Mediterranean chromosome number reports — 8

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

Abstract

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This is the eighth 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 126 taxa: *Scirpus* from Italy, by L. Pignotti & G. Fiorini (Nos. 899-904); *Ammi, Angelica, Berula, Bunium, Bupleurum, Chaerophyllum, Crithmum, Daucus, Echinophora, Ferula, Ferulago, Geocaryum, Gongylosciadium, Heptaptera, Johrenia, Katapsuxis, Lagoecia, Lecokia, Opopanax, Scaligeria, Thapsia* and *Torilis* from Turkey, by M. G. Pimenov, T. V. Alexeeva & E. V. Kljuykov (Nos. 905-935); *Aetheorhiza* and *Reichardia* from Spain and Portugal, by J. A. Mejías (Nos. 936-940); *Agrostis, Avenula, Bromus, Calamagrostis, Cynodon, Deschampsia, Dianthus, Festuca, Holcus, Koeleria, Lychnis, Phleum, Scleranthus, Silene, Spiraea* and *Sporobolus* from Bulgaria, by A. Petrova & K. Stoyanova (Nos. 941-960); *Asplenium, Dryopteris, Notholaena, Phyllitis, Polypodium* and *Polystichum* from Bulgaria, by D. Ivanova (Nos. 961-967); *Alyssum* from Turkey, by M. Ančev, N. Orcan & V. Goranova (Nos. 968-969); *Centaurea* from Bulgaria, by S. T. Bancheva (Nos. 970-976); *Antirrhinum, Biscutella, Caralluma, Echium, Erodium, Fumana, Lathyrus, Pseudoscabiosa, Scabiosa, Sideritis* and *Teucrium* from Spain, by M. Boscaiu, J. Riera, E. Estrelles & J. Güemes (Nos. 977-991); *Crepis* from Bulgaria, by D. Dimitrova (Nos. 992-993); *Genista* from Spain and Portugal, by T. Cusma Velari, L. Feoli Chiapella & C. Cristin (Nos. 994-995); *Genista* from Morocco, by T. Cusma Velari, L. Feoli Chiapella & L. Mangiavacchi (No. 996); *Colchicum* from Turkey, by L. Şik & O. Küçüker (Nos. 997-1000); *Allium, Anthriscus, Carum, Centaurea, Crepis, Gladiolus, Leucojum* from Greece, by E. P. Bareka, T. Constantinidis & G. Kamari (Nos. 1001-1008); *Alopecurus, Anisantha, Bromus, Elytrigia, Eremopoa, Eremopyrum, Milium, Polypogon, Sclerochloa, Tragus* and *Vulpia* from Caucasia, by A. Goukasian & E. Nazarova (Nos. 1009-1025).

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Reports (899-904) by Lia Pignotti & Graziana Fiorini

899. ***Scirpus lacustris*** L. subsp. ***lacustris*** — $2n = 38, 40$ (Figs. 1a-4c).

It: Padule di Fucecchio (PT - Tuscany), Porto delle Morette, 43°48'N, 10°49'E, 14 m, 25 May 1995, *Pignotti, Fiorini, Nardi & Turrini* (cult. Hort. Bot. Firenze n. NA4402).

S. lacustris subsp. *lacustris* is distributed in Europe, Siberia, Western Asia, Africa (Schultze-Motel 1967).

The somatic chromosome number of this taxon was hitherto unknown from Italy. Mitotic metaphases have been directly investigated on the root tips of plants collected in the field. The material examined reveals either the presence of 2 large sized chromosomes ("L") and 36 smaller sized chromosomes ("s") (diploid number of 38 = 36s+2L), or the presence of 1 large chromosome and 39 smaller sized chromosomes (diploid number of 40 = 39s+1L).

The large chromosomes are 2.16-2.67 µm long, while the small chromosomes are 0.67-1.5 µm long. The larger chromosomes have been considered "compound chromosomes" by Tanaka (1937) and Otzen (1962). This hypothesis accounts for the different numbers here observed.

These numbers partly agree with the countings found in literature: $n = 21$ (Håkansson 1928): Sweden; $n = 19$, $2n = 38$, $2n = 40$ (Tanaka 1937, 1938, 1939, 1940): Japan; $n = 21$ Otzen (1962): Holland; $2n = 42$ (Skalinska & al. 1966): Poland; $2n = 42$ (Löve & Kjellqvist 1973): Spain; $2n = 80$ (Sharma 1970): India; $n = 20$ (Mehra & Sachdeva 1975): Himalaya.

900. ***Scirpus lacustris*** L. subsp. ***tabernaemontani*** (Gmel) Syme — $2n = 40, 42$ (Figs. 5a-6c).

It: Macchia Lucchese-Torre del Lago (Tuscany), 43°49'N, 10°16'E, 1 m, 25 May 1995, *Pignotti, Fiorini, Nardi & Turrini* (cult. Hort. Bot. Firenze n. NA4442).

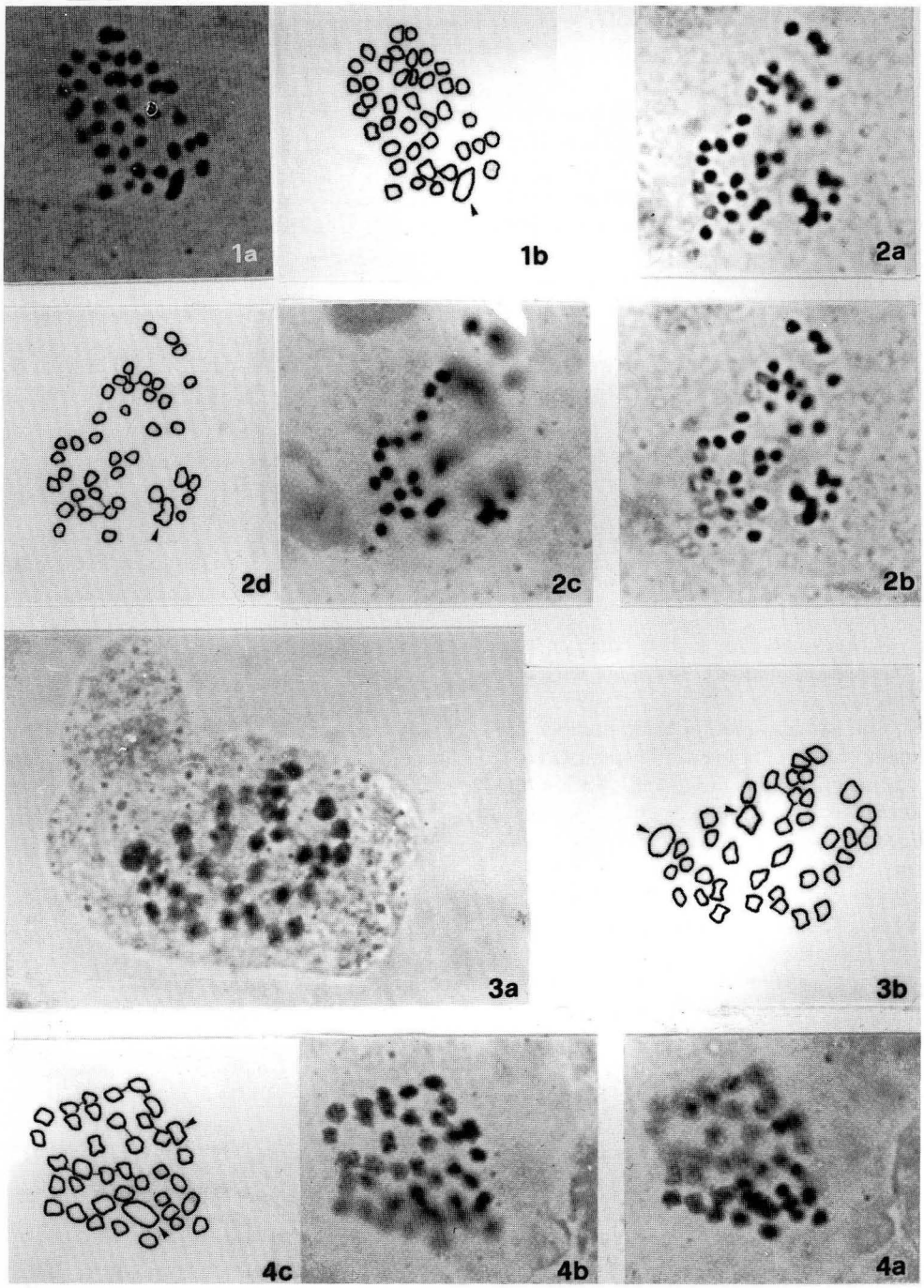
Scirpus lacustris subsp. *tabernaemontani* is distributed in Central and Southern Europe, Siberia, Kamtschatka, Western Asia, Africa (Schultze-Motel 1967).

The somatic chromosome number of this taxon was hitherto unknown from Italy. Mitotic metaphases have been directly investigated on the root tips of plants collected in the field.

The material examined reveals either the presence of one large chromosome ("L") and 39 smaller sized chromosomes ("s") (diploid number of 40 = 39s+1L), or 42 small sized chromosomes (diploid number of 42 = 42s).

The large chromosome is 2 µm long, while the small chromosomes are 0.67-1.67 µm long. The large chromosome is apparently analogous to the large chromosomes pointed out in the previous taxon, its presence or absence accounting for the observed variation in the diploid number (Tanaka 1938).

The counts found in literature are: $n = 21$ (Håkansson 1928): Sweden; $2n = 42$ (Tanaka 1938, 1939, 1940): Japan; $2n = 76, 77$ (Tarnavschi 1948): Rumania; $2n = 42$ (Vachova 1976): Slovakia; $2n = 42$ (Arohonka 1982): Finland; $2n = 42$ (Kozhevnikov & al. 1986): Eastern Russia; $2n = 42$ (Stoeva 1987) Bulgaria; $2n = 42$ (Hoshino & al. 1993): China.



Figs 1-4. Mitotic metaphase plates of *S. lacustris* subsp. *lacustris*: **1-2**, $2n = 40$; **3-4**, $2n = 38$. Arrow heads show the large size chromosomes (L). — Scale bar = 10 μm.

901. *Scirpus litoralis* Schrad. — $2n = 78$ (Figs. 7a, b).

It: Mazara del Vallo (Sicily), mouth of the Arena river, 37°38'N, 12°36'E, 0 m, 7 Jul 1995, *Pignotti, Nardi & Pasta* (FI) *s.n.*

Scirpus litoralis is widespread in palaeotropical and palaeosubtropical zones, while it gets sporadic in Southern Europe (Balkan region, Italy, Southern France) (Schultze-Motel 1967).

The somatic chromosome number of this taxon was hitherto unknown from Italy. Mitotic metaphases have been directly investigated on the root tips of plants collected in the field. The chromosomes evenly range from 0.83 to 1.5 µm in length.

The counts found in literature are: $2n = 36$ (Baquar 1969): Pakistan; $2n = 10$ (Sarkar & al. 1976): India; $n = 40$ (Njalingappa & al. 1978): India; $n = 39, 42$ (Bir & al. 1991): India.

902. *Scirpus holoschoenus* L. — $2n = 70$ (Figs. 8a-8d).

It: Stagno, along the road SS. 555 near the crossroad to SS. 1 Aurelia (Tuscany), 43°36'N, 10°22'E, 3 m, 8 Jun 1995, *Pignotti, Fiorini, & Turrini* (cult. Hort. Bot. Firenze n. NA4407).

S. holoschoenus is distributed in Europe, Western Siberia, Caucaso, Arabia, Persia, Afghanistan, Punjab, Northern Africa (except Sahara), Canary Islands (Schultze-Motel 1967).

The somatic chromosome number $2n = 70$ was hitherto unknown from Italy. Mitotic metaphases have been investigated on the root tips of plants collected in the field and cultivated in the Botanical Garden of Florence. The material examined reveals the presence of two larger chromosomes ("L") and 68 small sized chromosomes ("s") (68s+2L). The larger chromosomes are 1.67-2.33 µm long, while the small chromosomes are 0.67-1.5 µm long.

The counts found in literature are: $2n =$ c. 42 (Bhattacharya & al. 1971): Lybia; $2n =$ c. 84 sub *Scirpoides holoschoenus* (L.) Sojak (Ferakova & Murin 1978): Slovakia; $2n = 168$ sub *Holoschoenus vulgaris* Link (Löve & Löve 1982): Italy; $2n = 26, 128$ sub *Holoschoenus vulgaris* Link (Stoeva 1992): Bulgaria.

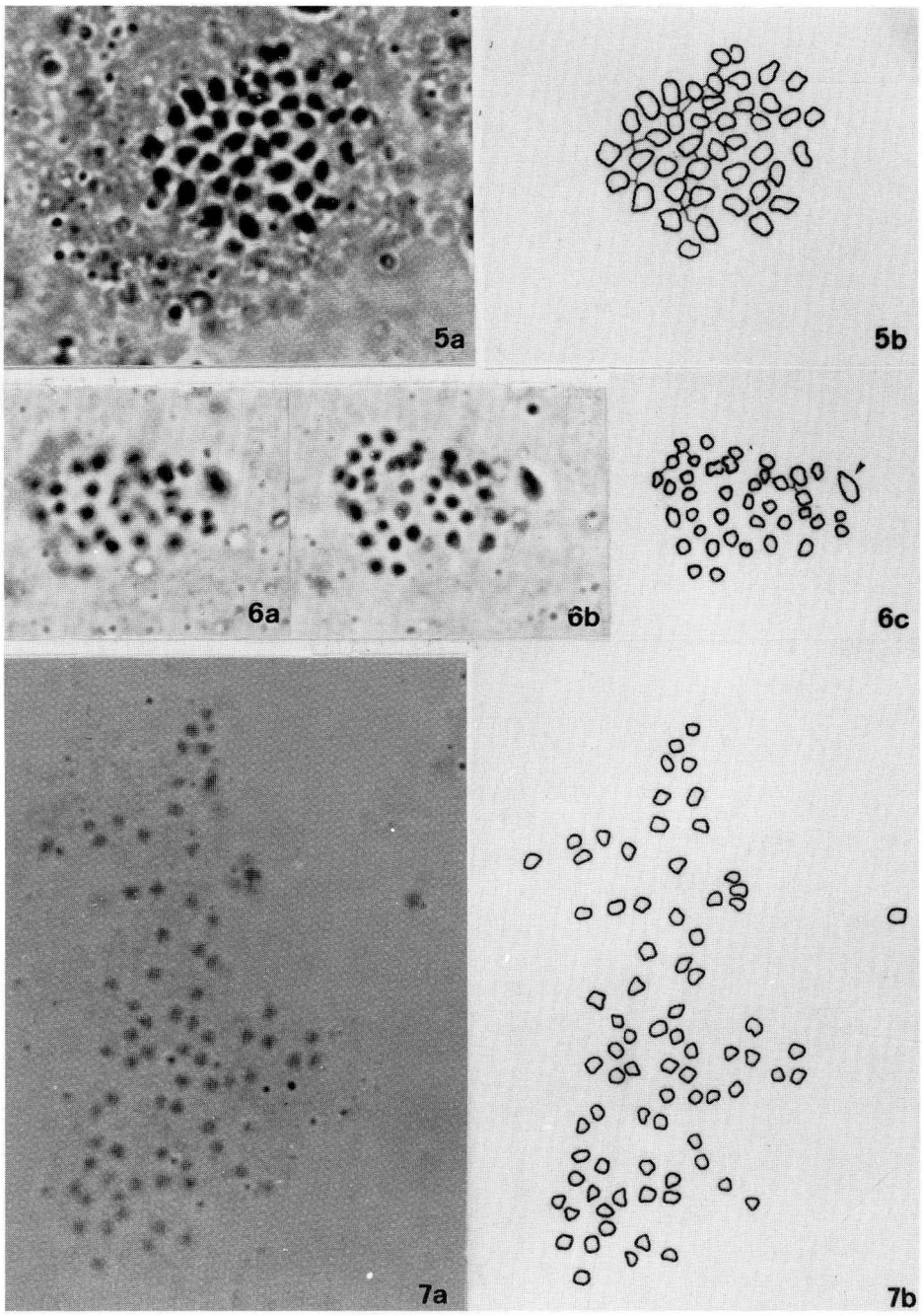
903. *Scirpus cernuus* Vahl — $2n = 31, 37, 60$ (Figs. 9a-11b).

