

— & Jurukova, P. 1977: Reports [In Löve, Á. (ed.), IOPB chromosome number reports, LVIII]. — Taxon **26:** 558.

— & Kožuharov, S. 1970: Reports [In Löve, Á. (ed.), IOPB chromosome number reports, XXVI]. — Taxon **19**: 265-266.

—, Georgieva, S., Nikolova, V. & Penceva, I. 1981: Reports [In Löve, Á. (ed.), IOPB chromosome number reports, LXXII]. — Taxon **30**: 701-702.

Loon, J. C. van & Snelders, H. C. M. 1979: Reports [In Löve, Á. (ed.), IOPB chromosome number reports, LXV]. — Taxon **28:** 632-634.

Schweizer, D. 1973: Differential staining of plant chromosomes with Giemsa. — Chromosoma **40:** 307-320.

Siljak-Yakovlev, S. & Cartier, D. 1979: Utilisation de la coloration différentielle au Giemsa dans l'analyse des caryotypes de quatre *Crepis*. — Rev. Cytol. Biol. Végét. Bot. **2**: 13-20.

Snogerup, S. 1995: Reports 491-517 [In Kamari, G., Felber, F. & Garbari, F. (eds.), Mediterranean chromosome number reports-5]. — Fl. Medit. **5**: 331-334.

Strid, A. & Franzén, R. 1981: Reports [In Löve, A. (ed.), IOPB chromosome number reports, LXVIII]. — Taxon **30:** 829-842.

Address of the author:
D. Dimitrova, Institute of Botany, BAS 23 "Acad. G. Bonchev" Str., BG-1113 Sofia, Bulgaria.

Reports (757-761) by Margarita Markova & Valentina Goranova

757. *Ornithogalum boucheanum* Aschers. — $2n = 28$.

Bu: Tundža hilly region, among the bushes, near the town Elhovo, 42°08'N, 26°33'E, dry places, 1975, *Markova L490* (SOM).

The chromosome number $2n = 28$ counted by us agrees with that found by Uhrikova (in Majovsky 1976), Agapova (1967, 1977), and other authors (see Fedorov 1969, Moore 1973, 1974, Goldblatt & Johnson 1994). It seems to be the first karyological study of this species based on Bulgarian material.

Disploidy is usually found in the genus *Ornithogalum* s.l. including the following basic numbers $x = 3, 5, 6, 7, 8, 9, 11, 12, 13$, and 17 (Darlington & Wylie 1955, Löve & Löve 1961, 1974, Ruiz Rejon 1978 and others).

The chromosome number $2n = 28$ counted by us is probably tetraploid ($x = 7$). The karyotype consists of $2n = 4x = 6m + 16sm + 4st + 2st$ - SAT = 28 chromosomes. The number of metacentric, submetacentric and SAT-chromosomes in the examined population differs from that given by Agapova (1977) in a population from Moldova.

758. *Ornithogalum brevistylus* Wolfn. — $2n = 24$ (Figs. 1, 2).

Bu: Southern Black Sea coast, around the International youth center near Primorsko, 42°14'N, 27°43'E, shruby places, 1977, *Markova L840* (SOM).

— Southern Black Sea coast, between Carevo and Achtopol, 42°07'N, 27°52'E, shruby places, 1987, *Černeva L1357* (SOM).

— Ljulin Mt, around the village Klisura, 42°42'N, 23°11'E, open grassy places, 1975, *Markova L532* (SOM).

— Eastern Rhodopes, along the road between the village Sviraci and the town Ivailovgrad, 41°24'N, 26°08'E, open grassy places, 1982, *Markova L1281* (SOM).

— Tundža hilly region, around the village Vojnika, near the town Jambol, 42°08'N, 26°32'E, among the bushes, 1980, *Markova L1102* (SOM).

— Tundža hilly region, above the village Knjazevo, near the town Topolovgrad, 42°02'N, 26°22'E, open grassy places, 1983, *Markova & Hrouda L1331* (SOM).

— Tundža hilly region, around the village Veselinovo, near the town Jambol, 42°32'N, 26°42'E, dry places among the bushes, 1984, *Markova & Goranova L1456* (SOM).

— Tundža hilly region, above the village Vodenicene, near the town Jambol, 42°31'N, 26°42'E, open grassy places, 1981, *Markova L1178* (SOM).

— Tundža hilly region, near the town Elhovo, 42°08'N, 26°33'E, dry places among the bushes, 1983, *Markova & Hrouda L1342* (SOM).

The chromosome number $2n = 24$ of *Ornithogalum brevistylus* established in 9 populations coincides with the results given for one of them (L1102) by Markova (1983)

as *O. narborense* and agrees to the data reported by Lungeanu (1971, 1972) and Wittmann (1985).

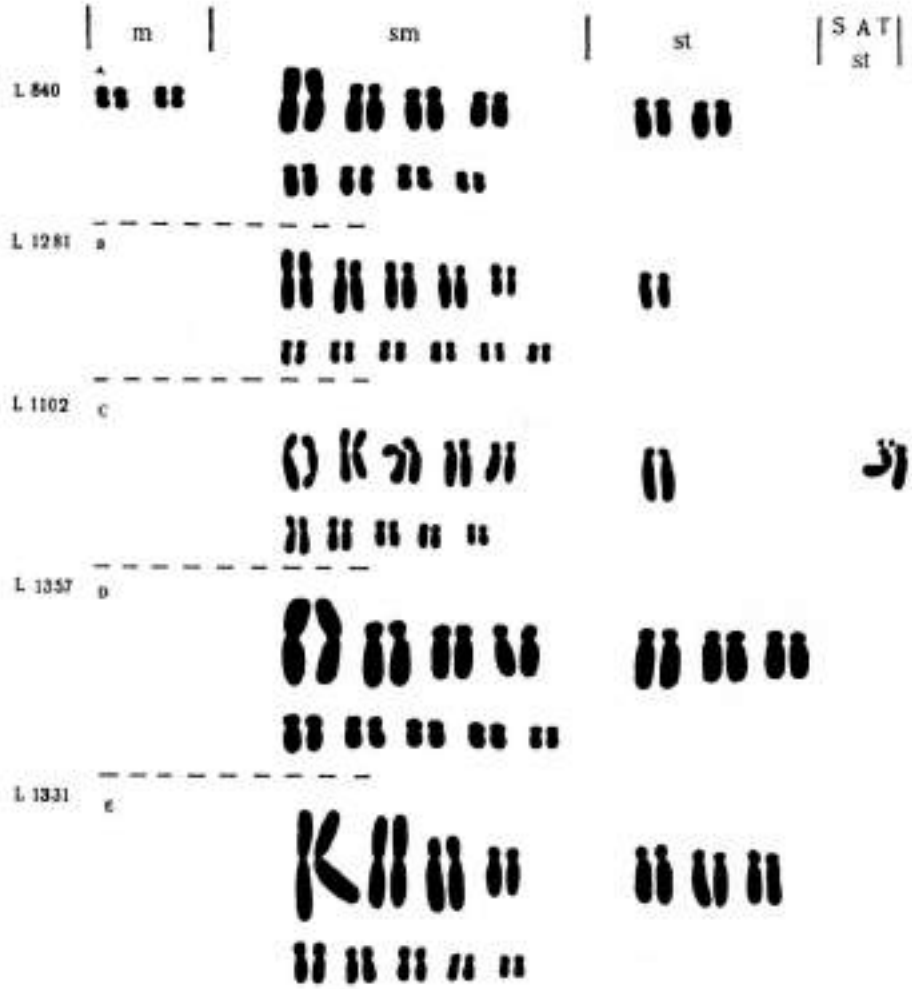

Fig. 1. Karyograms of: **A-E**, *Ornithogalum brevistylus*, $2n = 24$.

The karyotypes examined here exhibit high variability in the chromosomal morphology. Thus, the karyotype of pop. L840 consists of $2n = 2x = 4m + 16sm + 4st=24$ chromosomes (Fig. 1A), that of pop. L1281, of $2n = 2x = 22sm + 2st=24$ chromosomes (Fig. 1B) and that of L1102, of $2n = 2x = 20sm + 2st + 2st$ - SAT=24 chromosomes (Fig. 1C); the pops. L1357, L1331 & L1456 have similar karyotypes with $2n = 2x = 18sm + 6st = 24$ chromosomes (Fig. 1D, E & 2A); the karyotype of pop. L532 consists of $2n = 2x = 14sm + 8st$ chromosomes+ 1m + 1st= 24 chromosomes (Fig. 2B) and that of L1178 of $2n= 2x =$

14sm + 8st + 2st =24 chromosomes of different length (Fig. 2C); the karyotype of pop. L1342 includes $2n = 2x = 14sm + 10st = 24$ chromosomes (Fig. 2D).
The karyotypes of the 10 populations studied karyologically by Wittmann (l.c.) were all diploid, consisting of $2n = 2x = 2m+12sm+8st+2sm\text{-}SAT = 24$ chromosomes.

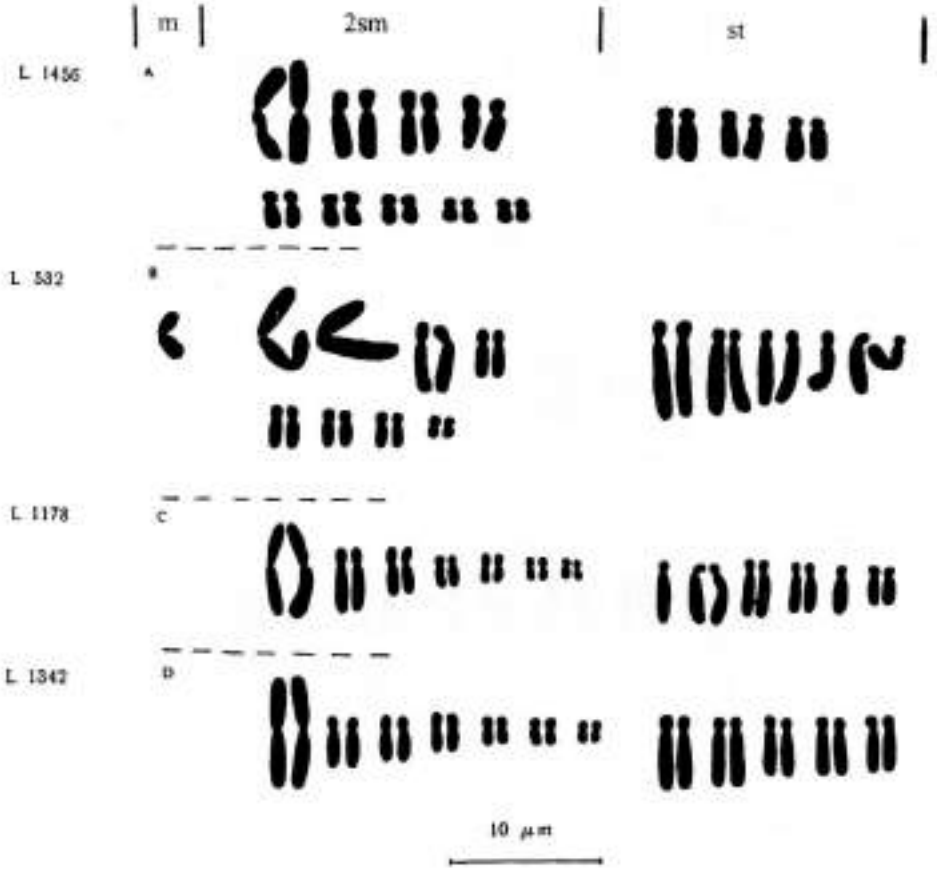

Fig. 2. Karyograms of: **A-D**, *Ornithogalum brevistylus*, $2n = 24$.

759. *Ornithogalum sphaerocarpum* Kern. — $2n = 16, 17, 32$ & 16+2B (Figs. 3A, B, C, D & E).

Bu: Vitoša Mt, above the village Simeonovo, 42°35'N, 23°23'E, open grassy places, 1985, *Markova & Goranova L1565* (SOM). (Fig. 3D).

— Vitoša Mt, along the path between the village Dragalevci and the village Simeonovo, 42°36'N, 23°23'E, open stony places in the forest, 1983, *Markova & Goranova L1386* (SOM). (Figs. 3A, B, C).

— Znepole region, around the village Vasilovci, 42°57'N, 23°04'E, dry stony places, 1985, *Hardalova L1566* (SOM). (Fig. 3E).

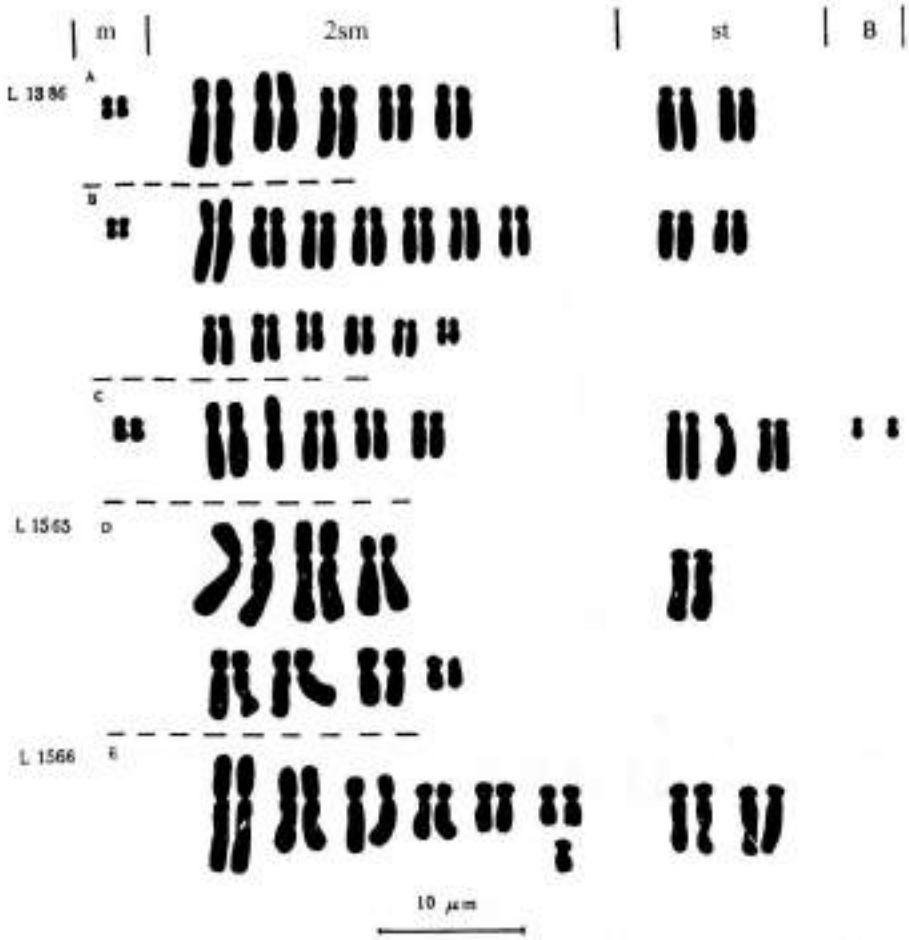

Fig. 3. Karyograms of: *Ornithogalum sphaerocarpum*, **A**, $2n = 16$; **B**, $2n = 32$; **C**, $2n = 16+2B$; **D**, $2n = 16$; **E**, $2n = 17$.

The chromosome number $2n = 16$ agrees with those previously reported by Neves (1952, 1973), Wittmann (1985, as *O. pyrenaicum* subsp. *sphaerocarpum*), Kieft & Loon (1978) and Loon & Kieft (1980). Probably this is the first karyological study of this species based on Bulgarian material.