Si: Near San Martino delle Scale (PA - Sicily), 38°5'N, 13°14'E, 725 m, 7 Jul 1995, *Pignotti, Nardi & Pasta* (FI) *s.n.*

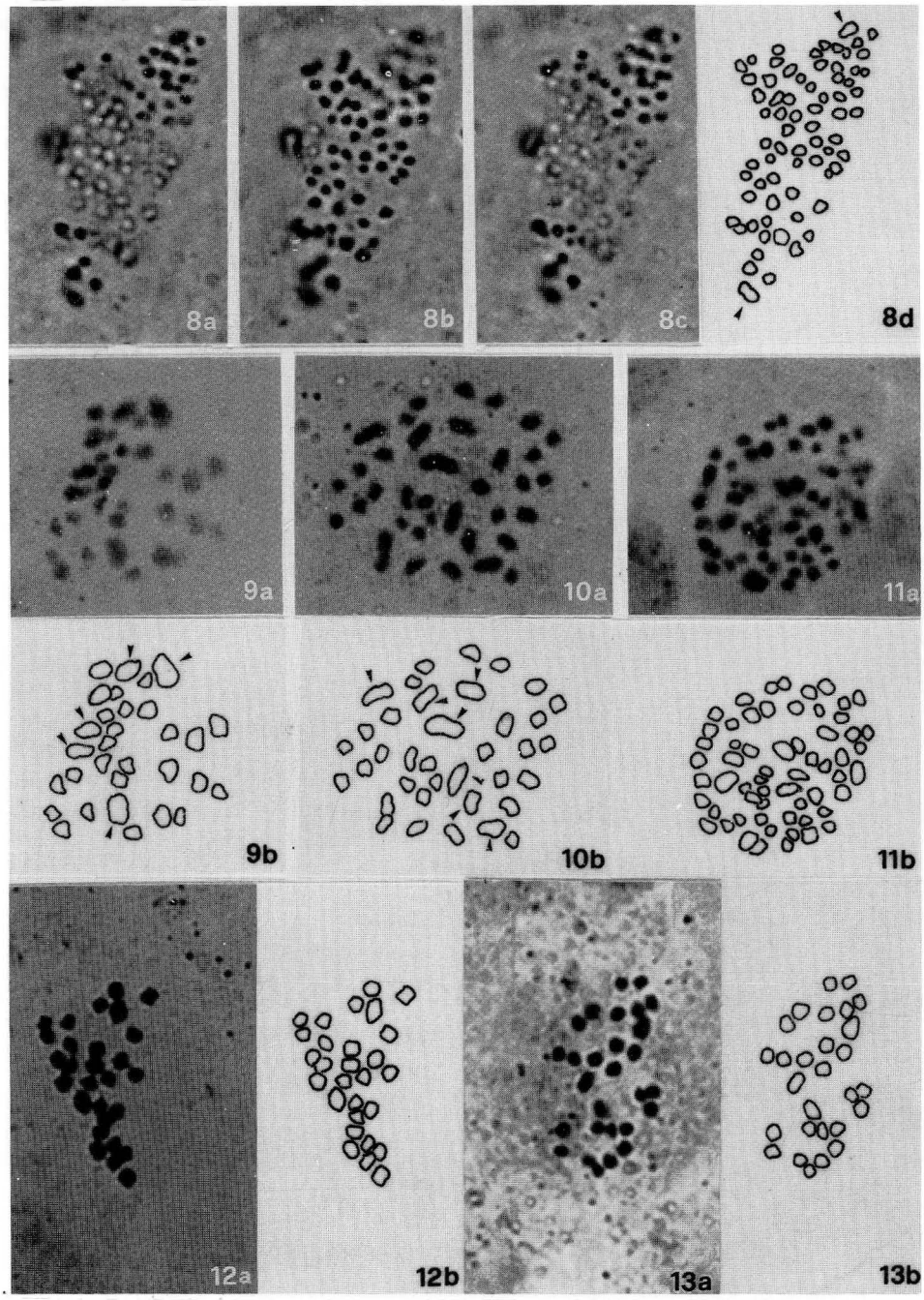
It: Santa Brigida (FI - Tuscany), pathway to Monte Rotondo, 43°51'N, 11°24'E, 425 m, 11 Sep 1995, *Pignotti L. & Pignotti N.* (FI) *s.n.*

— Monte Leoni (GR - Tuscany), road to the top of the mountain, 42°54'N, 11°11'E, 460 m, 23 Sep 1995, *Pignotti L. & Selvi F.* (FI) *s.n.*

S. cernuus is distributed in atlantic and mediterranean Europe (Northwards to S. W. Scotland), Northern, Eastern and Southern Africa, Australia, New Zealand, America (Schultze-Motel 1967).



Figs 5-7. Mitotic metaphase plates of: **5-6,** *S. lacustris* subsp. *tabernaemontani* **5**, $2n = 42$; **6**, $2n = 40$; and **7,** *S . litoralis*, $2n = 78$. Arrow head shows the large size chromosome (L). — Scale bar = 10 μm.



Figs 8-13. Mitotic metaphase plates of: **8,** *S. holoschoenus,* $2n = 70$; **9,** *S. cernuus* from San Martino delle Scale, $2n = 31$; **10,** Santa Brigida, $2n = 37$; **11,** Monte Leoni, $2n = 60$ and **12-13,** *S. setaceus,* $2n = 28$. Arrow heads show the large size chromosomes (L). — Scale bar = 10 μm.

The somatic chromosome number of this species was hitherto unknown from Italy. Mitotic metaphases have been directly investigated on the root tips of plants collected in the field. The examined populations show different somatic chromosome numbers: $2n = 31$ from San Martino delle Scale, $2n = 37$ from Santa Brigida and $2n = 60$ from Monte Leoni.

The plates from San Martino delle Scale reveal the presence of five large chromosomes ("L") and 26 smaller size chromosomes ("s") (diploid number of 31 = 26s+5L). The large chromosomes are 2-2.5 µm long, while the small chromosomes are 0.67-1.83 µm long.

The plates from Santa Brigida reveal the presence of seven large chromosomes and 30 smaller size chromosomes (diploid number of 37 = 30s+7L). The large chromosomes are 1.67-2.33 µm long, while the small chromosomes are 0.67-1.5 µm long.

The plates from Monte Leoni show 60 small sized chromosomes (diploid number of 60 = 60s) which evenly range from 0.83 to 1.5 µm in length.

The counts found in literature are with: $n = 30$ (Taylor & Mulligan 1968): from Pojar (1973)in material from Canada.

904. *Scirpus setaceus* L. — $2n = 28$ (Figs. 12a-13b).

It: Saltino, near Vallombrosa (Tuscany), at "Vignale" in a small swamp, 43°44'N, 11°32'E, 875 m, 21 Jul 1996, *Pignotti & Arcara* (FI) *s.n.*

S. setaceus is present in most of Europe (absent in the North-East, sporadic to absent southwards in Italy), Azores, Madera, Northern, Eastern and Southern Africa, Siberia, Western and Central Asia, Northern India, China, Australia and North America (Schultze-Motel 1967, De Filipps 1980).

The chromosome number of this taxon was hitherto unknown from Italy. Mitotic metaphases have been investigated on the root tips of plants collected in the field and cultivated in the Botanical Garden of Florence.

The material examined shows 28 chromosomes, evenly ranging from 1.31 to 1.91 µm in length. The numbers given in literature are: $2n = 26$ (Håkansson 1928): Sweden; $2n = 26$ (Scheerer 1940): Northern Germany; $n = 13$, $2n = 26$ (Davies 1956a, 1956b): Great Britain; $n = 14$ (Mehra & Sachdeva 1975): Himalaya; $2n = 56$ (Hedberg & Hedberg 1977): Northern Africa; $2n = 28$ (Micieta 1986): Slovakia; $n = 14$, $2n = 28$ (Galland 1988): Morocco.

Acknowledgements

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Reports (905-935) by M. G. Pimenov, T. V. Alexeeva & E. V. Kljuykov

905. *Ammi majus* L. — $2n = 22$ (Fig. 1).

Tu: C5 Adana, Mediterranean coast, Ceyhan delta, near Karataş, 36°34'N, 35°24'E, 17 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, s.n.*

A. majus is a widespread Mediterranean weed and a popular medicinal plant.

The chromosome number determinations were made for the species at least 25 times (but never from Turkey) with the same result - $n = 11$ or $2n = 22$; karyotype was described three times (Sharma 1970, Hore 1980, Hamal & al. 1986).

906. *Angelica purpurascens* (Lallem.) Gilli — $2n = 22$ (Fig. 2).

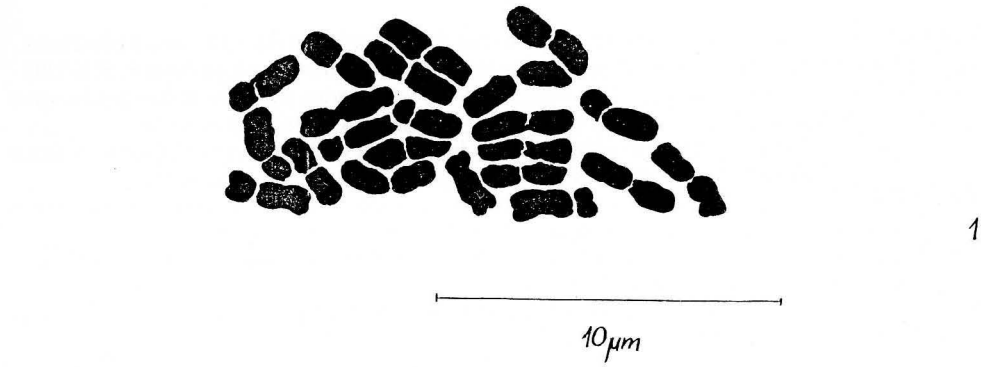
Tu: C5 Içel, Toros Dağlari, near Arslanköy, 37°08'N, 34°16'E, 20 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-148* (MW).

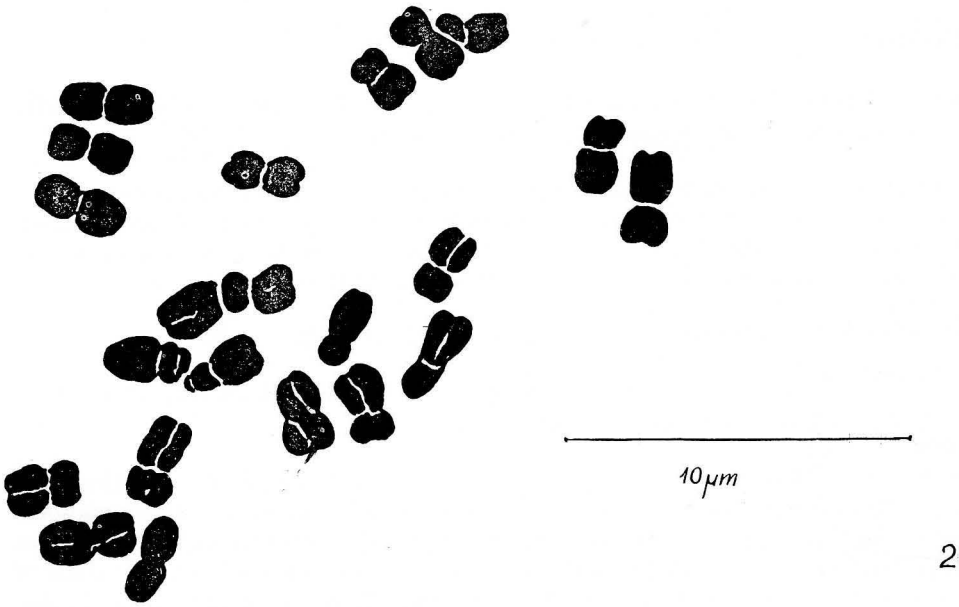
The Toros populations of *A. purpurascens* (*Xanthogalum purpurascens* Lallem.) are rather critical being slightly different from Caucasian ones. However, our chromosome number determination corresponds to three previous from Georgia and North Caucasus (Vasil'eva & al. 1981a, Vasil'eva & Pimenov 1991, Alexeeva & al. 1994). The count of $2n = 22$ is the most usual in *Angelica* in total, especially outside East Asia and Pacific region.

907. *Berula erecta* (Huds.) Coville — $2n = 18$ (Fig. 3).

Tu: C2 Muğla, near Köyçeğyz, lake shore, Liquidambar forest, 36°57'N, 28°41'E, 120 m, 23 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-279* (MW).

The species demonstrates variability in chromosome numbers. The most usual number is $2n = 18$ (11 determinations), meanwhile $n = 6$ (Bell & Constance 1957) and $2n = 20$ (Lovkvist 1963, Retina & Pimenov 1977) are rarer. Our new deternination, first for Turkey, corresponds to the majority of previous ones.





Figs. 1-2. **1**, *Ammi majus*, $2n = 22$; **2**, *Angelica purpurascens*, $2n = 22$.

908. *Bunium fallax* Freyn et Bornm. — $n = 10$ (Fig. 4).

Tu: B8 Erzurum, Bozburun between Aşkale and Kop Geç., 40°03'N, 40°30'E, 10 Jul 1994, *M. G. Pimenov & E. V. Kljuykov, s.n.*

This species was not adopted in *Flora of Turkey* (Hedge & Lamond 1972), being regarded as a synonym of *B. mircocarpum* (Boiss.) Freyn et Sint. ex Freyn. Both species

were cultivated in Botanical garden of Moscow University and showed a difference in shape of upper leaf blade and in number of fruit secretory ducts.

The chromosome number has been determined for the first time. The count of $2n = 20$ is most usual in the western half of Bunium area (Vasil'eva & al. 1985).

909. *Bunium microcarpum* (Boiss.) Freyn et Sint. ex Freyn — $n = 10$ (Fig. 5).

Tu: A9 Çoruh, Yalnizçam Dağlari, W. slope near Yalnizçam Geç., 41°06'N, 42°07'E, 7 Jul 1994, *M. G. Pimenov & E. V. Kljuykov, T94-227* (MW).

The determination confirms our previous investigations of this species, Ukrainian (Crimea) and Armenian populations of which have also $2n = 20$ (Vasil'eva & al. 1985).

910. *Bunium pinnatifolium* Kljuykov — $2n = 22$ (Fig. 6).

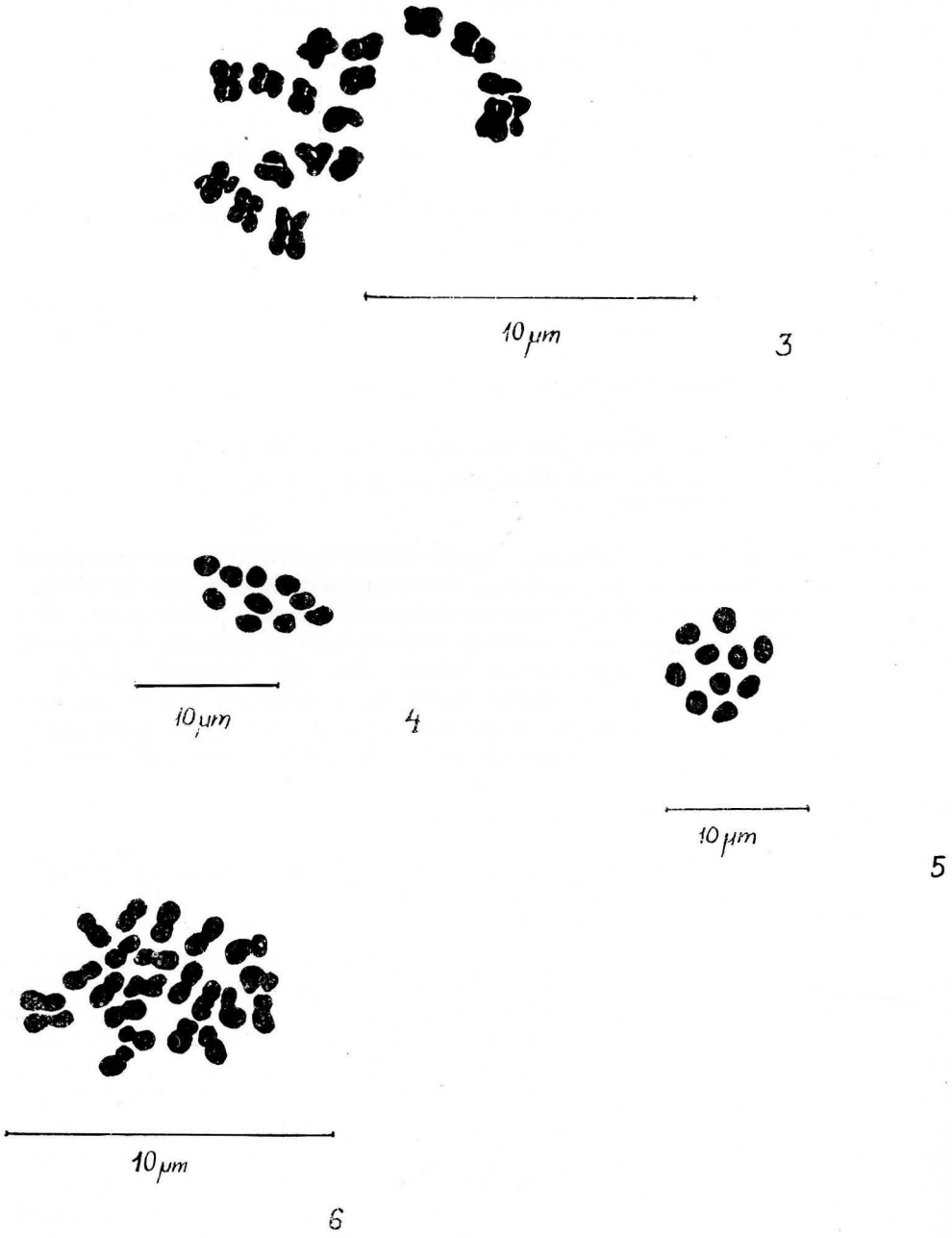
Tu: C1 Izmir, between Ephesus and Mariamane (Virgin Mary's house) 37°55'N, 27°20'E, 650 m, 27 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-75*, 15 Aug 1996, ejusd., *T96-28* (MW).