The karyotype of pop. L1565 consists of $2n = 2x = 14sm + 2st = 16$ chromosomes (Fig. 3D). This population is considerably large and of the mosaic type. Wittmann (l.c.) has published karyograms of plants from Jugoslavia and Austria. The karyogram of Jugoslavian origin is rather similar to the karyogram of the Bulgarian pop. L1386.

In the pop. L1386 we observed three cytotypes: A with $2n = 2m+10sm+4st = 16$ chromosomes (Fig. 3A), B with $2n = 2m+26sm+4st = 32$ chromosomes (Fig. 3B) and C with $2n = 2m+8sm+4st+1sm+1st+2B$-sm $= 16+2B$ chromosomes (Fig. 3C).

Fig. 4. Karyotypes of: **A-C**, *Potentilla pedata*, **A**, $2n = 35$; **B**, $2n = 49$; **C**, $2n = 56$; **D**, *P. pindicola*, $2n = 42$.

The chromosome number $2n = 32$ corresponds to the data of Sprumont (1928, as *O. pyrenaicum*). The number $2n = 32$ in our experiment is probably a result of endopolyploidy.

The chromosome number $2n = 17$ coincides with the results reported by Šopova and Sekovsky (1981) on Jugoslavian material. The karyotype with $2n = 17$ observed in the root tips of five bulbs from a population around the village Vasilovci, includes $2n = 2x + 1 = 12sm + 4st + 1sm = 17$ chromosomes (Fig. 3E).

760. *Potentilla pedata* Willd. — $2n = 35$, 49 & 56 (Figs. 4 A, B, C).

Bu: N.E. Bulgaria, among the bushes around the village Karapelit, 43°37'N, 27°35'E, dry places, 1969, *Markova P9* (SOM). (Fig. 4A).

— Rila Mt, among the bushes around the Rila closter, 42°06'N, 23°23'E, dry places, 1969, *Markova P11* (SOM). (Fig. 4B).

— Western Rhodopes, the locality "Rakovo dere", 41°48'N, 24°10'E, dry open places, 1970, *Markova P201* (SOM). (Fig. 4C).

The plants from the Bulgarian pops. have chromosome numbers $2n = 35$, 49, 56 which do not agree with the chromosome number $2n = 28$ found by Borhidi (1968) and other authors (see Fedorov 1969, for references). This is the first report based on Bulgarian material.

In the karyotypes of the populations P9 with $2n = 5x = 35$ (Fig. 4A), P11 with $2n = 7x = 49$ (Fig. 4B) and P201 with $2n = 8x = 56$ (Fig. 4C), the submetacentric chromosomes predominate and there are also 4-6 metacentric chromosomes.

761. *Potentilla pindicola* (Nyman.) Haussk. — $2n = 42$ (Fig. 4 D).

Bu: E. Stara planina Mt, the locality Karandila above the town Sliven, 42°39'N, 26°18'E, grassy places, 1970, *Markova P178* (SOM).

Distributed from N. Greece to Crimea. The chromosome number $2n = 6x = 42$ is reported here, probably, for the first time for this species. Its karyotype includes $2n = 4m + 36sm + 2sm\text{-}SAT = 42$ chromosomes (Fig. 4D).

Acknowledgements

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References

Agapova, N. D. 1967: Dopolnitel'nye dannye k kariosistematike kavkazskikh vidov roda *Ornithogalum* L. — Bot. Zurn. **52**: 1750-1756.

— 1977: Citosistematiceskoe issledovanie evropejskih predstavitelej roda *Ornithogalum* L. (Fam. *Liliaceae*) flori SSSR I. — Bot. Zurn. **62(7)**: 970-983.

Borhidi, A. 1968: Karyological studies on southeast Europaean plant species. I. — Acta Bot. Acad. Sci. Hung. **14(3-4)**: 253-260.

Darlington, C. D. & Wylie, A. 1955: Chromosome atlas of flowering plants. — London.

Fedorov, A. A. (ed.) 1969: Chromosome numbers of flowering plants. — Leningrad.

Goldblatt, P. & Johnson, D. 1994: Index to plant chromosome numbers for 1990-1991. — Monogr. Syst. Bot. Missouri Bot. Gard. **51**.

Kieft, B. & Loon, J. C. van 1978: Reports [In Löve, Á. (ed.), IOPB Chromosome number reports LXII]. — Taxon **27:** 524-525.
Loon, J. C. van & Kieft, B. 1980: Reports [In Löve Á. (ed.), IOPB Chromosome number reports XLVIII]. — Taxon **29:** 538-539.
Löve, Á. & Löve, D. 1961: Chromosome numbers of central and north west European Plant species. — Opera Botanica **5**: 1-581.
— 1974: Cytotaxonomical Atlas of the Slovenian Flora. — Lehre.
Lungeanu, I. 1971: Reports [In Löve A. (ed.), IOPB Chromosome number reports XXXIII]. — Taxon **20**: 609 - 614.
— 1972: Contributions to the caryologic study of the genus *Ornithogalum*. — Acta Bot. Hort. Buc.: 147-151.
Májovský, J. & al. 1976: Index of chromosome numbers of Slovakian flora (Part 5). — Acta Fac. Rerum Nat. Univ. Comen., Bot. **25:** 1-18.
Markova, M. 1983: Reports [In Löve, A. (ed.), IOPB chromosome number reports LXXX]. — Taxon **32**: 140.
Moore, R. J. (ed.) 1973: Index to plant chromosome numbers for 1967-1971. — Reg. Veg. **90**.
— 1974: Index to plant chromosome number for 1972. — Reg. Veg. **91**.
Neves, J. B. 1952: Estudios cariologicos no genero *Ornithogalum* L. — Bol. Soc. Brot., ser. 2, **26**: 5-192.
— 1973: Contribution à la connaissance cytotaxonomique des *Spermatophyta* du Portugal. VIII. *Liliaceae*. — Bol. Soc. Brot., ser.2, **47**: 157-212.
Ruiz Rejon, M. 1978: Estudios cariologicos en especies espanolas del Orden *Liliales*. III. Familia *Liliaceae*. — Anal. Inst. Bot. Cavanille **34(2):** 733-759.
Šopova, M. & Sekovsky, Z. 1981: Chromosome atlas of some macedonian *Angiosperms*. II. — Annuare Fac. Biol. Univ. "Kiril et Metodij" — Skopije, **34**: 65-76.
Sprumont, G. 1928: Chromosomes et satellites dans quelques espèces d'*Ornithogalum*. — Cellule, Paris **38**: 271-289.
Wittmann, H. 1985: Beitrag zur Systematik der *Ornithogalum* - Arten mit verlängert - traubiger Infloreszenz. — Stapfia, **13**: 1-117.

Address of the authors:
Dr M. Markova & Dr V. Goranova, Institute of Botany, "Akad. G. Bonchev" Str., bl. 23, BG-1113 Sofia, Bulgaria.

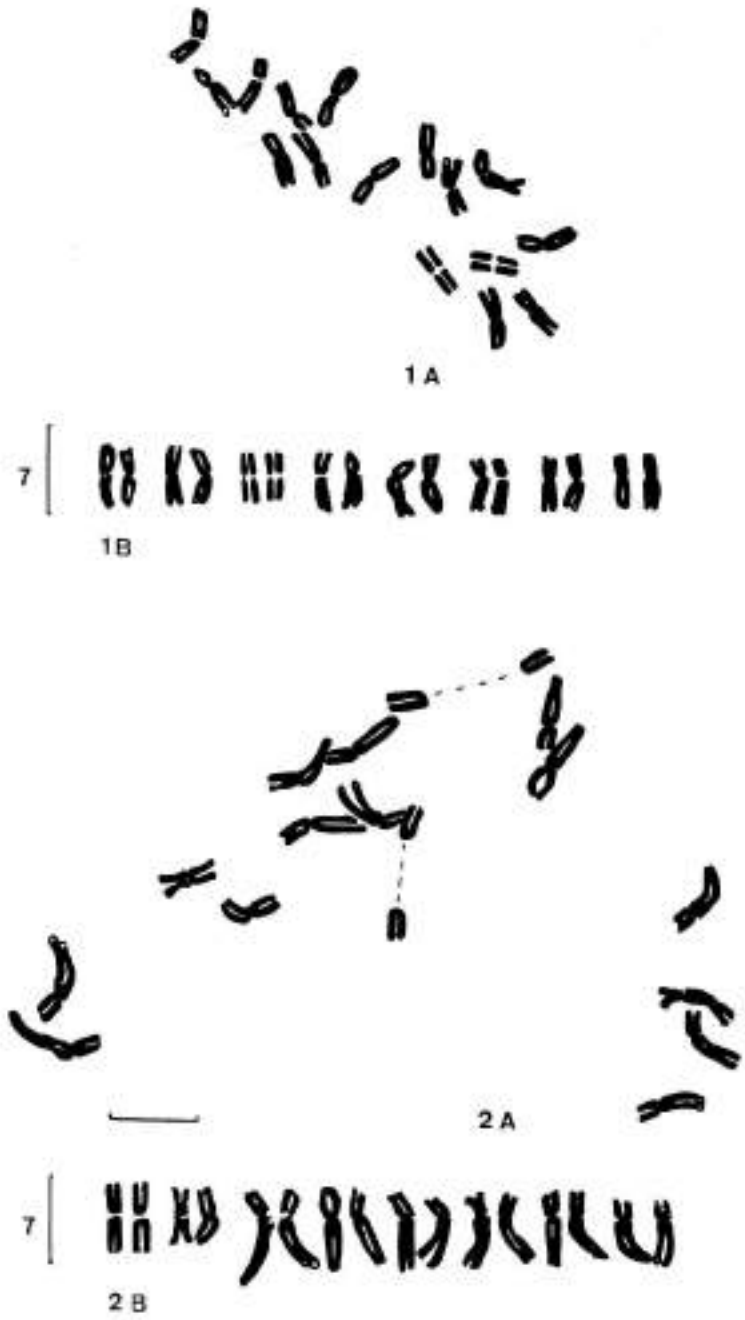
Reports (762-766) by Dolja Pavlova

762. *Oxytropis pilosa* (L.) DC. — $2n = 16$ (Figs. 1A, B).

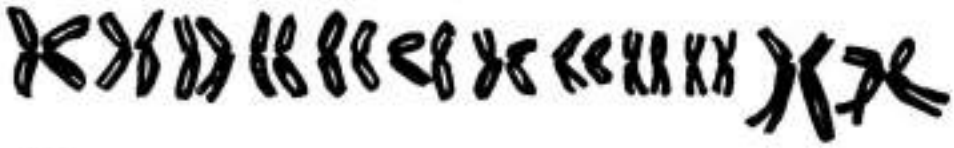
Bu: Znepole region, on rocky and calcareous places between village Razdavitza and village Garbino, 42°20′N, 22°45′E, *D. Pavlova 95 241* (SO).

Distributed in Au, Bu, Cz, Ga, Ge, He, Hu, It, Ju, Po, Rm, Rs, Su (According to Leins & Merxmüller 1968).

The chromosome number $2n = 2x = 16$, reported here for the first time from Bulgarian material, confirms previous counts from elsewhere (see Fedorov 1969: 313 and Goldblatt 1981: 252 & 1984: 190, for references). The karyotype is symmetrical, consisting of $2n=2x=6m + 10sm=16$ chromosomes. The chromosomes are of small size.



Figs. 1-2. Karyotypes and karyograms of *Oxytropis* species from Bulgaria: **1A, B**, *O. pilosa*, $2n = 16$; **2A, B**, *O. urumovii*, $2n = 16$. - Scale bar = 7µm.



3 B

Fig. 3. **A**, karyotype and **B**, karyogram of *Oxytropis campestris*, $2n = 48$. - Scale bar= 7µm.

763. *Oxytropis urumovii* Jav. — $2n = 16$ (Figs. 2A, B).

Bu: Pirin Mts, the locality Goljam Kazan on rocky calcareous terrain, 2700 m, 41°45'N, 23°25'E, *D. Stojanov 97793* (SO).

Oxytropis urumovii is a Balkan endemic species, distributed in Al, Bu, Ju.

This species was previously investigated by Andreev (1981) and Kruscheva (1986), who reported the chromosome numbers $2n = 16$ and $2n = 48$, without any comment for the morphology of the karyotypes.

Its karyotype is symmetrical, consisting of $2n = 2x = 4m + 12sm=16$ chromosomes; these are of small and medium size. Endopolyploidy ($2n = 48$) is also observed. In our opinion, the previously reported number $2n = 48$ is probably a result of endopolyploidy, too. All three counts are from the same population of the species.

Figs. 4-5. Karyotypes of *Trigonella* species from Bulgaria: **4**, *T. gladiata*, $2n = 16+2B$; **5**, *T. monspeliaca*, $2n = 16$. - Scale bar = 7µm.

764. *Oxytropis campestris* (L.) DC. — $2n = 48$ (Figs. 3A, B).

Bu: Pirin Mts, at the locality Kabata, on the path to peak Vihren, 2600m, 41°45'N, 23°25'E, *D. Stojanov 97 792* (SO).

Distributed in Au, Br, Bu, Cz, Ga, He, Hs, It, Ju, Po, Rm, Rs, Su.

The species is quite variable, presented in Bulgaria only with its typical subspecies *campestris*. It is distributed in the high mountains Pirin and Rila, above 2500 m.

The chromosome number $2n = 48$, counted in Bulgarian material for the first time, confirms the previous reports of Uhrikova (1974) for the Polish populations of the species. The karyotype consists of $2n=4x=24m+ 20sm + 4st=48$ and the chromosomes are of medium size.

765. *Trigonella gladiata* L. — $2n = 16 + 2B$ (Fig. 4).

Bu: Strandza Mts on rocky calcareous terrain on the territory of the Vitanovo Reserve, 42°02'N, 27°20'E, *D. Pavlova 97 790* (SO).

Distributed in Bu, Gr, Ga, Cr, Hs, Hu, It, Ju, Rm, Rs (K), Sa, Si, Tu (According to Ivimey-Cook 1968).

The chromosome number $2n = 16$, reported for the first time from Bulgaria, confirms all previous counts (see Goldblatt 1981: 265 and Goldblatt & Johnson 1990: 113 & 1991: 110, for references). The karyotype consists of $2n = 2x=10m+6sm+2B$-chromosomes; it is symmetrical and the chromosomes are of medium and long size. The B-chromosomes are the shortest ones in the karyotype; the centromeres are slightly visible.

766. *Trigonella monspeliaca* L. — $2n = 16$ (Fig. 5).

Bu: Strandza Mts, on rocky calcareous terrain on the territory of the Vitanovo Reserve, 42°02'N, 27°20'E, *D. Pavlova 97 791* (SO).

A widespread in Europe species, common also in the Bulgarian flora.

Karyologically is investigated for the first time from Bulgaria. The chromosome number $2n = 16$ confirms previous counts (see Fedorov 1969:321, Goldblatt 1981: 265 & 1984: 196 and Goldblatt & Johnson 1990: 113, for references) from elsewhere. Its karyotype consists of $2n=2x=6m+8sm+2m$ -SAT=16 chromosomes.

Morphologically the karyotype is different from that reported by Dvorak & Dadakova (1984) by one pair metacentric chromosomes with satellites, while it coincides with the result of Fernandes & Santos (1971). The karyotype is symmetrical with metacentric and submetacentric chromosomes. The arm index shows slight differences of the various chromosome types. The SAT-pair seems to be of m-type, the satellites are ball-shaped.

References

Andreev, N. 1981: Reports [In Löve, Å.(ed.), IOPB Chromosome numbers reports, LXX]. — Taxon **30**: 74-75.

Dvorak, F. & Dadakova, B. 1984: Chromosome counts and chromosome morphology of some selected species. — Folia Geob. Phytotax. **19**: 41-70.