Recently described species (Pimenov & al. 1998); the material for cytological investigation was collected in type population. The chromosome number $2n = 22$ is rather rare in *Bunium*; the species with this count are distributed in eastern part of generic area (a group of *B. setaceum* (Schrenk) H. Wolff: *B. badachschanicum* Kamelin, *B. setaceum*, *B. angreni* Korovin). This number is known also for "western" species - *B. bulbocastanum* L. and *B. alpinum* Waldst. et Kit., but in both cases side by side with $2n = 20$. However, *B. paucifolium* DC., a species, supposedly regarded as a relative of *B. pinnatifolium*, has a different chromosome number ($2n = 20$, Vasil'eva & al. 1985).

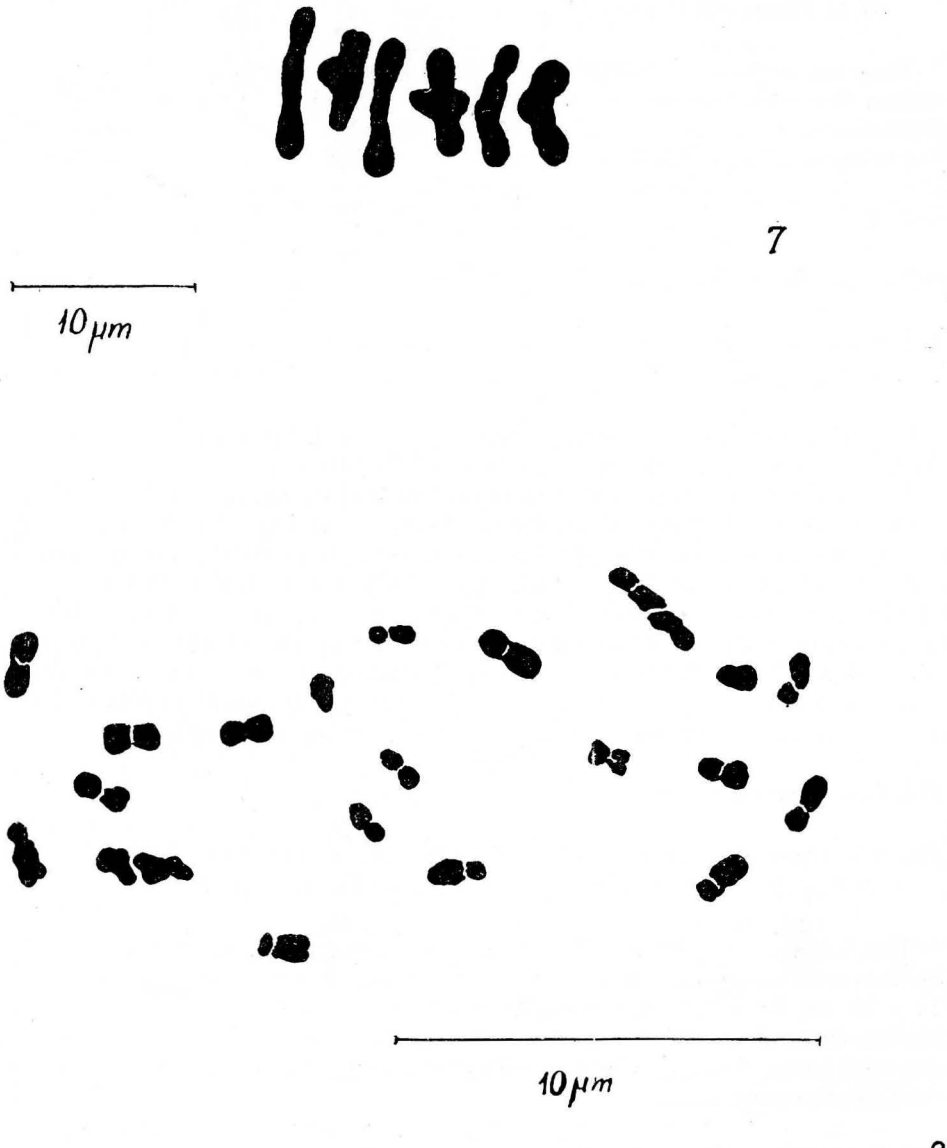
911. *Bupleurum exaltatum* Bieb. — $n = 6$ (Fig. 7).

Tu: C5 Içel, Toros Dağlari, near Arslanköy, 37°08'N, 34°16'E, 2300 m, 20 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-211* (MW).

We referred to *B. exaltatum* the Toros populations of narrow-leaved perennial *Bupleurum*, regarded in *Flora of Turkey* (Davis 1972) as *B. falcatum* L. subsp. *cernuum* (Ten.) Arcangeli, due to the absence of differences from Caucasian, Iranian, and Middle-Asiatic material. Being very polymorphic species (Rechinger & Riedl 1963, Pimenov 1983, etc.) in its vegetative morphology, *B. exaltatum* forms also a few chromosome races with unclear geographical localisation (Daushkevich & al. 1993). A race with $2n = 16$ ($n = 8$) is known from Nepal (Cauwet-Marc 1978), Greece (Strid & Franzen 1981), Georgia, Ukraine (Daushkevich & al. 1993), and N. E. Turkey (Pimenov & al. 1996). The latter showed infrapopulational chromosomal variability: besides $n = 8$ the plants with 1-2 B-chromosomes and with $n = 9$ were found. The plants with $n = 6$ were found in Iran (Küpfer 1980), Uzbekistan and Tadzhikistan (Daushkevich & al. 1993); now additionally the same count has been determined for a Turkish population of Toros Mts. There is also a race with $n = 7$, distributed in Kazakhstan (Vasil'eva & al. 1981b) and Tadzhikistan (Daushkevich & al. 1993).



Figs. 3-6. **3**, *Berula erecta*, $2n = 18$; **4**, *Bunium fallax*, $n = 10$; **5**, *B. microcarpum*, $n = 10$; **6**, *B. pinnatifolium*, $2n = 22$.



Figs. 7-8. **7,** *Bupleurum exaltatum*, $n = 6$; **8**, *Chaerophyllum temulum*, $2n = 22$.

912. *Chaerophyllum temulum* L. — $2n = 22$ (Fig. 8).

Tu: C5 Içel, Toros Dağlari, near Arslanköy, 37°08'N, 34°16'E, 1800 m, 20 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-146* (MW).

There are at least 22 determinations of chromosome numbers in the species from various European countries, showing moderate variability. The number of $2n = 14$ predominates, and $n = 11$ (or $2n = 22$) was determined four times, once (from the Netherlands) together with $2n = 14$ (Gadella & Kliphuis 1967). $n = 11$ was showed for the plants from Germany (Wulff 1939), Ukraine (Kord'um 1967), and Spain (Silvestre 1978). Once $2n = 24$ was also reported (from Bulgaria: Peev 1977).

913. *Crithmum maritimum* L. — $n = 10$ (Fig. 9).

Tu: C5 Adana, Mediterranean coast, Ceyhan delta, near Karataş, 36°34'N, 35°24'E, 17 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-48* (MW).

C. maritimum is a species, widely distributed on sea shores in Europe, N. Africa, and W. Asia, from Black and Mediterranean seas to N. E. Atlantic.

There are at least 15 determinations of the chromosome numbers in this species; two numbers - $2n = 20$ and $2n = 22$ are known, the former being predominant, especially in recent publications: from Portugal (Malheiros-Garde & Garde 1950, 1951, Queiros 1974, Dalgaard 1986a), France (Vazart 1960, Cauwet 1968, Delay 1969a), Italy (Villa 1978), Georgia (Vasil'eva & al. 1993), Great Britain (Al-Bermani & al. 1993). $2n = 22$ was determined by Wanscher (1932; origin unknown), Tamamschjan (1933; origin unknown), and by Borgen (1970, from Canary Ils.) $n = 10$ could be regarded as a result of aneuploid reduction; the regularity in distribution of two cytotypes is presently unclear. Our new determination corresponds to the usual race, distributed in adjacent countries.

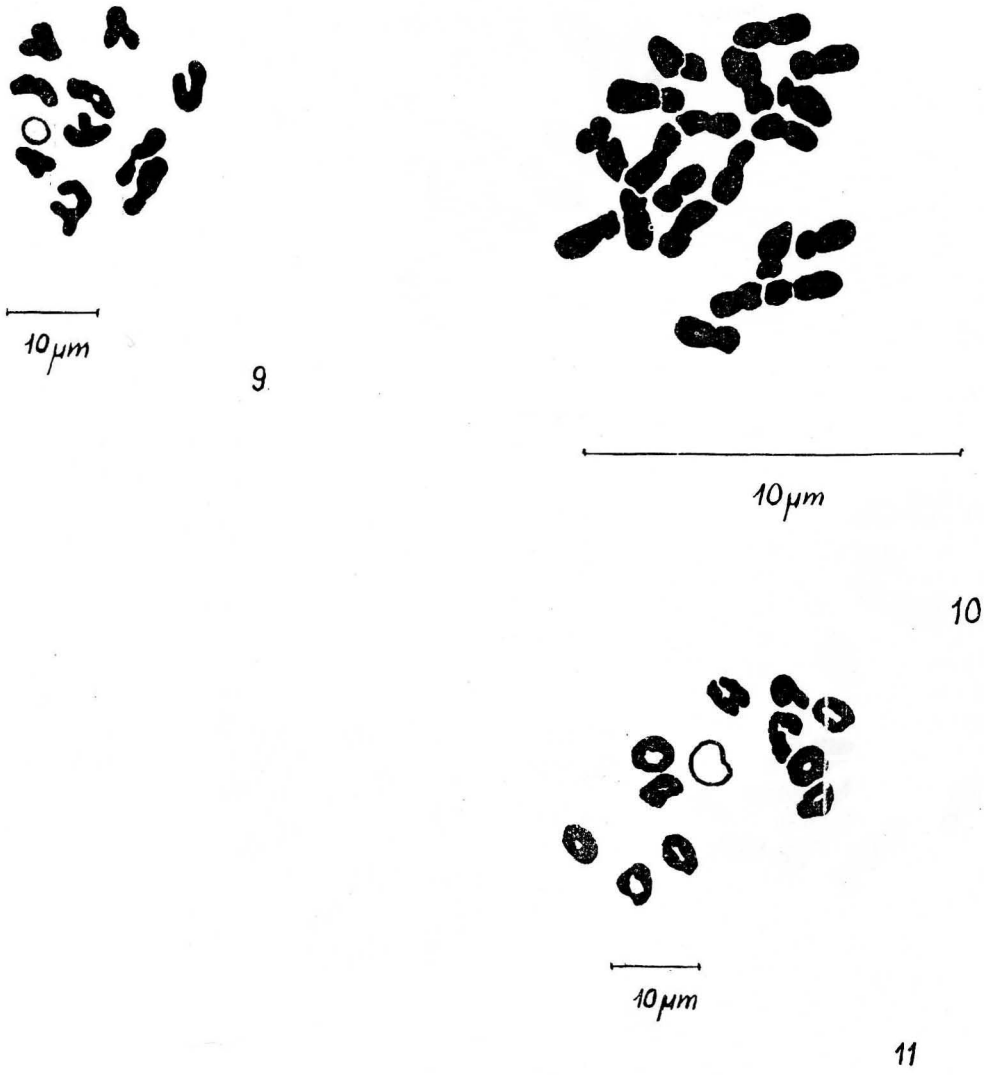
914. *Daucus involucratus* Smith — $2n = 20$ (Fig. 10).

Tu: C5 Adana, Mediterranean coast, Ceyhan delta, near Karataş, 36°34'N, 35°24'E, 17 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-60* (MW).

This is second determination for the species, not corresponding to previous counting by Engstrand (1970), who showed $2n = 22$ for a population from Greece. The numbers $2n = 20$ and $2n = 22$ both are not rare in *Daucus*. For instance, some other annual Mediterranean species - *D. duriea* Lange, *D. guttatus* Smith, and *D. bicolor* Smith, have also both counts. Other species group, including biennial *D. carota* L., has $2n = 18$ as main chromosome number.

915. *Echinophora sibthorpiana* Gussone — $n = 11$ (Fig. 11).

Tu: B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, along roadside, 38°25'N, 27°26'E, 300 m, 14 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-26* (MW).



Figs. 9-11. **9**, *Crithmum maritimum*, $n = 10$; **10**, *Daucus involucratus*, $2n = 20$; **11**, *Echinophora sibthorpiana*, $n = 11$.

There are rather scanty and controversial data about chromosome numbers in *Echinophora*. Two species were studied, and $2n \sim 64$ (Wancher 1933) or $n = 32$ (Rashid 1974), as well as $n = 30$ (Cauwet 1968) were reported for *E. spinosa* L., meanwhile $2n = 22$ was determined for *E. tenuifolia* L. from Italy (Brullo & al. 1991). Our determination confirms the last count. *E. sibthorpiana* is a taxon, not rarely being regarded as an eastern subspecies of *E. tenuifolia*, or even as conspecific with the latter.

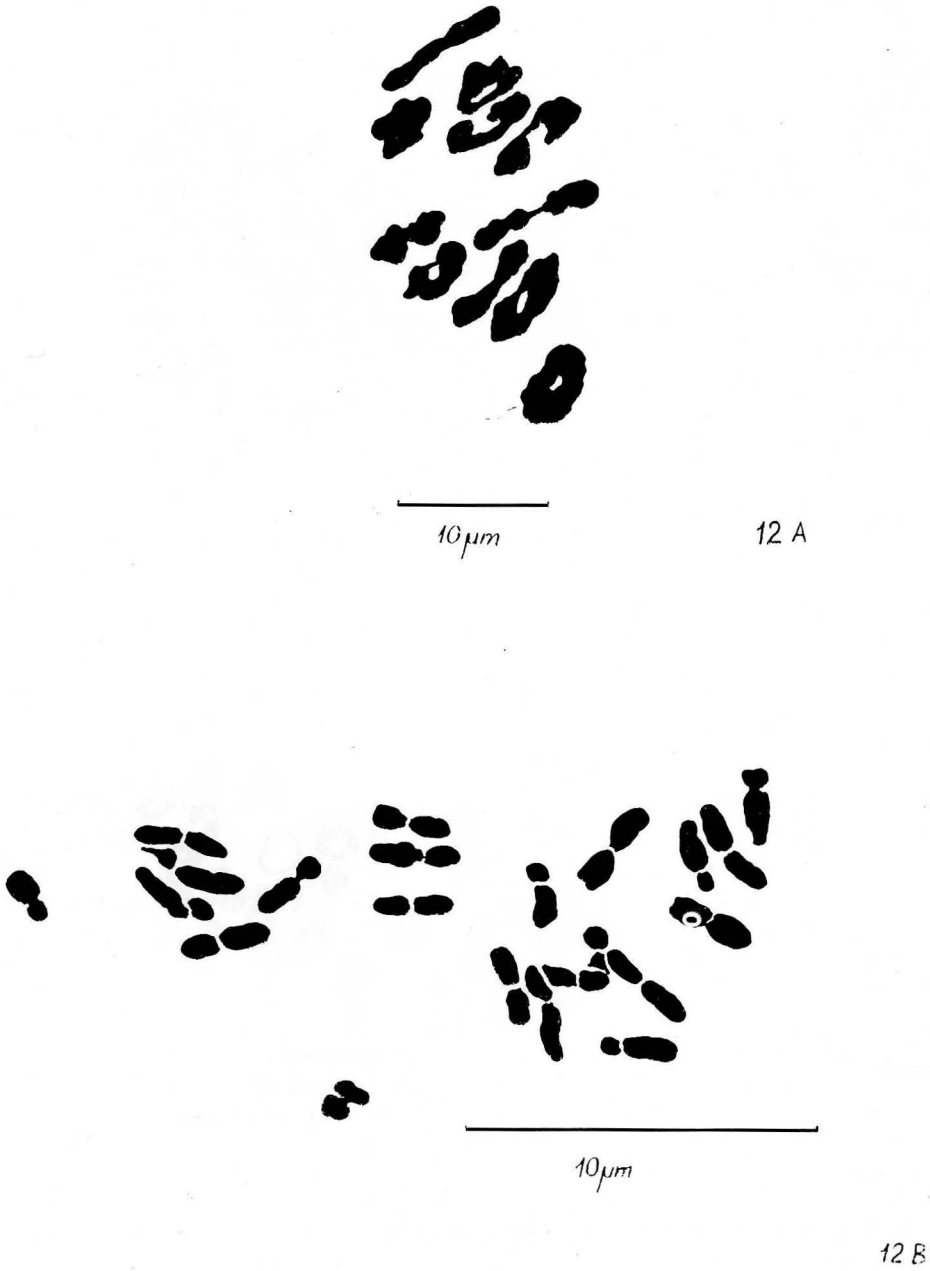


Fig. 12. *Ferula communis*, **A**, $n = 11$; **B**, $2n = 22$.