Fedorov, A. N. (ed.) 1969: Chromosome numbers of flowering plants. — Leningrad.

Fernandes, A. & Santos, M. F. 1971: Contribution à la connaissance cytotaxonamique des *Spermatophyta* du Portugal, IV. *Leguminosae*. — Bol. Soc. Brot., ser. 2, **45**: 177-225.

Goldblatt, P. 1981: Index to chromosome numbers for 1975-1978. — Monogr. Syst. Botany, Missouri Bot. Gard. **5**.

— 1984: Index to plant chromosome numbers for 1979-1981. — Monogr. Syst. Botany, Missouri Bot. Gard. **8**.

— & Johnson, D. E. 1990: Index to plant chromosome numbers for 1986-1987. — Monogr. Syst. Botany, Missouri Bot. Gard. **30**.

— & — 1991: Index to plant chromosome numbers for 1988-1989. — Monogr. Syst. Botany, Missouri Bot. Gard. **40**.

Ivimey-Cook, R. B. 1968: *Trigonella*. — In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (eds.) — Flora Europaea **2**:150-152. — Cambridge University Press.

Krusheva, R. 1986: Reports [In Löve, A.(ed.), IOPB Chromosome numbers reports, LCII]. — Taxon **35**: 613.

Leins, P. & Merxmüller, H. 1968: *Oxytropis*. — In Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. — Flora Europaea **2**: 124-126. — Cambridge University Press.

Uhrikova, A. 1974: Correction in Index to chromosome numbers of Slovakian flora. Part 4. — Acta Fac. Rerum Nat. Univ. Comenianae, Bot. **23**: 1-23.

Address of the author:
Dr D. Pavlova, University of Sofia, Biological Faculty, Department of Botany, blv. Dragan Tzankov 8, BG-1421 Sofia, Bulgaria.

Reports (767-772) by Svetlana T. Sharkova

767. *Centaurea cyanus* L. — $2n = 24$ (Fig. 1).

Bu: Toundzha Hilly Country, St. Iliya Hills, above the village of Sokol, 42°24'N, 26°04'E, dry, open grassy places, 4 Jul 1995, *Sharkova & Denchev Sh9519* (SOM).

Native in S.E. Europe, Sicilia and Asia Minor.

The chromosome number $2n = 24$, is in accordance with the results of previous investigations (see Ornduff 1967, 1969, Fedorov 1969, Moore 1970, 1977, Goldblatt 1981, 1984, 1985, 1988, Goldblatt & Johnson 1990, 1991, 1994, Loon 1987, for references). The karyotype consists of chromosomes with slight differences in their length. There are 6 SAT-chromosomes, including the two longest of the karyotype. Another different record with a chromosome number $2n = 20$ is given by Dey & Sharma (1967).

768. *Centaurea indurata* Janka — $2n = 44$ (Figs. 2, 3, 4).

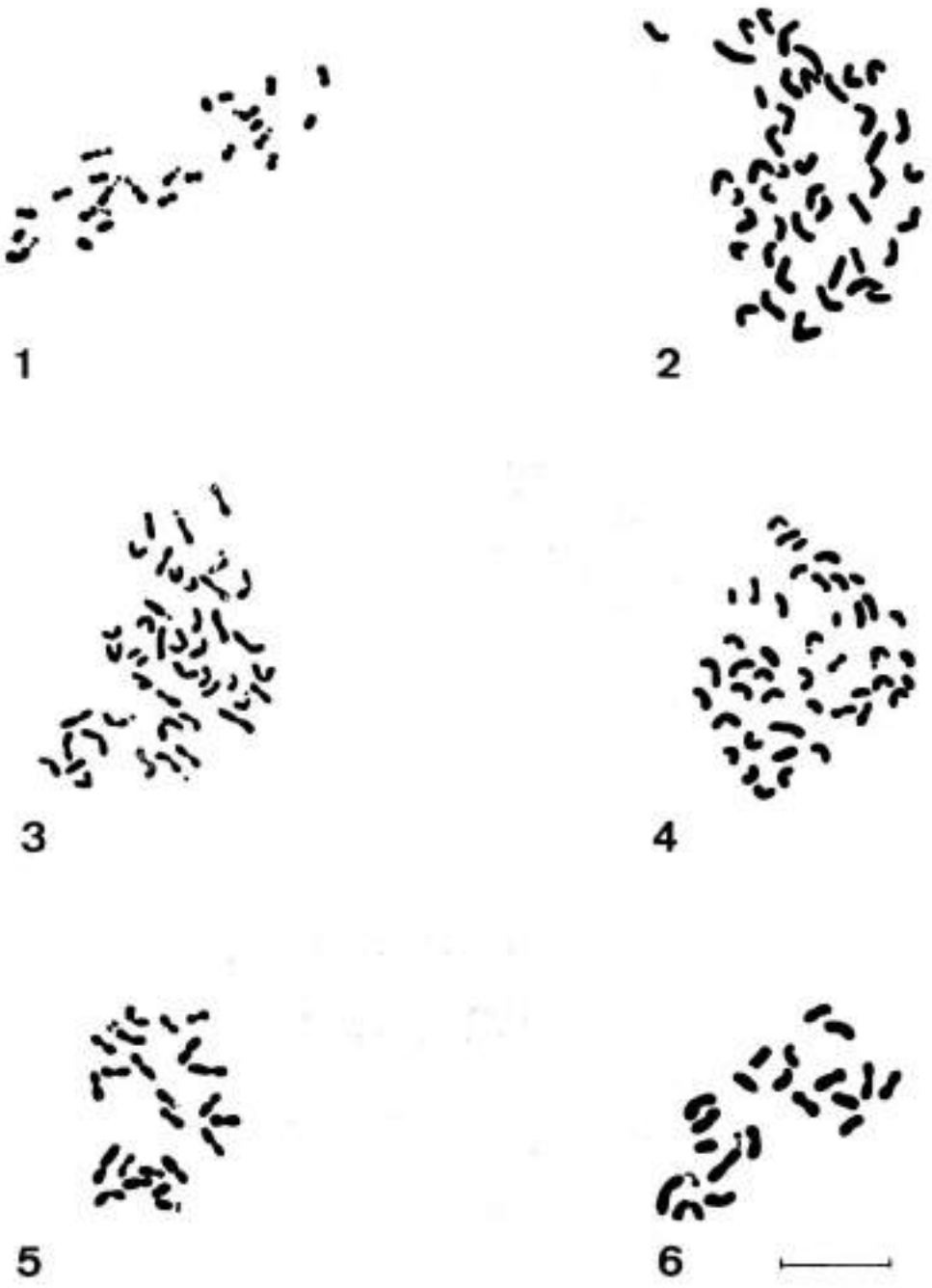
Bu: West Balkan Mt, below Peak Midzhour, above the village of Gorni Lom, 900 m, 43°24'N, 22°42'E, open places in the forest, 26 Jul 1995, *Sharkova & Denchev Sh9530* (SOM).

— Rila Mt, around the Rila Monastery, 1150 m, 42°08'N, 23°21'E, open places in the forest, 12 Jul 1995, *Sharkova Sh9526* (SOM).

— Central Balkan Mt, around the Bebresh storage reservoir, 500 m, 42°50'N, 23°47'E, open places in the forest, 9 Jul 1995, *Koeva Sh9546* (SOM).

Distributed in Bu, Cz, Hu, Rm.

The count of $2n = 4x = 44$ chromosomes confirms the previous records by Kuzmanov & Nikolova (1986), Kuzmanov & Georghieva (1990) based on Bulgarian material from Mt Vitosha. There are differences in the number of SAT-chromosomes of investigated populations.



Figs. 1-6. Mitotic metaphase plates of: **1,** *Centaurea cyanus*, $2n = 24$; **2, 3, 4,** *C. indurata*, $2n = 44$; **5,** *C. kernerana* subsp. *kernerana*, $2n = 22$; **6,** *C. napulifera* subsp. *nyssana*, $2n = 20$. - Scale bar=10µm.

769. *Centaurea kernerana* Janka subsp. ***kernerana*** — $2n = 22$ (Fig. 5).

Bu: Central Balkan Mt, between the Kozyata Stena Mountain Hut and Ekho Mountain Hut, 1650 m, 42°38'N, 24°31'E, rocky places, 19 Aug 1995, *Sharkova Sh9537* (SOM).

Endemic to Bulgaria (Central Balkan Mt and Rila Mt).

This count is the first report for the species. The karyotype consists of $2n = 2x = 4m + 16 sm + 2 sm - SAT = 22$ chromosomes.

770. *Centaurea napulifera* Rochel subsp. ***nyssana*** (Petrovic) Dostal — $2n = 20$ (Figs. 6, 7) & $2n=40$ (Fig. 8).

Bu: Pirin Mt, above the Vihren Mountain Hut, 2200 m, 41°46'N, 23°25'E, subalpine grasslands, 7 Jul 1995, *Sharkova Sh9521* (SOM). (Fig. 6).

— Rila Mt, above the Sukhoto Ezero Lake, 1950 m, 42°10'N, 23°26'E, subalpine grasslands, 12 Jul 1995, *Sharkova Sh9524* (SOM). (Fig. 7).

— Slavyanka Mt, above the village of Paril, 1700 m, 41°25'N, 23°40'E, open places in the forest, 18 Jun 1995, *Sharkova Sh9514* (SOM). (Fig. 8).

Endemic to the Balkan Peninsula.

The chromosome number $2n = 20$ is in agreement with the reports given by Strid & Andersson (1985) from Mt Vitsi, Greece and by Kuzmanov & Georghieva (1987, 1990) as *Centaurea nyssana* from Mt Pirin. The karyotype of *Centaurea napulifera* subsp. *nyssana* from Mt Pirin with $2n = 2x = 4m + 12sm + 4sm - SAT = 20$ chromosomes, is different from the karyotype of the population of Mt Rila, which is also diploid but contains only two, the longest, m-SAT chromosomes.

The tetraploid chromosome number $2n = 4x = 40$ is reported here for the first time for this species.

771. *Centaurea stenolepis* A. Kerner subsp. ***stenolepis*** — $2n = 22$ (Fig. 9).

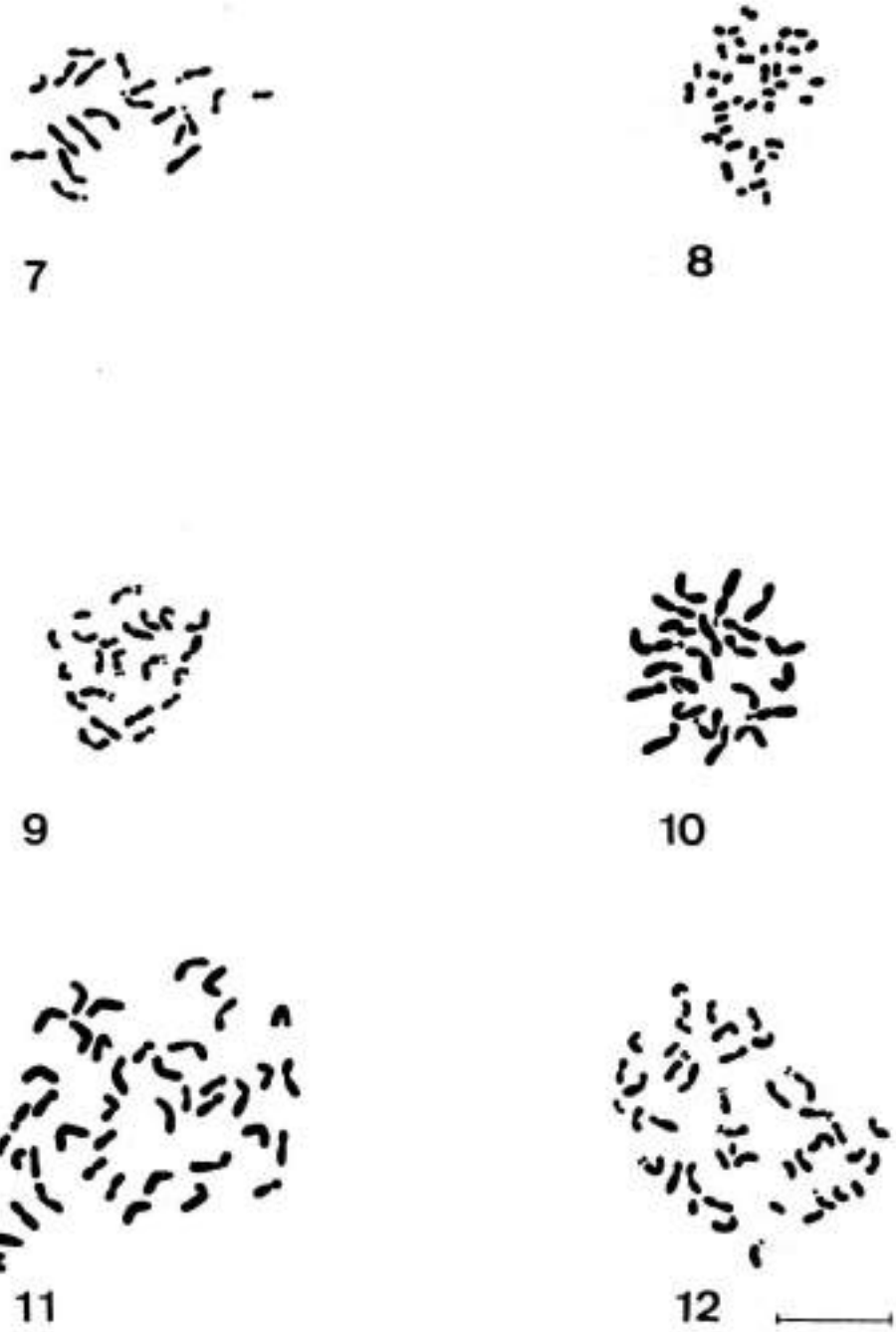
Bu: Pirin Mt, near the river of Glazne, above the town of Bansko, 1000 m, 41°50'N, 23°29'E, open places in the forest, 9 Aug 1995, *Sharkova & Denchev Sh9533* (SOM).

Endemic to Europe (Au, Bu, Cz, Gr, Hu, It, Yu, Rm, Ukraine).

The present count is in agreement with previous reports given by Guinochet & Foissac (1962) and Kuzmanov & Georghieva (1977, 1990).The karyotype consists of $2n = 2x = 2m + 16sm + 4sm - SAT=22$ chromosomes. A tetraploid chromosome number with $2n=44$ was reported by Lovric (1982) for *Centaurea stenolepis* subsp. *joannis* Kappot.

772. *Centaurea triumfettii* All. — $2n = 22$ (Fig. 10) & $2n = 44$ (Figs. 11, 12).

Bu: Central Balkan Mt, below Peak Kozyata Stena, 1700 m, 42°38'N, 24°34'E, rocky calcareous slopes, 18 Aug 1995, *Sharkova Sh9536* (SOM). (Fig. 10).



Figs. 7-12. Mitotic metaphase plates of: **7,** *Centaurea napulifera* subsp. *nyssana*, $2n = 20$; **8,** *C. napulifera* subsp. *nyssana*, $2n = 40$; **9,** *C. stenolepis* subsp. *stenolepis*, $2n=22$; **10,** *C. triumfetti*, $2n=22$; **11, 12,** *C. triumfetii*, $2n = 44$. - Scale bar = 10µm.

Bu: Strandzha Mt, Vitanovo Nature Reserve, above the village of Brashlyan, 450 m, 41°59'N, 27°27'E, dry, calcareous open places in the forest, 15 Jun 1995, *Sharkova & Denchev Sh9513* (SOM). (Fig. 11).