916. ***Ferula communis*** L. — $n = 11$, $2n = 22$ (Fig. 12A, B).

Tu: C1 Izmir, between Ephesus and Mariamane (Virgin Mary's house), 37°55'N, 27°20'E, 650 m, 27 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-67* (MW).

The chromosome numbers in *F. communis* subsp. *communis* have been reported at least 17 times showing homogeneity ($2n = 22$) of species ($2n = 22, 23$ by Dalhren & al. 1971 is not an exception). The populations from France, Italy, Greece, Spain, Portugal, and Morocco have been investigated. The karyotype of *F. communis* has been described four times (Cauwet-Marc 1981, Solov'eva & al. 1982, Aparicio & Garcia Martin 1986, Elalaoui-Faris & Cauwet-Marc 1989). Our determination is the first from Turkey, an eastern border of species area, and it does not differ from all previous ones.

917. ***Ferula drudeana*** Korovin — $2n = 22$ (Fig. 13).

Tu: C5 Içel, Toros Dağlari, near Arslanköy, 37°08'N, 34°16'E, 1800 m, 20 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-236* (MW).

The chromosome number of the species has been determined for the first time. It corresponds to $2n = 22$ showed for 76 *Ferula* species studied previously. The only exception (*F. lancerottensis* Parl.: $2n = 18$; Borgen 1980) is to be confirmed.

918. ***Ferula tingitana*** L. — $n = 11$ (Fig. 14).

Tu: C1 Izmir, near Kuşadasi, national park of Dilek Peninsula, Samsundağ, 37°40'N, 27°13'E, 250 m, 25 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-61* (MW).

This is second determination of chromosome number for *F. tingitana,* made near its eastern area border. It confirms the data by Aparicio & Garcia Martin (1986) who studied a population from Spain.

919. ***Ferulago asparagifolia*** Boiss. — $n = 11$ (Fig. 15).

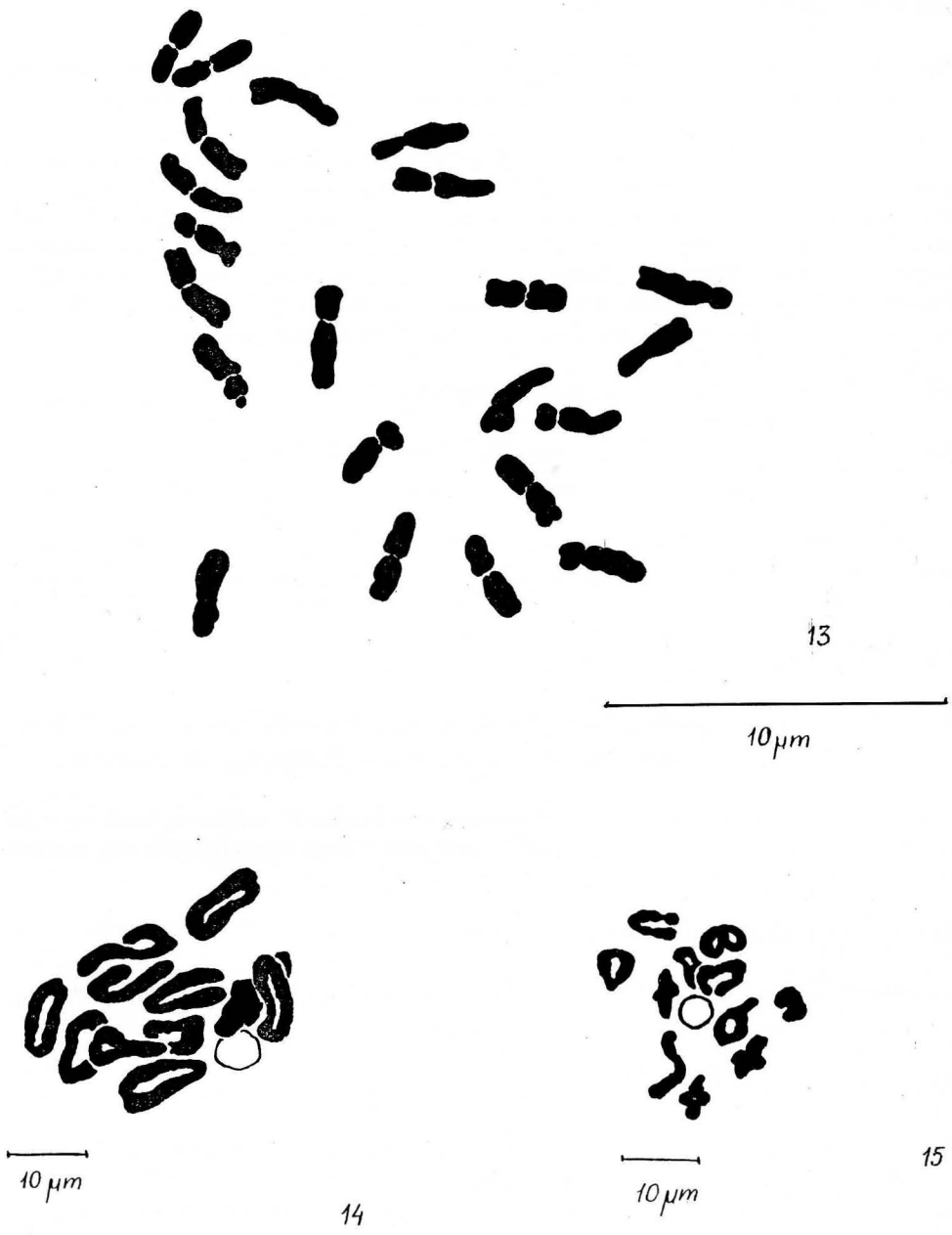
Tu: B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 700 m, 28 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-91* (MW).

920. ***Ferulago aucheri*** Boiss. — $n = 11$ (Fig. 16).

Tu: B1 Manisa, Spildağ (Mt. Sipylus), 38°34'N, 27°23'E, 800 m, 24 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-33* (MW).

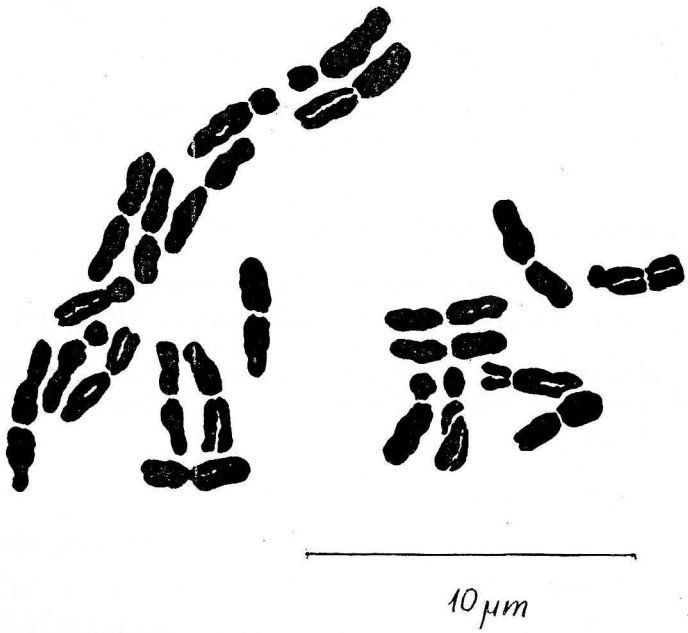
— B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 650 m, 28 May 1996, *M. G. Pimenov & E. V. Kljuykov, T95-99* (MW).

The chromosome numbers for these two species have been determined for the first time. They correspond to the majority of chromosome data for other species of *Ferulago* studied.



Figs. 13-15. **13**, *Ferula drudeana*, $2n = 22$; **14**, *F. tingitana*, $n = 11$; **15**, *Ferulago asparagifolia*, $n = 11$.

16



17

Figs. 16-17. **16**, *Ferulago aucheri*, $n = 11$; **17**, *F. humilis*, $2n = 22$.

921. *Ferulago humilis* Boiss. — $2n = 22$ (Fig. 17).

Tu: B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 600 m, 14 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-25* (MW).

This is second determination of chromosome number for Turkish endemic *F. humilis*. It does not confirm previous A. Strid's (1987) determination ($n = 22$) which characterized the species as tetraploid. The polyploid variability is known for *F. galbanifera* (Miller) W. D. J. Koch (*F. campestris* (Besser) Grecescu) being diploid in East Europe (Kord'um 1967, Rostovtzeva 1982, Tomkovich 1982) and tetraploid in Italy (Colombo & al. 1983).

922. *Ferulago pachyloba* Boiss. — $n = 11$ (Fig. 18).

Tu: C5 Içel, Toros Dağlari, near Çamliyayla, on the cliffs, 37°09'N, 34°36'E, 1700 m, 18-19 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-85* (MW).

The species is a narrow endemic of the mountains of S. Turkey (vilajets Içel and Niğde).

The chromosome number has never been determined before. Our result corresponds to chromosome numbers, being predominate in the genus *Ferulago*.

923. *Geocaryum macrocarpum* (Boiss. et Spruner) Engstrand — $n = 10$ (Fig. 19).

Tu: B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 1200 m, 28 May 1996, *M. G. Pimenov & E. V. Kljuykov, T95-283* (MW).

The chromosome number for the species has been determined for the first time, but it corresponds to the data by Engstand (1973) and Strid & Andersson (1985) for closely related *G. capillifolium* (Gussone) Cosson.

924. *Gongylosciadium falcarioides* (H. Wolff) Rech. f. — $n = 11$ (Fig. 20).

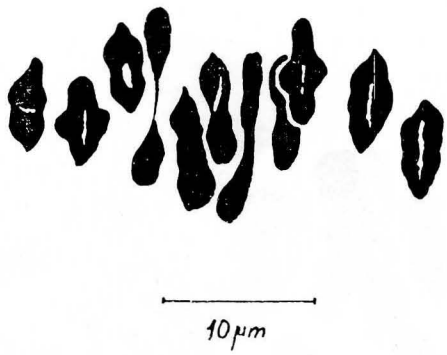
Tu: C2 Muğla, near Koyçeğyz, lake shore, margin of the Liquidambar forest, 36°57'N, 28°41'E, 120 m, 23 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-283* (MW).

This is second chromosome number determination for the species, corresponding to our previous data (Pimenov & al. 1996). The present material was collected near the western border of species area.

925. *Heptaptera cilicica* (Boiss. et Bal.) Tutin — $2n = 22$ (Fig. 21).

Tu: C5 Adana, Mediterranean coast, Ceyhan delta, near Karataş, 36°34'N, 35°24'E, 17 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-63* (MW).

Rare species endemic for vilajets Adana and Içel. The chromosome number has been determined for *H. cilicica* for the first time, but it corresponds to the previous determinations made for *H. anisoptera* (DC.) Tutin (Herrnstadt & Heyn 1971, Pimenov & Vasil'eva 1983) and *H. triquetra* (Vent.) Tutin (Česchmedjiev 1976).



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19

20

Figs. 18-20. **18**, *Ferulago pachyloba*, $n = 11$; **19**, *Geocaryum macrocarpum*, $n = 10$; **20**, *Gongylosciadium falcarioides*, $n = 11$.

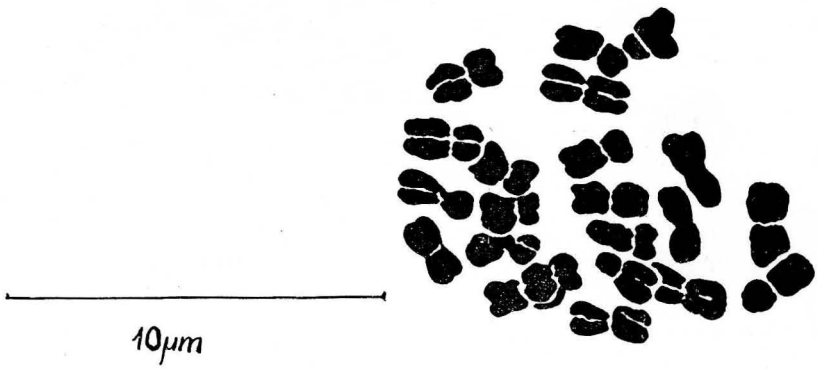
926. *Johrenia dichotoma* DC. — $2n = 22$ (Fig. 22).

Tu: C5 Içel, Toros Dağlari, near Çamliyayla, 37°09'N, 34°36'E, 1700 m, 18 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-72* (MW).

Johrenia is a small genus poorly investigated in its cytology. There is only a determination of chromosome number for *J. paucijuga* (DC.) Bornm. ($2n = 22$; Vasil'eva & al. 1981a). *J. dichotoma* has been studied for the first time, showing the same count that was known for *J. paucijuga*.

10µm

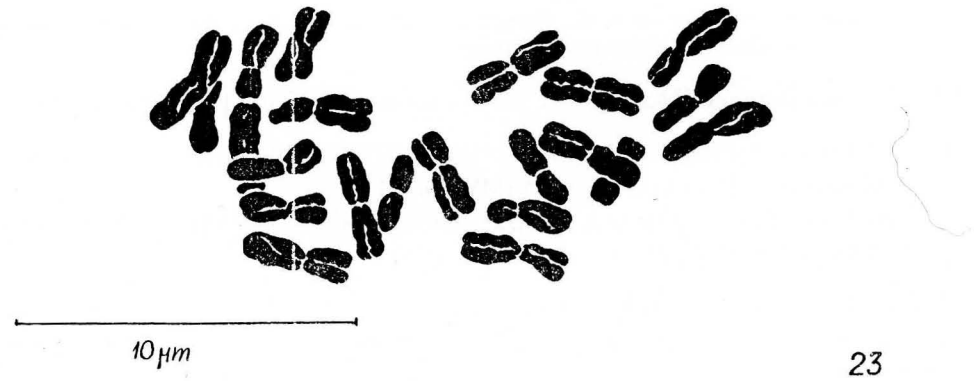
21

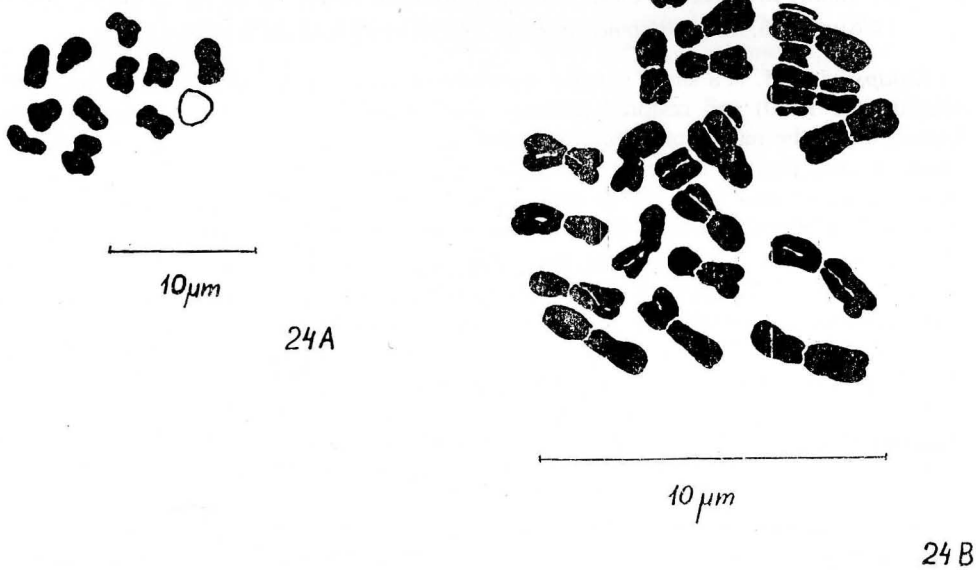


10µm

22

Figs. 21-22. **21**, *Heptaptera cilicica*, $2n = 22$; **22**, *Johrenia dichotoma*, $2n = 22$.





Figs. 23-24. **23**, *Johrenia selinoides*, $2n = 22$; **24**, *J. tortuosa*, **A**, $n = 11$; **B**, $2n = 22$.

927. *Johrenia selinoides* Boiss. et Bal. ex Boiss. — $2n = 22$ (Fig. 23).

Tu: C5 Içel, Toros Dağlari, foothills, near Çamlidere, 36°50'N, 34°32'E, 400 m, 22 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-250* (MW).

A rare species endemic for S. W. Turkey (vilajets Antalya, Içel, Adana). Chromosome number has been determined for the first time.

928. ***Johrenia tortuosa*** (Fisch. et C. A. Mey.) Chamberlain — n=11, $2n$=22(Fig. 24A, B).

Tu: B1 Manisa, Spildağ (Mt. Sipylus), 38°34'N, 27°23'E, 800 m, 24 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-35* (MW) (n = 11).
— B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 650 m, 14 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, s.n.* ($2n$ = 22).

This is a first determination of chromosome number for *J. tortuosa*. It corresponds to other data for *Johrenia* (in total four species were investigated with those published here), which could be characterized as a strong diploid genus with x = 11.

929. ***Katapsuxis silaifolia*** (Jacq.) Raf. var. ***orientalis*** (Boiss.) Reduron & al. (*Cnidium silaifolium* Jacq.) — n = 11, $2n$ = 22 (Fig. 25A, B).