— Black Sea coast, the Otmanli locality, south of the town of Bourgas, 42°26'N, 27°33'E, dry open places in the forest, 17 Jun 1995, *Koeva Sh9515* (SOM). (Fig. 12).

Distributed in Europe, Asia Minor, Transcaucasia, Persia, Syria, Morocco.

This taxon has been previously studied by Baksay (1956, 1957), Siljak (1977), Kieft & Loon (1978) Monti & al (1978), Chichiricco & Tammaro (1980), Baltisberger & Huber (1987) and Pogan & al. (1989) with the corresponding result of $2n = 22$ chromosomes. Its karyotype includes $2n = 2x = 2m + 16sm + 4sm - SAT = 22$ chromosomes. However, other diploid chromosome numbers were also reported: $2n = 22 + 0 - 1$ (Damboldt & Matthäs 1975) and $2n = 20$ (Česhmedziev 1976).

Additionally, the tetraploid chromosome number $2n = 4x = 44$ counted here confirms earlier report (Lovric 1982).

References

Baksay, L. 1956: Cytotaxonomical studies on the flora of Hungary. — Ann. Hist. Nat. Mus. Nat. Hung., ser. 2, **7**: 321-334.

— 1957: The cytotaxonomy of the species *Chrysanthemum maximum* Ram, *Centaurea montana* L, etc. in Europe. — Ann. Hist. Nat Mus. Natn. Hung., ser. 2, **8**: 155-168.

Baltisberger, A. & Huber, 1987: Chromosome number report — Int. Organ. Pl. Biosyst. Newsletter (Zurich). **9:** 4-5.

Česhmedziev, I. 1976: Reports [In Löve, A. (ed.), IOPB chromosome number reports LIV]. — Taxon **25**: 642-643.

Chichiricco, G. & Tammaro, F. 1980: Numeri cromosomici per la Flora Italiana: 652-661. — Inorm. Bot. Ital. **11**: 307-313.

Damboldt, J. & Matthäs, U. 1975: Chromosomenzahlen einiger mediterraner und mitteleuropäischer *Centaurea* - Arten (*Asteraceae*). — Plant Syst. Evol. **123**: 107-115.

Dey, D. & Sharma, A. K. 1967: Chromosome studies in the genus *Centaurea* — Fol. Biol. Poisk. Acad. Nauk **15**: 191-207.

Fedorov, A. N. (ed.) 1969: Chromosome numbers of flowering plants. — Leningrad.

Goldblatt, P. 1981: Index to plant chromosome numbers for 1975-1978. — Monogr. Syst. Bot. Missouri Bot. Gard. **5**.

— 1984: Index to plant chromosome numbers for 1979-1981. — Monogr. Syst. Bot. Missouri Bot. Gard. **8**.

— 1985: Index to plant chromosome numbers for 1982-1983. — Monogr. Syst. Bot. Missouri Bot. Gard. **13**.

— 1988: Index to plant chromosome numbers for 1984-1985. — Monogr. Syst. Bot. Missouri Bot. Gard. **23**.

— & Johnson, D. E. 1990: Index to plant chromosome numbers for 1986-1987. — Monogr. Syst. Bot. Missouri Bot. Gard. **30**.

— & — 1991: Index to plant chromosome numbers for 1988-1989. — Monogr. Syst. Bot. Missouri Bot. Gard. **40.**

— & — 1994: Index to plant chromosome numbers for 1990-1991. — Monogr. Syst. Bot. Missouri Bot. Gard. **51.**

Guinochet, M. & Foissac, J. 1962: Sur les caryotypes de quelques espèces du genre *Centaurea* et leur signification taxonomique. — Rev. Cytol. et Biol. Vég. **25**: 373-390.

Kieft, B. & Loon, J. C. van 1978: Reports [In Löve, A. (ed.), IOPB chromosome number reports LXII]. — Taxon **27**: 519-535.
Kuzmanov, B. A. & Georghieva, S. B. 1977: Reports [In Löve, A. (ed.), IOPB chromosome number reports LVII]. — Taxon **26**: 448.
— & — 1987:— Reports [In Löve, A. (ed.), IOPB chromosome number reports XCIV]. — Taxon **36**: 284.
— & — 1990: Cytotaxonomy of Bulgarian *Centaurea* species. — Razpr. IV. Razr. Sazu **31**: 106-128.
— & Nikolova, V. A. 1986: — Chromosome numbers of Bulgarian flowering plants, fam. *Asteraceae*. — Fitologija (Sofia) **31**: 71-74.
Loon, J. C. van 1987: A Cytotaxonomical Atlas of the Balkan Flora. — Berlin & Stuttgart.
Lovric, A. Z. 1982: Reports [In Löve, A. (ed.), IOPB chromosome number reports LXXVII]. — Taxon **31**: 762-763.
Monti, G., Pagni, A. M. & Viegi, L. 1978: Numeri cromosomici per la Flora Italiana:416-422. — Inform. Bot. Ital. **10**: 101-110.
Moore, R. 1970: Index to Plant chromosome numbers for 1968. — Regnum Veg. **84**.
— 1977: Index to Plant chromosome numbers for 1973-1974. — Regnum Veg. **96**.
Ornduff, R. 1967: Index to Plant chromosome numbers for 1965 — Regnum Veg. **50**.
— 1969 Index to Plant chromosome numbers for 1967 — Regnum Veg. **59**.
Pogan, E., Jankin, A. & Weislo, H. 1989: Further studies in chromosome numbers of Polish angiosperms XXI. — Acta Biol. Cracov., ser. Bot. **30**: 119-136.
Siljak, C. 1977: Reports [In Löve, A. (ed.), IOPB chromosome number reports LVII]. — Taxon **26**: 447-448.
Strid, A., & Andersson, I. A. 1985: Chromosome number of Greek mountain plants. An annotated list of 115 species. — Bot. Jarb. Syst. **107**: 203-228.

Address of the author:
Svetlana T. Sharkova, St. Kliment Okhridski University of Sofia, Department of Botany, 8 Dragan Tsankov Str., BG-1421 Sofia, Bulgaria.

Reports (773-778) by Argyro Tiniakou

773. ***Gypsophila muralis*** L. — $2n = 34$.

Gr: Makedonia, Nomos Kavalas, Thasos island, Mt Ipsario, schist, 600 m, 40°43′N, 24°41′E, 9 Jul 1992, *Tiniakou 1873* (UPA).
— Makedonia, Nomos Kavalas, Mt Pangeo, S.-facing slopes of the summit, marbles and schist, 1700 m, 40°55′N, 24°08′E, 12 Jul 1992, *Tiniakou 2020* (UPA).
— Makedonia, Nomos Chalkidikis, between the villages of Megali Panagia and Plana, marbly-sandy substrate, 150 m, 40°22′N, 23°46′E, 13 Jul 1992, *Tiniakou 1994* (UPA).

Gypsophila muralis is a widespread species in the Euro-Siberian region. The chromosome number $2n = 34$ was reported from elsewhere (see Fedorov 1969, Löve & Löve 1974, Goldblatt 1981, 1984, Goldblatt & Johnson 1994, for references). The chromosome number $2n = 34$ counted here for the first time for Greece, agrees with all previous reports.

774. ***Moehringia pentandra*** Gay (= *Moehringia thasia* Stoj. & Kitanov) — $2n = 48$ (Fig. 1).

Gr: Makedonia, Nomos Kavalas, Thasos island, Mt Ipsario, summit area, micaceous schist and quarzite, 1100 m, 40°43′N, 24°39′E, 9 Jul 1992, *Tiniakou 1956* (UPA).

This Mediterranean species is rare and scattered in Greece. The chromosome number $2n = 48$ has previously been reported for Europe (see Fedorov 1969, Moore 1982, for references) and a karyotype has been given (Luque & Díaz Lifante 1991) from material collected in Spain. The same chromosome number $2n = 48$ and a karyotype (Fig. 1) are presented here for the first time for Greece. The karyotype is symmetrical, consisting of small (c. 1 to 2 µm), mostly metacentric (m) chromosomes.