Tu: B1 Manisa, Spildağ (Mt. Sipylus), 38°34'N, 27°23'E, 800 m, 24 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-46* (MW) (n = 11).
— B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 500 m, 14 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T95-12* (MW) ($2n$ = 22).

Katapsuxis Raf. is a small generic segregate of *Cnidium* described as early as 1840-s (Rafinesque 1840) and restored recently (Reduron & al. 1997). *K. silaifolia* is more known under the names of *Cnidium silaifolium* (Jacq.) Simonkai or *Selinum silaifolium* (Jacq.) Leute. There are four determinations of chromosome numbers of the species from Austria, Greece and Bulgaria, as well as based on cultivated plants (Leute 1970, Sz.-Borsos 1971, Strid & Franzen 1981, Češchmedjiev 1983), all showing n = 11 or $2n$ = 22. Our determination confirms these data. The population studied by us belongs to var. *orientalis* (Boiss.) Reduron & al. (*Cnidium orientale* Boiss., *C. silaifolium* var. *orientale* (Boiss.) Halacsy, *C. silaifolium* subsp. *orientale* (Boiss.) Tutin).

930. ***Lagoecia cuminoides*** L. — $2n$ = 16 (Fig. 26).

Tu: B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 550 m, 14 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-5* (MW).

Our determination confirms the previous made on the basis of plants from Palestine (Tamamschjan 1933), Greece (Engstrand 1970, Baltisberger 1991b), Iraq (Constance & al. 1976), Jordan (Al-Eisawi 1989), and Spain (Diosdado & al. 1993).

931. ***Lecokia cretica*** (Lam.) DC. — $2n$ = 22 (Fig. 27).

Tu: C5 Içel, Toros Dağlari, near Çamliyayla, 37°09'N, 34°36'E, 1800 m, 18 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, T96-95* (MW).

This is a third determination for the species, confirming two previous ones - from Crete (Contandriopoulos & Zaffran 1969) and Azerbaidzhan (Vasil'eva & al. 1981a).

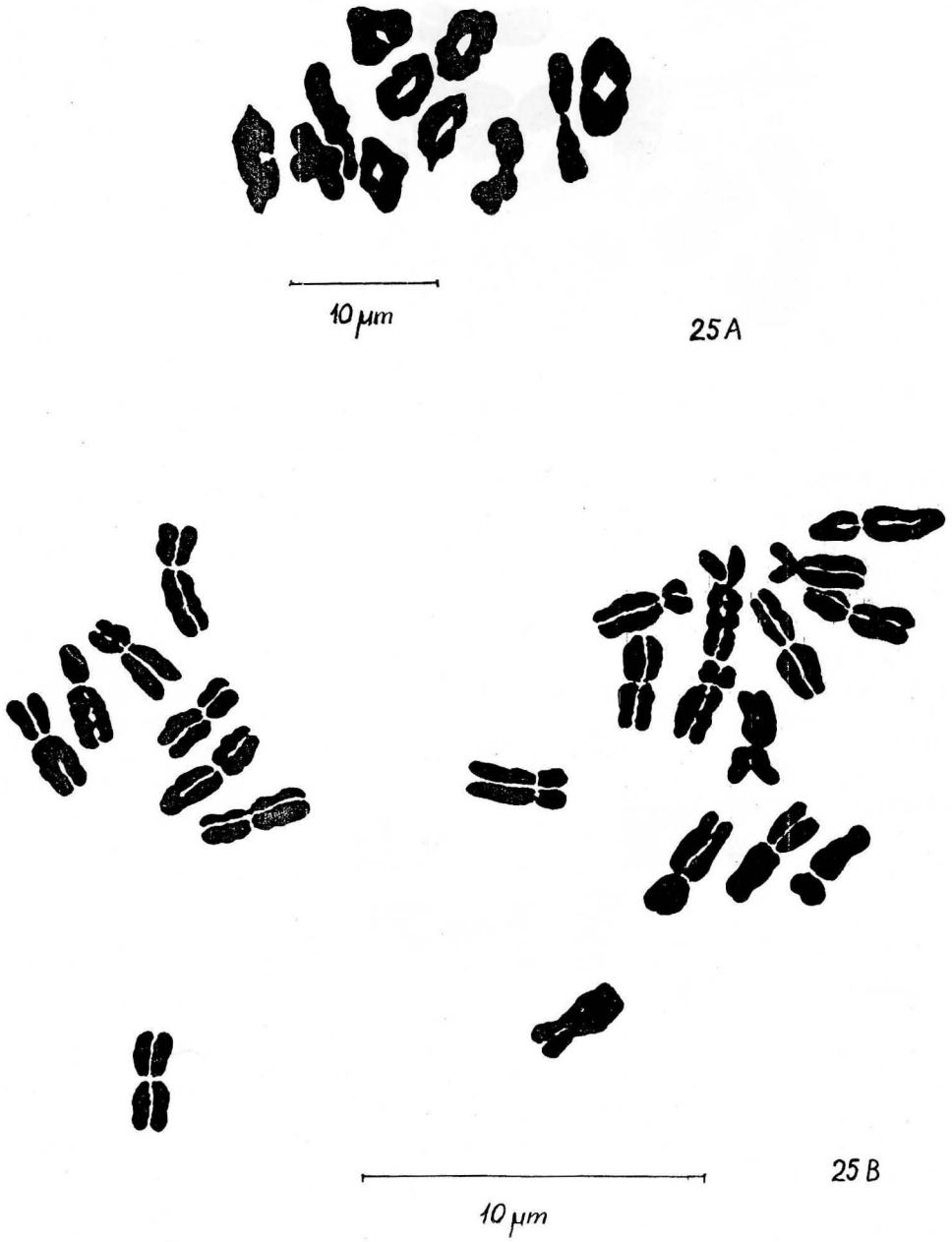
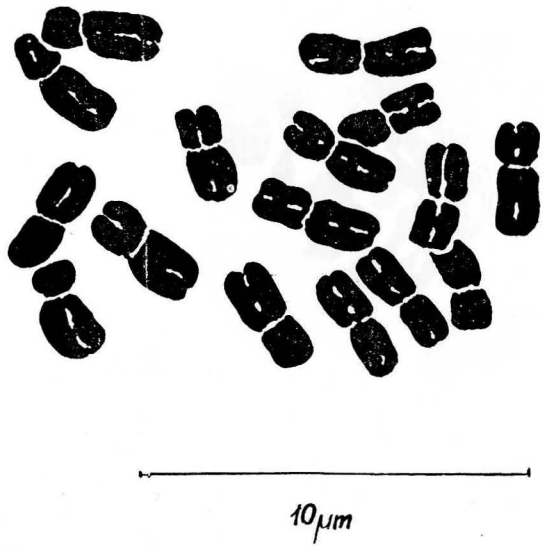
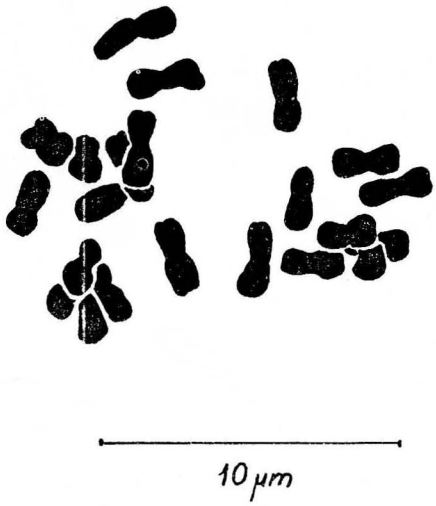


Fig. 25. *Katapsuxis silaifolia*, **A**, $n = 11$; **B**, $2n = 22$.





Figs. 26-27. **26**, *Lagoecia cuminoides*, $2n = 16$; **27**, *Lecokia cretica*, $2n = 22$.

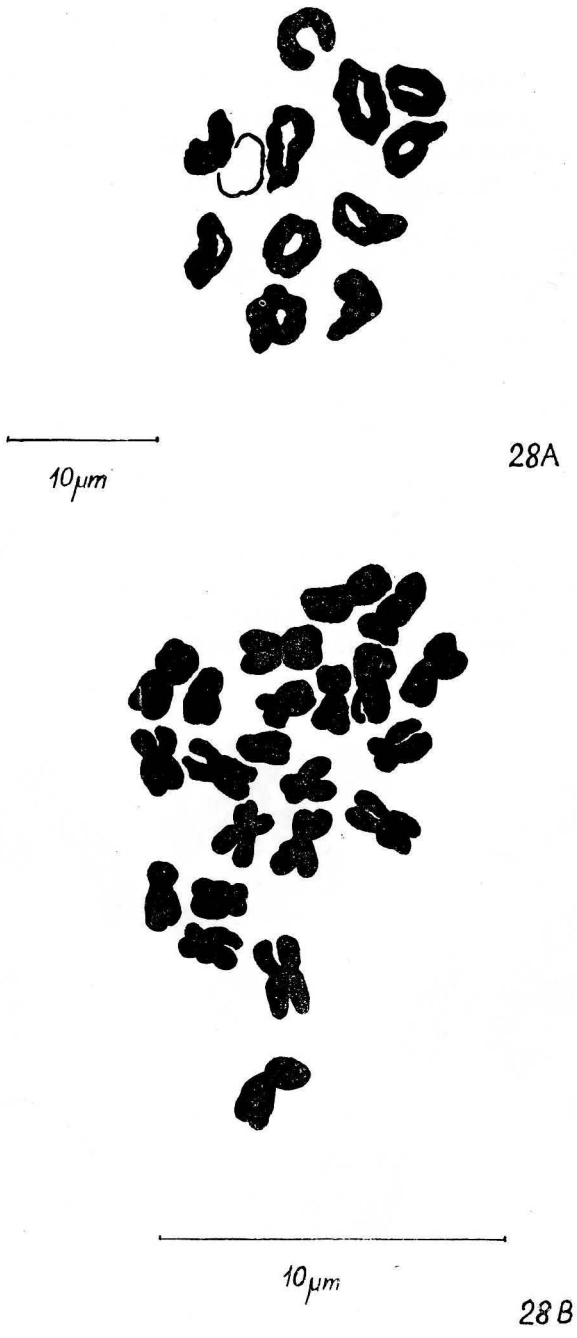


Fig. 28. *Opopanax hispidus*, **A**, $n = 11$; **B**, $2n = 22$.

932. *Opopanax hispidus* (Friv.) Griseb. — $n = 11$, $2n = 22$ (Fig. 28A, B).

Tu: C1 Izmir, near Kuşadasi, national park of Dilek Peninsula, Samsundağ, 37°40'N, 27°13'E, 250 m, 25 May 1995, *M. G. Pimenov & E. V. Kljuykov, s.n.* ($n = 11$).
— B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 800 m, 14 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, s. n.* ($2n = 22$).

Our determination confirm two previous ones, made on the basis of Bulgarian populations of the species (Andreev 1979, Češchmedjiev 1983).

933. *Scaligeria napiformis* (Willd. ex Spreng.) Grande — $2n = 22$ (Fig. 29).

Tu: B1 Izmir, near Kemal-Paşa, Nif Dağ, northern slope, 38°25'N, 27°26'E, 500 m, 14 Aug 1996, *M. G. Pimenov & E. V. Kljuykov, s.n.*

We treat *Scaligeria* in the narrow sense, excluding *Elaeosticta* and some other taxa of geophilic *Umbelliferae,* formerly lumped with *Scaligeria.* In such circumscribtion the genus contains three species only. Two of them, *S. napiformis* (under the name of *S. cretica* (Miller) Boiss.) and closely related *S. halophila* (Rech. f.) Rech. f. have been investigated earlier (Engstrand 1970). Both species have, by Engstrand, $2n = 20$. Our determination showed a different count for *S. napiformis.*

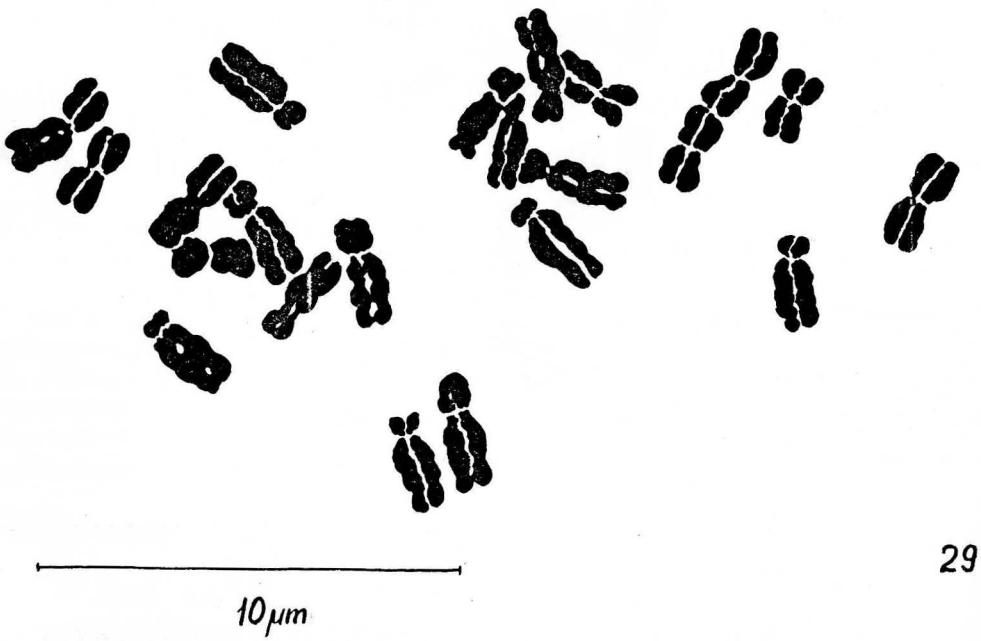
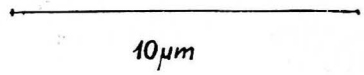
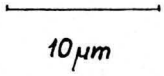


Fig. 29. *Scaligeria napiformis*, $2n = 22$.

30A



30B



31

Figs. 30-31. **30**, *Thapsia garganica*, **A**, $n = 11$; **B**, $2n = 22$; **31**, *Torilis arvensis* subsp. *purpurea*, $n = 6$.

934. ***Thapsia garganica*** L. — $n = 11$, 2n = 22 (Fig. 30, A, B).

Tu: C1 Izmir, between Ephesus and Mariamane (Virgin Mary's house), 37°55'N, 27°20'E, 300 m, 27 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-71* (MW), 15 Aug 1996, ejusd. *s.n.*

Our results correspond to previously known data on chromosome numbers in *Thapsia*. All four *Thapsia* species investigated have $x = 11$, and three of them, including *T. garganica* (Garde & Malheiros-Garde 1949, Silvestre 1976, Valdes-Bermejo 1980) are diploid. Polyploid variability ($2n = 22, 44, 66$) has been shown only in *T. villosa* L.

935. ***Torilis arvensis*** (Huds.) Link subsp. ***purpurea*** (Ten.) Hayek — $n = 6$ (Fig. 31).

Tu: C1 Izmir, near Kuşadasi, national park of Dilek Peninsula, Samsundağ, 37°40'N, 27°13'E, 250 m, 25 May 1995, *M. G. Pimenov & E. V. Kljuykov, T95-62* (MW).

There are two determinations for the subspecies: $2n = 16$ (Melderis 1930), and $2n = 12$ (Strid & Franzen 1981), the latter (from Greece) being more convincing. Our counting confirms it. There are numerous (at least 36) determinations for the other subspecies of *T. arvensis*, and the overwhelming majortity of them also showed $2n = 12$ (for subsp. *arvensis* and subsp. *neglecta* (Schult.) Thell.)

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Reports (936-940) by José A. Mejías

936. ***Aetheorhiza bulbosa*** (L.) Cass. — $n = 9$, $2n = 18$ (Figs. 1, 2).

Hs: Alicante, San Pedro del Pinatar, Punta de la Horadada, 37°52'N, 0°45'O, 11 Apr 1985, *Mejías, Polo & Valdés* (SEV 125403). — $n = 9$ (Fig. 1).

— Cádiz, Puerto de Gális, 36°33'N, 5°35'O, 15 May 1986, *Mejías* (SEV 125406). — $2n = 18$.

— Cádiz, Sancti Petri, 36°22'N, 6°13'O, 24 May 1985, *Mejías* (SEV 125407). — $2n = 18$.

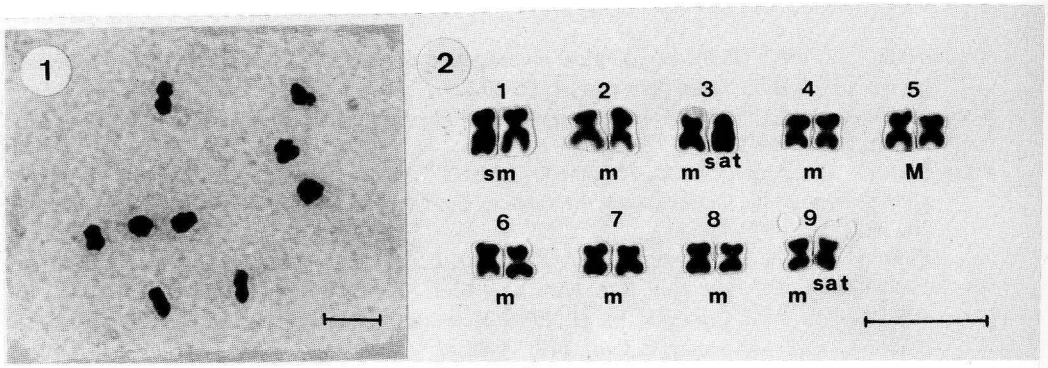
— Huelva, between Fuenteheridos and Alájar, 37°53'N 6°39'O, 15 May 1985, *Mejías* (SEV 125405). — $2n = 18$.

— Huelva, Hinojos, 37°18'N, 6°17'O, 23 Jan 1988, *Mejías & Ortiz* (SEV 125404). — $2n = 18$.

— Huelva, Mazagón, Punta del Loro, 37°06'N, 6°43'O, 12 Jun 1985, *Mejías* (SEV 125408). — $2n = 18$.

— Sevilla, Alcalá de Guadaira, 37°21'N, 5°52'O, 21 Apr 1986, *Mejías & Muñoz* (SEV 125401). — $2n = 18$ (Fig. 2).

Lu: Minho, Viana do Castelo, 41°42'N, 8°49'O, 28 May 1985, *Luque, Polo & Valdés* (SEV 125409). — $2n = 18$.



Figs 1-2. *Aetheoriza bulbosa*: **1**, meiosis (diakinesis), $n = 9$; **2**, karyogram, $2n = 18$. — Scale bars = 5 µm.

The somatic number $2n = 18$ has been observed in seven populations from the Iberian Peninsula. It agrees with the indications of several authors (Babcock & Stebbins 1943: 237; Mesquita 1953: 133, Fernandes & Queirós 1971: 87, Dahlgren & al. 1971: 250, Nordenstam 1972: 393, Pavone & al. 1981: 695) in plants from the Mediterranean area; on the other hand Mori (1957, sec. Bolkhovskikh & al. 1969: 62) observed the number $2n = 32$ on Italian plants. In meiosis the chromosomes regularly form 9 bivalents.

The karyotype of this species has been studied in plants from Alcalá de Guadaira (Sevilla) where the apparent size of the chromosomes varies between 0.96 and 1.82 µm; therefore the chromosomes are small (Stebbins 1938). These chromosomes can be grouped (Levan & al. 1965, modified by Küpfer 1974) as follows (Fig. 2): 2 metacentric (M; pair 5); 14 metacentric (m; pairs 2, 3, 4, 6, 7, 8 and 9), 4 of them being satellited (pairs 3 and 9); 2 submetacentric (sm, pair 1). The karyotype of this population includes 2n = 2M + 10m + 4m-SAT + 2sm = 18 chromosomes and a type 1A - 1B asymmetry. Asymmetry coefficients (Romero 1986) are $A_1 = 0.20$ and $A_2 = 0.17$. In the material from Puerto de Gális (Cádiz) the apparent size of the chromosomes varies between 1.07 and 2.36 µm, being small and medium small. The karyotype consists of $2n = 4M + 8m + 4m$-SAT + 2m sm = 18 chromosomes. The asymmetry is of type 1B, but it has not been possible to deduce A_1 and A_2 asymmetry coefficients.

937. *Reichardia tingitana* (L.) Roth — $n = 8$, $2n = 16$ (Fig. 6).

Hs: Alicante, San Miguel de Salinas, 37°59'N, 0°47'O, 4 Jun 1985, *García & Mejías*, (SEV 125356). — $2n = 16$.
— Almería, Adra, Adra lagoon, 36°45'N, 3°00'O, 30 May 1985, *García & Mejías*, (SEV 125358). — $2n = 16$ (Fig. 6).
— Almería, Lucainena de las Torres, 37°02'N, 2°12'O, 21 May 1988, *López & Mejías*, (SEV 125355). — $n = 8$.
— Almería, Punta Entinas, 36°42'N, 2°45'O, 5 Jul 1984, *Mateo & Mejías* (SEV 125353). — $2n = 16$.
— Murcia, Between Vélez Rubio and Puerto Lumbreras, 37°35'N, 2°10'O, 10 Apr 1985, *Mejías, Polo & Valdés* (SEV 125352). — $n = 8$.

The somatic number $2n = 16$ has been observed in three populations from south Spain. It agrees with the observations of various authors (Borgen 1970: 152, Dahlgren & al.

1971: 251, van Loon 1974: 116, Brullo & Pavone 1978: 263, Gallego 1980: 151, Siljak-Yakovlev 1982: 768, Dalgaard 1986: 84) on plants from the Mediterranean region and the Canary Islands.

In meiosis the chromosomes regularly form 8 bivalents, as Gallego (l.c.) and Aparicio (1988: 491) had previously indicated.

The karyotype of this species has been studied in plants from Adra (Almería) and Salinas (Alicante) where the apparent size of the chromosomes varies between 1.93 and 3.43 µm; therefore the chromosomes are small and medium small.

These chromosomes can be grouped as follows: 12 metacentric (m; pairs 2, 3, 4, 5, 6 and 7), 2 of them being satellited (pair 4); 2 submetacentric (sm; pair 1); 2 submetacentric-subtelocentric (pair 8), which are satellited.

The karyotype of the plants from both populations consists of $2n$ = 10m + 2m-SAT + 2sm + 2sm st-SAT = 16 chromosomes.

The asymmetry is of type 2A and asymmetry coefficients are $A_1 = 0.27$, $A_2 = 0.15$ in the first case and $A_1 = 0.33$, $A_2 = 0.12$ in the second.

938. *Reichardia gaditana* (Willk.) Samp. — $n = 8$, $2n = 16$ (Fig. 3).

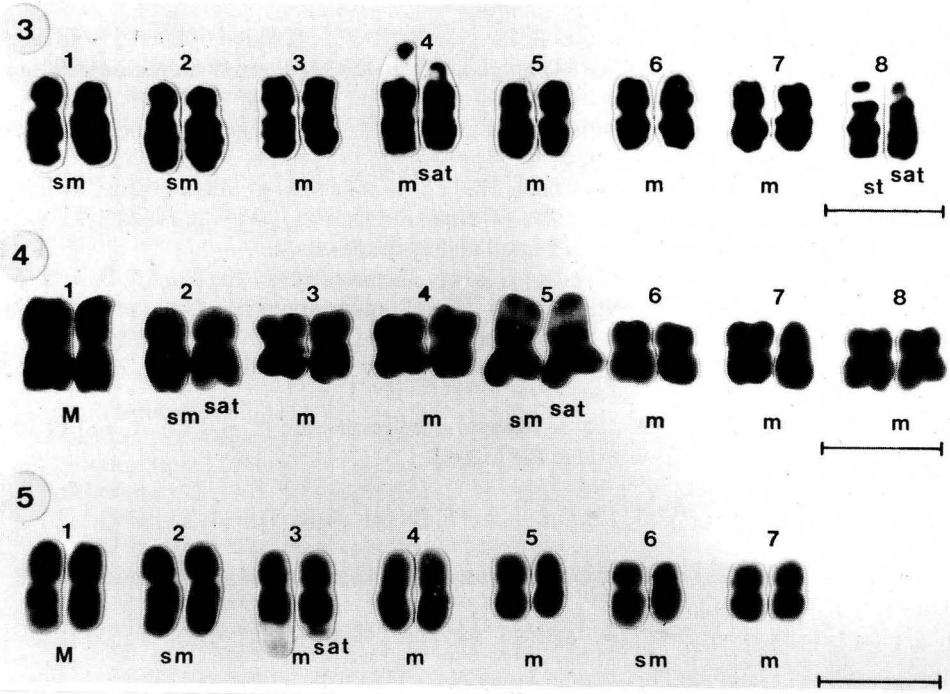
Hs: Cádiz, La Línea, 36°09'N, 5°21'O, 11 Jun 1984, *Arroyo, Mejías & Talavera* (SEV 125379). — $2n = 16$ (Fig. 3).
— Cádiz, Sancti Petri, 36°22'N, 6°13'O, 24 Apr 1985, *Mejías* (SEV 125373). — $2n = 16$.
— Huelva, Almonte, Matalascañas Beach, 37°00'N, 6°33'O, 18 Jun 1985, *Mejías* (SEV 125378). — $2n = 16$.
— Málaga, Marbella, 36°30'N, 5°07'O, 28 May 1985, *García & Mejías* (SEV 125376). — $n = 8$, $2n = 16$.
Lu: Algarve, Faro, 37°04'N, 8°02'O, 3 Jun 1986, *López & Muñoz* (SEV 125380). — $2n = 16$.

In this species, endemic from the Iberian Peninsula and north Morocco, the somatic chromosome number $2n = 16$ has been found in plants from the five populations studied. This number agrees with several previous counts (Mesquita 1953: 133, Fernandes & Queirós 1971: 85, Gallego 1980: 152, Siljak-Yakovlev 1982: 768). In meiosis the chromosomes regularly form 8 bivalents as Gallego (1980: 152) and Talavera & al. (1984: 276) indicated.

Karyotype analyses have been done in two of the populations studied, La Línea (Cádiz) and Sancti Petri (Cádiz), where the apparent size of the chromosomes varies from 2.36 to 3.38 µm; therefore they are medium small. These chromosomes can be grouped as follows (Fig. 3): 10 metacentric (m; pairs 3, 4, 5, 6 and 7), 2 of them being satellited in the plants from La Línea (pair 4); 4 submetacentric (sm; pairs 1 and 2); 2 subtelocentric (st; pair 8) which are satellited.

In the plants from La Línea the karyotype consists of $2n$ = 8m + 2m-SAT + 4sm + 2st-SAT = 16 chromososmes.

In the plants from Sancti Petri the karyotype includes $2n$ = 10m + 4sm + 2st-SAT = 16 chromosomes. The asymmetry is of type 2A and asymmetry coefficients are $A_1 = 0.36$ in both cases and $A_2 = 0.16$ in the plants from La Línea and $A_2 = 0.13$ in the plants from Sancti Petri.



Figs 3-5. Karyograms of: **3**, *Reichardia gaditana*, $2n = 16$; **4**, *R. intermedia*, $2n = 16$; **5**, *R. picroides*, $2n = 14$. — Scale bars = 5 µm.

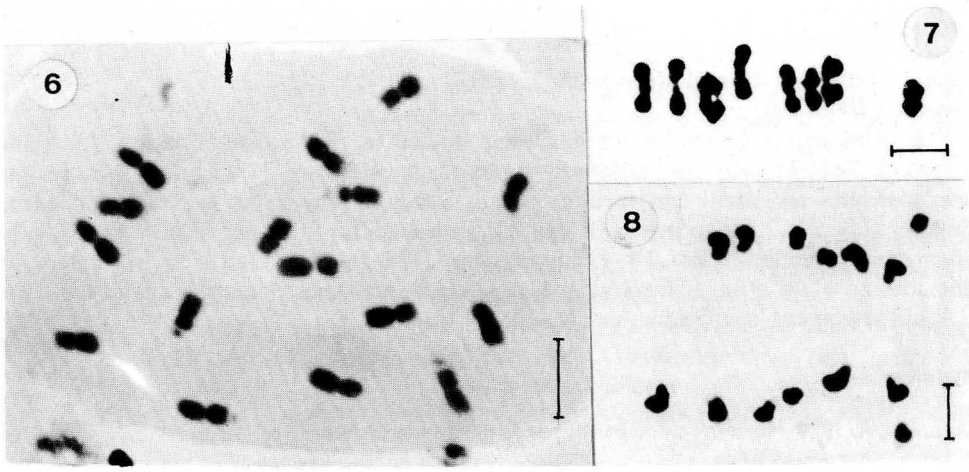
939. *Reichardia intermedia* (Schultz Bip.) Samp. — $n = 8$, $2n = 16$ (Figs. 4, 7).

Hs: Alicante, Villajoyosa, Río Amadorio Reservoir, 38°33'N, 0°15'O, 1 Jun 1985, *García & Mejías* (SEV 125362). — $2n = 16$.
— Almería, Lucainena de las Torres, 37°02'N, 2°12'O, 24 Apr 1987, *Mejías* (SEV 125365). — $n = 8$.
— Huelva, Linares de la Sierra, 37°51'N, 6°37'O, 18 Jun 1986, *Mejías* (SEV 125364). — $2n = 16$ (Fig. 4).
— Málaga, Antequera, Hacho Mountains, 37°00'N, 4°35'O, 30 May 1986, *Mejías* (SEV 125394). — $2n = 18$.
— Murcia, Mazarrón, Isla Plana, 37°33'N, 1°15'O, 11 Apr 1985, *Mejías, Polo & Valdés* (SEV 125361). — $n = 8$ (Fig.7).

The somatic chromosome number found, $2n = 16$, agrees with the observations of Gallego (1980: 153) on plants from south Spain.

The number $2n = 14$ indicated by Fernandes & Queirós (1971: 85) and Löve & Kjellqvist (1974: 195) may be considered erroneous and probably corresponding to *R. picroides* (Gallego, l.c.).

In meiosis the chromosomes regularly form 8 bivalents as some authors (Bramwell & al. 1976: 12, Gallego 1980: 153, Talavera & al. 1984: 275) indicated in plants from the Canary Islands, south Spain and north Morocco respectively.



Figs 6-8. **6**, Somatic metaphase of *R. tingitana*, $2n = 16$; **7**, meiosis (metaphase I) of *R. intermedia*, $n = 8$; **8**, meiosis (anaphase I) of *R. picroides*, $n = 7$. — Scale bars = 5 µm.

The karyotype of this species has been studied in plants from Linares de la Sierra (Huelva) and Antequera (Málaga) where the apparent size of the chromosomes varies between 1.82 and 3.64 µm; therefore the chromosomes are small and medium small. These chromosomes can be grouped as follows (Fig. 4): 2 metacentric (M; pair 1); 10 metacentric (m; pairs 3, 4, 6, 7 and 8); 4 submetacentric (sm; pairs 2 and 5), all of them being satellited in the plants from Linares de la Sierra and 2 of them satellited in the plants from Antequera (pair 2). The karyotype consists of $2n = 2M + 10m + 4sm\text{-}SAT = 16$ chromosomes in the plants from Linares de la Sierra and $2n = 2M + 10m + 2sm + 2sm\text{-}SAT = 16$ chromosomes in the plants from Antequera. The asymmetry is of type 1A - 1B in the first population and 2B in the second population. Asymmetry coefficients are $A_1 = 0.28$ in both cases and $A_2 = 0.25$ in the plants form Linares and $A_2 = 0.22$ in the plants from Antequera.

940. *Reichardia picroides* (L.) Roth — $n = 7$, $2n = 14$ (Figs. 5, 8).

Hs: Alicante, Jávea, Jávea Port, 38°48'N, 0°09'E, 1 Jun 1985, *García & Mejías* (SEV 125372). — $n = 7$ (Fig. 8).

— Gerona, Rosas, 42°15'N, 3°13'E, 7 Aug 1985, *Mejías, Polo & Romero* (SEV 125370). — $2n = 14$.

— Málaga, between Alora and Carratraca, 36°50'N, 4°45'O, 28 May 1985, *García & Mejías* (SEV 125368). — $2n = 14$.

Lu: Estremadura, Cascais, Cabo Raso, 38°32'N, 9°21'O, 30 May 1985, *Luque, Polo & Valdés* (SEV 125367). — $2n = 14$ (Fig. 5).

The somatic chromosome number found, $2n = 14$, agrees with previous counts (Dahlgren & al. 1971: 251, Fernandes & Queirós 1971: 85, Strid 1971: 491, Cardona 1973: 19; 1974: 216, Queirós 1973: 312, Siljak-Yakovlev 1977: 448, 1981: 270, 1982: 768, Brullo & Pavone 1978: 260, Natarajan 1978: 531, Gallego: 1980: 154) on plants from the Mediterranean region and Portugal. In the plants form Jávea these chromosomes have been found to form 7 bivalents regularly during meiosis as several

authors indicated before (Larsen 1955: 273, Gallego 1980: 154, Talavera & al. 1984: 276, Aparicio 1988: 491).

The karyotype of this species has been studied in plants from Cascais where the apparent size of the chromosomes varies from 1.60 to 3.00 µm; therefore the chromosomes are small and medium small. These chromosomes can be grouped as follows (Fig. 5): 2 metacentric (M; pair 1), 8 metacentric (m; pairs 3, 4, 5 and 7), 2 of them being satellited (pair 3); 4 submetacentric (sm; pairs 2 and 6). This karyotype includes $2n = 2M + 6m + 2m\text{-}SAT + 4sm = 14$ chromosomes. The asymmetry is of type 1A and asymmetry coefficients are $A_1 = 0.24$, $A_2 = 0.25$.

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Reports (941-960) by Ana Petrova & Kalina Stoyanova

941. ***Agrostis capillaris*** L. — $2n = 28$ (Figs. 1, 2).