775. ***Moehringia trinervia*** (L.) Clairv. — $2n = 24$.

Gr: Makedonia, Nomos Kavalas, Mt Pangeo, S.-facing slopes of the summit, marbles and schist, 1700 m, 40°55′N, 24°08′E, 12 Jul 1992, *Tiniakou 1992* (UPA).

— Makedonia, Nomos Chalkidikis, Mt Stratoniko, at the road between Stavros and Arnea, near the village of Varvara, granitic substrate, 710 m, 40°34′N, 23°42′E, 12 Jul 1992, *Tiniakou 1993* (UPA).

Moehringia trinervia is a widespread species in Europe, N. Africa and much of temperate Asia. The chromosome number $2n = 24$ is in agreement with counts cited in the literature for other countries (see Fedorov 1969, Löve & Löve 1974, Moore 1982, Goldblatt 1981, 1988, for references) and for Greece (Strid 1980).

776. ***Matthiola incana*** (L.) R. Br. subsp. ***incana*** (= *M. annua* (L.) Sweet, *M. fenestralis* (L.) R. Br.) — $2n = 14$ (Fig. 2).

Gr: Kiklades, Nomos Kikladon, Serifos island, Koutalas bay, 37°08′N, 24°27′E, 14 May 1993, *Tiniakou & al 2685* (UPA).

— Peloponnisos, Nomos Messinias, Methoni castle, 36°49′N, 21°42′E, 24 Jul 1994, *Tiniakou 2901* (UPA).

Distributed in S. and W. Europe, Cyprus, N. Africa, Arabia, is widely cultivated as an ornamental. The chromosome number $2n = 14$ has been reported for Europe (see Fedorov 1969, Moore 1982, for references) and for Greece (Darlington & Wylie 1955). The karyotype (Fig. 2) is symmetrical, consisting of 8 metacentric (m) and 6 submetacentric (sm) chromosomes, ranging from 1.5 to 4.2 µm in size.

777. ***Matthiola longipetala*** (Vent.) DC. subsp. ***pumilio*** (Sm.) P. W. Ball — $2n = 14$ (Fig. 3).

Gr: Dodekanisa, Nomos Dodekanisou, Rodos island, at cape Vagia, on the N. side, 36°23′N, 28°15′E, 7 Mar 1995, *Tiniakou 2925* (UPA).

— Dodekanisa, Nomos Dodekanisou, Rodos island, at the N. side of Afantou bay, 36°17′N, 28°11′E, 8 Mar 1995, *Tiniakou 2935* (UPA).

Figs. 1–4. Karyotypes of: **1**, *Moehringia pentandra*, $2n = 48$; **2**, *Matthiola incana*, $2n = 14$; **3**, *M. longipetala* subsp.*pumilio*, $2n = 14$; **4**, *M. sinuata*, $2n = 14$. - Scale bar = 10 µm.

Gr: Dodekanisa, Nomos Dodekanisou, Rodos island, cape Tsambika, 36°12′N, 28°09′E, 8 Mar 1995, *Tiniakou 2936* (UPA).

— Dodekanisa, Nomos Dodekanisou, Rodos island, at the beach of Gennadion, 36°02′N, 27°55′E, 8 Mar 1995, *Tiniakou 2953* (UPA).

Distributed in Eastern Mediterranean region (Gr, An) and N. Africa. The chromosome number $2n = 14$ as well as the karyotype (Fig. 3) of this subspecies are given here for the first time. The chromosome number $2n = 14$ is a common diploid number in this genus and the same number has been reported for *M. longipetala* s.l. as well as for subsp. *bicornis* from many countries (see Darlington & Wylie 1955, Fedorov 1969, Goldblatt 1981, 1984, 1985, Goldblatt & Johnson 1990, 1991, for references). The karyotype of subsp. *pumilio* examined here is symmetrical and consists of 6 metacentric (m), 6 submetacentric (sm) and 2 acrocentric (st) chromosomes, c. 1.8 to 4.5 µm in size. Two of the m-chromosomes bear small satellites on their short arms.

778. *Matthiola sinuata* (L.) R. Br. s.l. — $2n = 14$ (Fig. 4).

Gr: Sterea Ellas, Nomos Evvias, Evvia island, ad promontorium Ochthonia, in arenosis maritimis, 38°31′N, 24°13′E, 8 Aug 1992, *Phitos & Kamari 23062* (UPA).
— Sterea Ellas, Nomos Attikis, Cape Sounion, 37°39′N, 24°02′E, 25 Apr 1994, *Tiniakou 2820* (UPA).
— Peloponnisos, Nomos Messinias, on the dunes of Voidokilias bay near Pilos, 36°58′N, 21°42′E, 25 Nov 1995, *Tiniakou 2908* (UPA).

Distributed in the coasts of S. and W. Europe, Cyprus and N. Africa. The same chromosome number $2n = 14$ has been reported for Europe (see Fedorov 1969, for references) and also for Greece (Damboldt 1968, Montmollin 1986) and a karyotype has been given by Romano & al. (1994) from Italy. The chromosome number $2n = 28$ is also reported by Ball (1993). The karyotype (Fig. 4) examined here is symmetrical, consisting of 8 metacentric (m) and 6 submetacentric (sm) chromosomes, ranging from c. 1.8 to 4 µm in size.

References

Ball, P. W. 1993: *Matthiola* R. Br. — In Tutin, T. G., Heywood, V. H., Burges, N. A., Valentine, D. H., Walters, S. M. & Webb, D. A. (ed.). — Flora Europaea **1**: 340-341.
Damboldt, J. 1968: Reports. [In Löve, A. (ed.), IOPB chromosome number reports XVI]. — Taxon **17**: 96.
Darlington, C. D. & Wylie, A. 1955: Chromosome atlas of flowering plants. — London.
Fedorov, A. N. (ed.) 1969: Chromosome numbers of flowering plants. — Leningrad.
Goldblatt, P. 1981: Index to plant chromosome numbers for 1975-1978. — Monogr. Syst. Bot. Missouri Bot. Gard. **5**.
— 1984: Index to plant chromosome numbers for 1979-1981. — Monogr. Syst. Bot. Missouri Bot. Gard. **8**.
— 1985: Index to plant chromosome numbers for 1982-1983. — Monogr. Syst. Bot. Missouri Bot. Gard. **13**.
— 1988: Index to plant chromosome numbers for 1984-1985. — Monogr. Syst. Bot. Missouri Bot. Gard. **23**.
— & Johnson, D. E. 1990: Index to plant chromosome numbers for 1986-1987. — Monogr. Syst. Bot. Missouri Bot. Gard. **30**.
— & — 1991: Index to plant chromosome numbers for 1988-1989. — Monogr. Syst. Bot. Missouri Bot. Gard. **40**.
— & — 1994: Index to plant chromosome numbers for 1990-1991. — Monogr. Syst. Bot. Missouri Bot. Gard. **51**.

Löve, Á. & Löve, D. 1974: Cytotaxonomical atlas of the Slovenian flora. — Lehre.
Laque, T. & Díaz Lifante, Z. 1991: Chromosome numbers of plants collected during Iter Mediterraneum I in the SE of Spain. — Bocconea **1**: 310, 330.
Montmollin, B. de 1986: Etude cytotaxonomique de la flore de la Crète. III. Nombres chromosomiques. — Candollea **41**: 433.
Moore, D. M. 1982: Flora Europaea. Check-list and Chromosome Atlas. — Cambridge.
Romano, S., Ottonello, D. & Marcenò, C. 1994: Numeri cromosomici per la Flora Italiana: 1302-1313. — Inform. Bot. Ital. **26**: 201, 203.
Strid, A. 1980: Reports. [In Löve, Á.(ed.), IOPB chromosome number reports LXIX]. — Taxon **29**: 709.

Address of the author:
Dr Argyro Tiniakou, Botanical Institute, University of Patras, GR-26500 Patras, Greece.