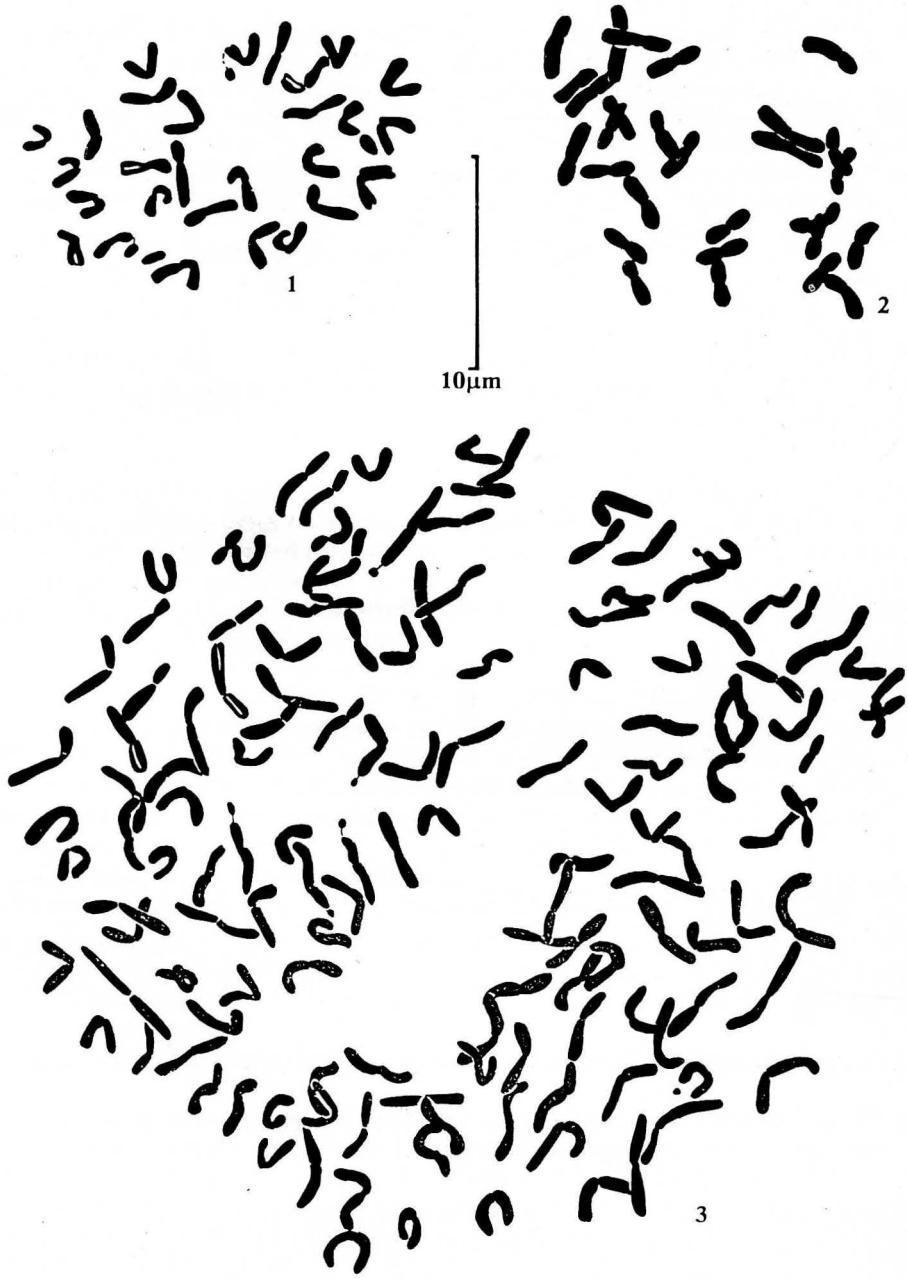
Bu: Central Balkan range, around the Trojan monastery, 42°52'N, 24°47'E, 560 m, *Petrova* 18596 (SOM).
— Western Balkan range, Koznitza Mt, 43°07'N, 23°09'E, 1100 m, *Petrova* 40484 (SOM).

The chromosome number $2n = 28$ confirms our previous results from other parts of the country (Kožuharov & Petrova 1991) as well as these of other authors (see Quieros 1974, Goldblatt 1985, Goldblatt & Johnson 1991, Sorokin 1993) from elsewere. The karyotype studied consists of $2n = 16m + 10sm + 2sm\text{-}SAT = 28$ chromosomes (Fig. 1). Another cytotype studied from Western Balkan does not show SAT-chromosomes (Fig. 2).

942. ***Avenula planiculmis*** (Schrader) W. Sauer & Chmelitschek — $2n = 140$ (Fig. 3).

Bu: Central Balkan range, around the rest house Triglav, grassy places, 42°41'N, 25°04'E, 1530 m, *Petrova* 12096 (SOM).

The chromosome number $2n = 140$ seems to be a new one for this species for which Skalinska & al (1961), Frey (1991) reported ≈ 120 chromosomes and Gervais (1966) — $2n = 126 + 2B$ chromosomes. The karyotype consists of long chromosomes of meta- and submetacentric type and SAT chromosomes of meta- and submetacentric type, too. The species is rarely distributed in Bulgarian mountains.



Figs. 1-3. Karyotypes of: **1-2**, *Agrostis capillaris*, $2n = 28 + 2B$ & $2n = 28$; **3**, *Avenula planiculmis*, $2n = 140$.

943. *Bromus ramosus* Huds. — $2n = 28 + 2B$ (Fig. 4).

Bu: Central Balkan range, rocky places around the waterfall near the village of Tuzha, 42°42'N, 25°04'E, 1300 m, *Petrova* 13396 (SOM).

The tetraploid chromosome number $2n = 4x = 28$ coincides with our previous report (Kožuharov & Petrova 1991), as well as this of Mehra & Sood (1976). For this species hexa- and octoploid chromosome numbers are also known in the literature. A hexaploid cytotype has been found in Bulgaria, too (Kožuharov & Petrova 1991). The karyotype studied consists of $2n = 4x = 14m + 12sm + 2sm\text{-}SAT + 2B = 28 + 2B$ chromosomes.

944. *Calamagrostis arundinacea* (L.) Roth — $2n = 28$ (Figs. 5, 6).

Bu: Central Balkan range, around the rest house Triglav, grassy places, 42°41'N, 25°04'E, 1530 m, *Petrova* 11196 (SOM).
— Western Rhodopes, loc. Longurli, 41°42'N, 24°07'E, grassy places, 1250 m, *Petrova* 26594 (SOM).

The tetraploid chromosome number $2n = 28$ confirms the results of Kožuharov & Kuzmanov (1970) and Andreev (1979) from this country, as well as of the authors from elsewere (see Fedorov 1969, Pogan & al. 1983, Sorokin 1991, 1993). The karyotype studied consists of $2n = 10m + 16sm + 2sm\text{-}SAT = 28$ chromosomes (Fig. 6). The karyotype of the plants studied from the second locality - Western Rhodopes shows a pair of metacentric chromosomes rather than submetacentric ones (Fig. 5).

945. *Calamagrostis epigejos* (L.) Roth — $2n = 28$ (Figs. 7, 8).

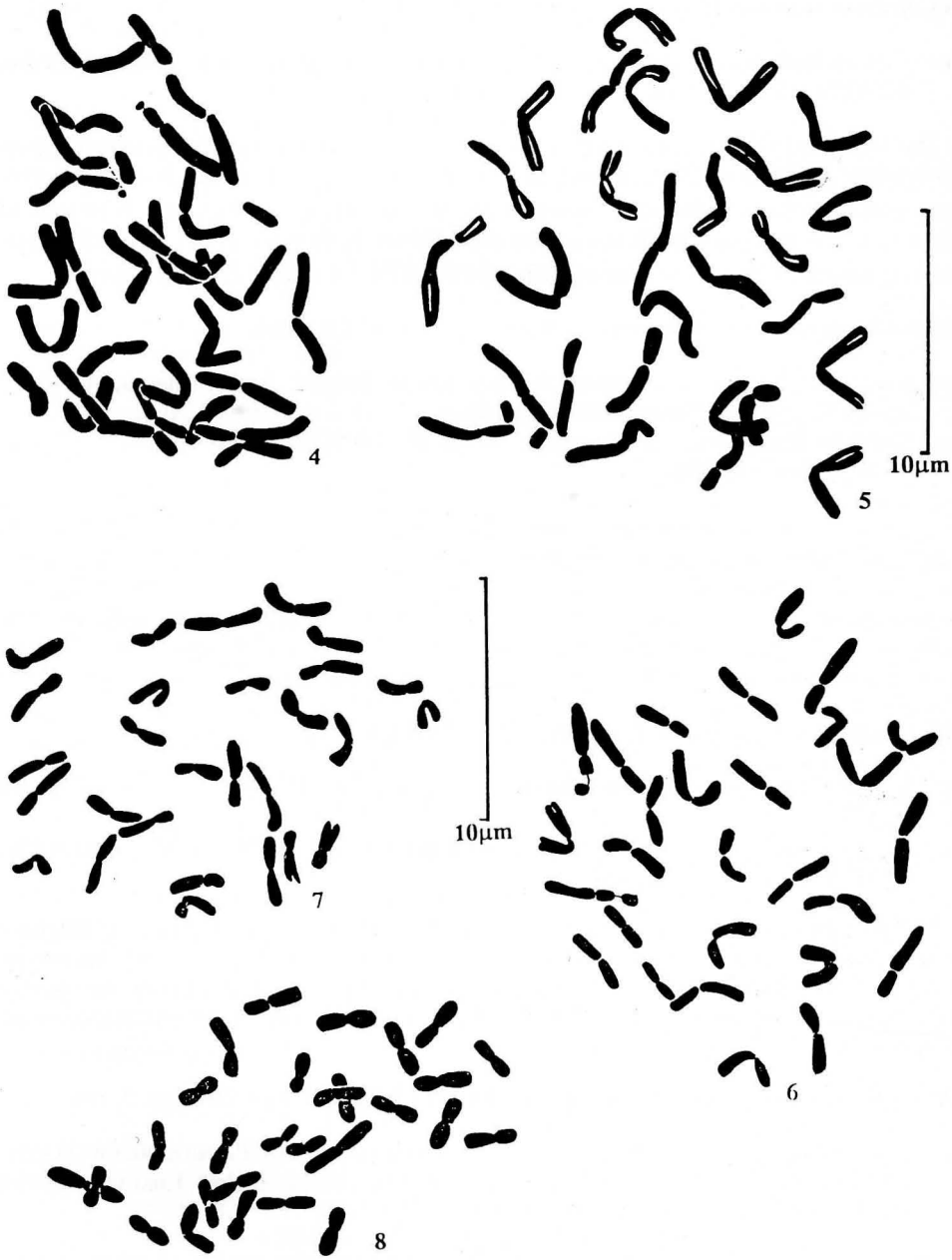
Bu: Western Rhodopes, loc. Shiroka poljana, grassy places, 1200 m, *Petrova* 25894 (SOM).
— Western Rhodopes, grassy places around the forestry Beglika, 1500 m, 41°52'N, 24°07'E, Petrova 29694 (SOM).

The tetraploid chromosome number agrees with the reports of Gadella & Kliphuis (1967), Strid & Franzén (1981), Probatova & Sokolovskaya (1983). The karyotype consists of $2n = 16m + 12sm = 28$ chromosomes (Fig. 7). The karyotype of the species from the second locality (N 29694) differs with a pair of submetacentric chromosome more (Fig. 8).

946. *Calamagrostis pseudophragmites* (Haller fill.) Koeler — $2n = 28$ (Figs. 9, 10).

Bu: Znepole region, Konjavska Mt, stony grassy places, 1300 m, *Petrova* 40368 (SOM).
— Western Rhodopes, grassy places around the village Dolno Lukovo, district Kardzhali, 85 m, *Petrova* 38294 (SOM).

The tetraploid chromosome number $2n = 28$ confirms the results of other authors (Fedorov 1969, Mehra & Sharma 1975a, Gadella & Kliphuis 1967, Sokolovkaya & Probatova 1977, Strid & Franzén 1981) from elsewere. The karyotype studied consists of $2n = 4x = 10m = 14sm + 4sm\text{-}SAT = 28$ chromosomes (Fig. 9). The karyotype of the species from the second locality studied (N 38294) does not show SAT-chromosomes (Fig. 10).



Figs. 4-8. Karyotypes of: **4**, *Bromus ramosus*, $2n = 28 + 2B$; **5-6**, *Calamagrostis arundinaceae*, $2n = 28$; **7-8**, *Calamagrostis epigejos*, $2n = 28$.

947. ***Cynodon dactylon*** (L.) Pers. — $2n = 36$ (Fig. 11).

Bu: Sofia region, grassy places along the irrigation chanals around the village of Kazichene, 42°39'N, 23°29'E, 550 m, *Petrova* 15494 (SOM).

The chromosome number $2n = 36$ agrees with the results reported by Good (1966, 1968), Mehra & Sharma (1975b), van Loon & Kieft (1980), Wentworth & al. (1991). The karyotype consists of meta- and submetacentric chromosomes.

948. ***Deschampsia flexuosa*** (L.) Trin. — $2n = 28$ (Fig. 12).

Bu: Central Balkan range, grassy places near the top Triglav (Kademlija), 1800 m, 42°44'N, 25°03'E, *Petrova* 14896 (SOM).

The tetraploid chromosome number $2n = 28$ coincides with the results reported by Stoeva (1983) for this country, as well as of other authors from different areas (see Fedorov 1969, Strid & Franzén 1981, Sorokin 1991, 1993). The karyotype consists of $2n = 4x = 14m = 14sm = 28$ chromosomes.

949. ***Dianthus petraeus*** Waldst. et Kit. — $2n = 60$ (Fig. 13).

Bu: Slavjanka Mt, near Gocev vruch, 41°24'N, 23°37'E, stony grassy places, 2100 m, *Petrova* 6795 (SOM).

The tetraploid chromosome number $2n = 4x = 60$ confirms the reports of van Loon & van Setten (1982) for this country as well as of other authors from elsewhere (see Fedorov 1969). A diploid chromosome number $2n = 30$ has also been reported by Kožuharov & Petrova (1975) and by Andreev (1981).

950. ***Dianthus superbus*** L. — $2n = 30$ (Fig. 14).

Bu: Vitosha Mt, grassy stony places, 42°13'N, 23°47'E, 1550 m, *Petrova* 30494 (SOM).

The diploid chromosome number $2n = 2x = 30$ confirms the results of other authors (Carolin 1957, see Fedorov 1969, Belaeva & Siplivinsky 1975, Malakhova 1990). It is the first report for the Bulgarian flora. Tetraploids ($2n = 4x = 60$) and hexaploids ($2n = 6x = 90$) karyotypes, also reported for this taxon (see Fedorov 1969).

951. ***Festuca drymeja*** Mert. & Koch — $2n = 14 = 2B$ (Fig. 15).

Bu: Central Balkan range, oak forest around the rest house Triglav, 42°41'N, 25°04'E, 1450m, *Petrova* 10896 (SOM).

The diploid chromosome number $2n = 14$ confirms the results reported by other authors (see Goldblatt 1981, Sokolovskaya & Probatova 1979, Strid & Franzen, 1981). It is the first report from Bulgarian material. The karyotype studied consists of $2n = 2x = 10m + 4sm + 2B = 14 + 2B$ -chromosomes.

Figs. 9-14. Karyotypes of: **9-10**, *Calamagrostis pseudophragmites*, 2*n* = 28; **11**, *Cynodon dactylon*, 2*n* = 36; **12**, *Deschampsia flexiosa*, 2*n* = 28; **13**, *Dianthus petraeus*, 2*n* = 60; **14**, *Dianthus superbus*, 2n = 30.

952. *Holcus lanatus* L. — $2n = 14$ (Fig. 16).

Bu: Central Balkan range, around the Trojan monastery, 42°52'N, 24°47'E, grassy places, 560 m, *Petrova* 18496 (SOM).

The diploid chromosome number $2n = 14$ agrees with the report of Kožuharov & Nikolova (1975) for this country, as well as of other authors from elsewhere (see Fedorov 1969, Strid & Franzén 1981). The karyotype consists of $2n = 2x = 6m + 8sm = 14$ chromosomes.

953. *Koeleria eriostachya* Pančič — $2n = 56$ (Fig. 17).

Bu: Central Balkan range, grassy meadows near the top of Triglav (Kademlija), 42°44'N, 25°03'E, 1800 m, *Petrova* 15196 (SOM).

The octoploid chromosome number $2n = 8x = 56$ confirms our previous report from other part of the country (Kožuharov & Petrova 1991). The karyotype consists of $2n = 8x = 20m + 30sm + 6sm\text{-}SAT = 56$ chromosomes. For this species $2n = 70$ have also been counted by Kožuharov & al. (1988).

954. *Koeleria nitidula* Velen. — $2n = 14$ (Fig. 18).

Bu: N. E. Bulgaria, calcareous hills around Provadija, district Varna, 30 m, 43°11'N, 27°25'E, *Petrova* 40249 (SOM).

The diploid chromosome number of this species $2n = 14$ coincides with our previous results (Kožuharov & al. 1988) from other parts of the country. The karyotype studied consists of $2n = 2x = 10m + 4sm = 14$ chromosomes.

955. *Lychnis coronaria* (L.) Desr. — $2n = 24$ (Fig. 19).

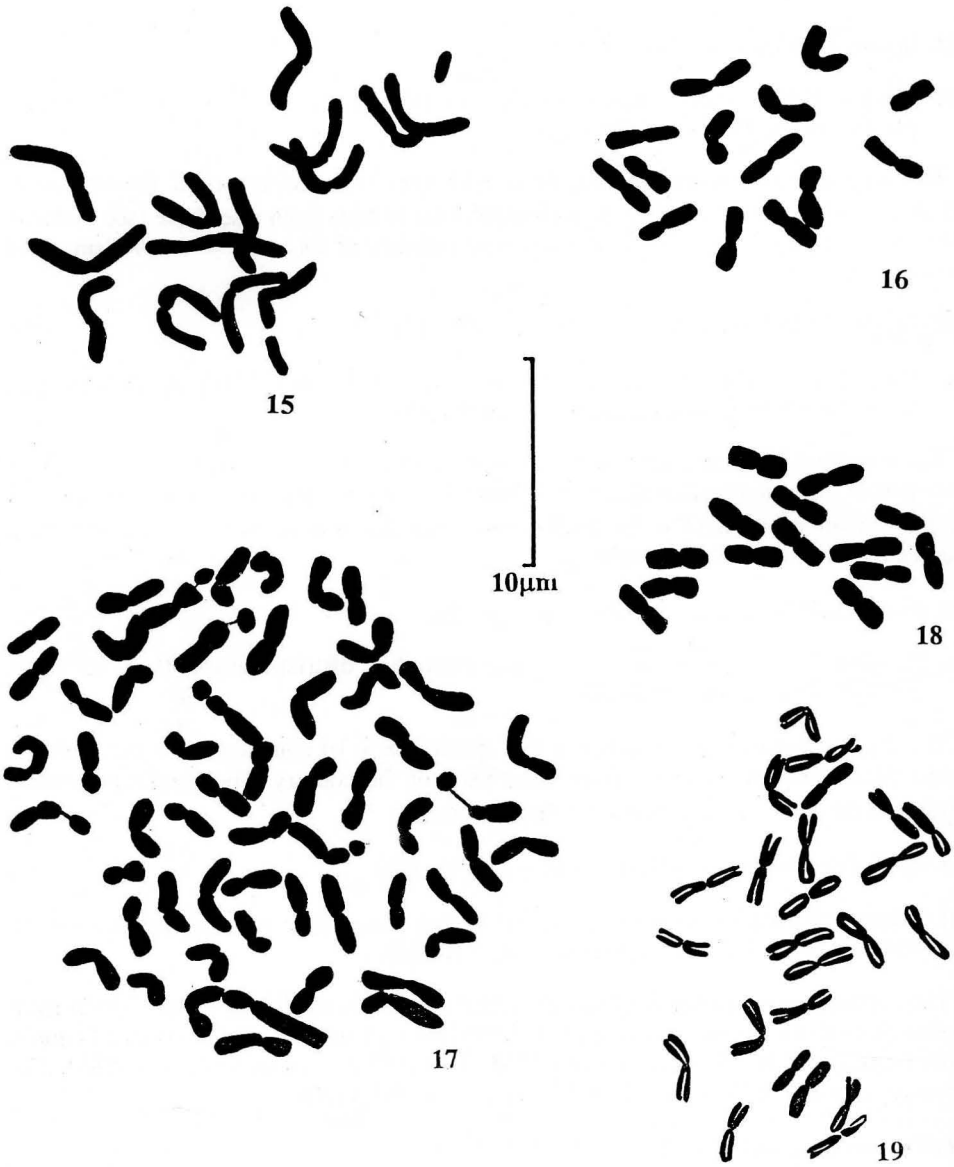
Bu: Western Balkan range, Vrachanska Mt, grassy places near the camping Okolchitza, 43°10'N, 23°35'E, 980 m, *Petrova* 53197 (SOM).

The chromosome number confirms the results of van Loon & van Setten (1982) from another part of this country, as well as of other authors from different parts (see Fedorov 1969, Degraeve 1980, Strid & Franzén 1983, Sorokin 1991, 1993, Goldblatt 1985). The karyotype consists of $2n = 2x = 16\ m + 8sm = 24$ chromosomes.

956. *Phleum alpinum* L. — $2n = 14 + 2B$ (Fig. 20).

Bu: Rila Mt, near the rest house Ribni ezera, 42°06'N, 23°30'E, grassy places, 2230 m, *Petrova* 2095 (SOM).

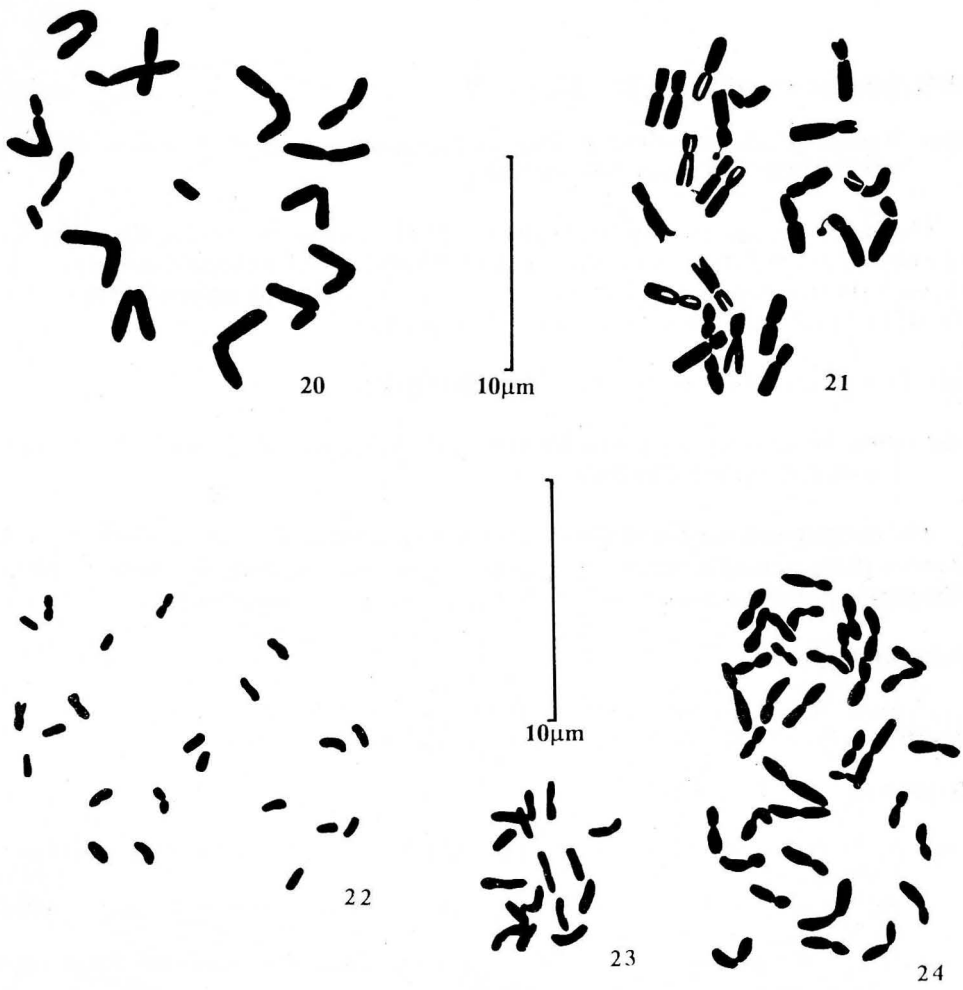
The diploid chromosome number $2n = 14$ confirms the results of previous studies for this country of Kožuharov & Nikolova (1975), Kožuharov & Petrova (1991), as well as of authors from other parts (see Fedorov 1969, Strid & Franzén 1981, Goldblatt 1984, Goldblatt & Johnson 1994). The karyoype consists of $2n = 2x = 8m + 4sm + 2st + 2B = 14 + 2B$ chromosomes.



Figs. 15-19. Karyotypes of: **15**, *Festuca drymeja*, $2n = 14 + 2B$; **16**, *Holcus lanatus*, $2n = 14$; **17**, *Koeleria erystachya*, $2n = 56$; **18**, *Koeleria nitidula* $2n = 14$; **19**, *Lychnis coronaria* $2n = 24$.

957. *Scleranthus neglectus* Roch. — $2n = 22$ (Fig. 22).

Bu: Central Balkan range, grassy places, the top of Triglav (Malak Kademlija), 42°44'N, 25°03'E, 1850 m, *Petrova* 15996 (SOM).



Figs. 20-24. Karyotypes of: **20**, *Phleum alpinum*, $2n = 14 + 2B$; **21**, *Silene italica*, $2n = 24$; **22**, *Scleranthus neglectus*, $2n = 22$; **23**, *Spiraea salicifolia*, $2n = 16$; **24**, *Sporobolus indicus*, $2n = 36$.

The diploid chromosome number $2n = 22$ confirms the result reported by Jasiewicz & Mizianty (1975) for this country.

958. *Silene italica* (L.) Pers. — $2n = 24$ (Fig. 21).

Bu: Thracian Lowlands, near the village of Markovo, district Plovdiv, 42°04'N, 24°43'E, 270 m, *Petrova* 397 (SOM).

The chromosome number of the species confirms our previous results (Kožuharov & Petrova 1974a) from another part of the country, as well as of other authors (see Fedorov 1969, Goldblatt 1985, Runemark 1996) from elsewhere. The karyotype consists of $2n = 2x = 4m + 18sm + 2sm\text{-}SAT = 24$ chromosomes.

959. *Spiraea salicifolia* L. — $2n = 16$ (Fig. 23).

Bu: Western Rhodopes, near the village of Sarnitza, along the river Dospat, 41°42'N, 4°05'E, 1300 m, *Petrova* 31094 (SOM).

The species was known for this country from one locality in Western Rhodopes and recently also found in Central Balkan, reserve Boatin by Stoeva (unpublished data). The chromosome number $2n = 16$ does not confirm the only known by me result of Sax (1936 in Fedorov 1969) who reported $2n = 36$ for this species.

960. *Sporobolus indicus* (L.) R. Br. — $2n = 36$ (Fig. 24).

Bu: River Strouma region, around the town of Petrich, grassy places, 41°24'N, 23°13'E, 150 m, *Petrova* 38563 (SOM).

The chromosome number confirms our previous count of this species (Kožuharov & Petrova 1974), as well as the results of Queiros & Ormonde (1984), Devesa & al. (1990). The karyotype studied consists of $2n = 4x = 20m + 16sm = 36$ chromosomes.

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Reports (961-967) by Daniella Ivanova

961. *Polypodium vulgare* L. — $2n = 4x = 148$ (Fig. 1A, B).

Bu: Vitosha Mt, along the path between loc. Zlatnite mostove and Kumata hut, 42°37'N, 23°15'E, shady places in mixed forest, c. 1500 m, 26 Sep 1994, *Ivanova DI-224.94* (SOM).

— Northern Pirin Mt, above Strijishko Lake, eastward from Todorin Peak, 41°45'N, 23°26'E, on silicate, in open rocky places, 2200 m, 28 Jun 1993, *Kachaunova DI-6.93(b)* (SOM).

— Western Rhodopes, by the road from Devin to Dospat, near the crossroad to Zmeica, 41°39'N, 24°14'E, spruce forest, 16 Aug 1991, *Ivanova DI-15.91(a)* (SOM).

The circumboreal *Polypodium vulgare* complex is represented in Europe by 3 ploidy levels, which represent 3 different species (Manton 1950, Shivas 1961a, b): diploid with $2n = 74$ (*P. cambricum* L.), tetraploid with $2n = 148$ (*P. vulgare* L. s. str.) and hexaploid with $2n = 222$ (*P. interjectum* Shivas). The species *P. vulgare* L. occurs in almost all Europe except Bl, Cr, Sb, Si. Plants used for this study correspond morphologically and cytologically to the tetraploid *P. vulgare*. The somatic chromosome number $2n = 148$ was observed in all three populations investigated. This is the first count for Bulgarian material. It confirms earlier reports of $n = 74$ bivalents and $2n = 148$ from different countries made by Manton (1947, 1950), Sorsa (1958), Löve & Löve (1961), Shivas (1961a), Vida (1963), Lenski (1964), Kempf (1967), Meinders-Groeneveld & Segal (1967), Rychlewski & Jankun (1972), Zabelina & Filin (1974), Nardi & Tommei (1976), Shimura & al. (1980), Murin (1982), Murray (1985), and Manton & al. (1986).

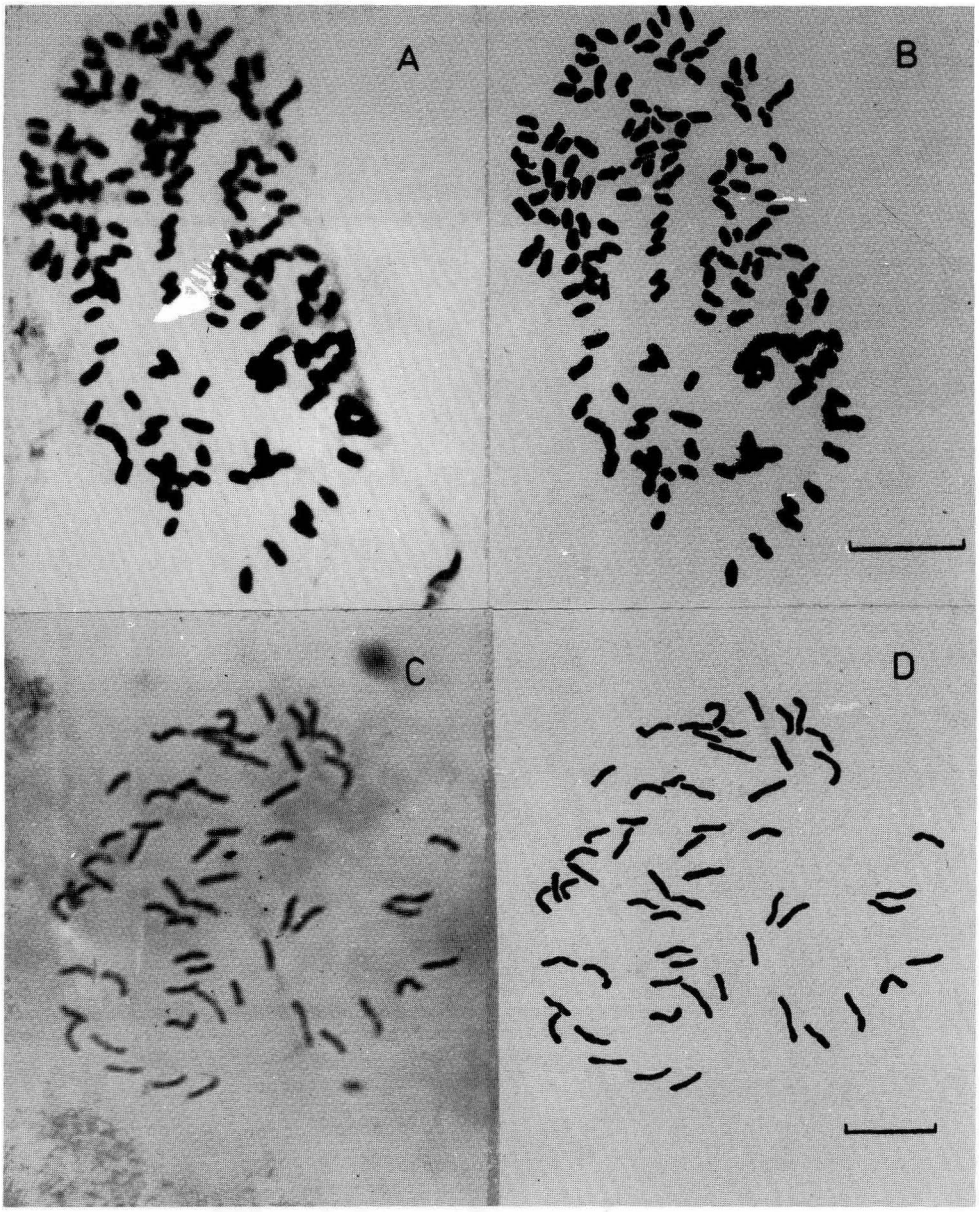

Fig. 1. Photographs and drawings of root tip mitosis: **A, B,** *Polypodium vulgare*, $2n = 148$; **C, D,** *Notholaena marantae* subsp. *marantae*, $2n = 58$. — Scale bars = 10 µm.

962. *Notholaena marantae* (L.) Desv. subsp. ***marantae*** — $2n = 2x = 58$ (Fig. 1C, D).

Bu: Eastern Rhodopes, southeastward from Avren, 41°20'N, 25°43'E, on a scree by the river, 2 Sep 1993, *Georgiev DI-9.93* (SOM).

The two intraspecific taxa of *N. marantae* are subsp. *subcordata* (Cav.) Benl & Poelt, which occurs mainly in Macaronesia and subsp. *marantae*, distributed in S. Europe, extending northwards to S. Czechoslovakia.

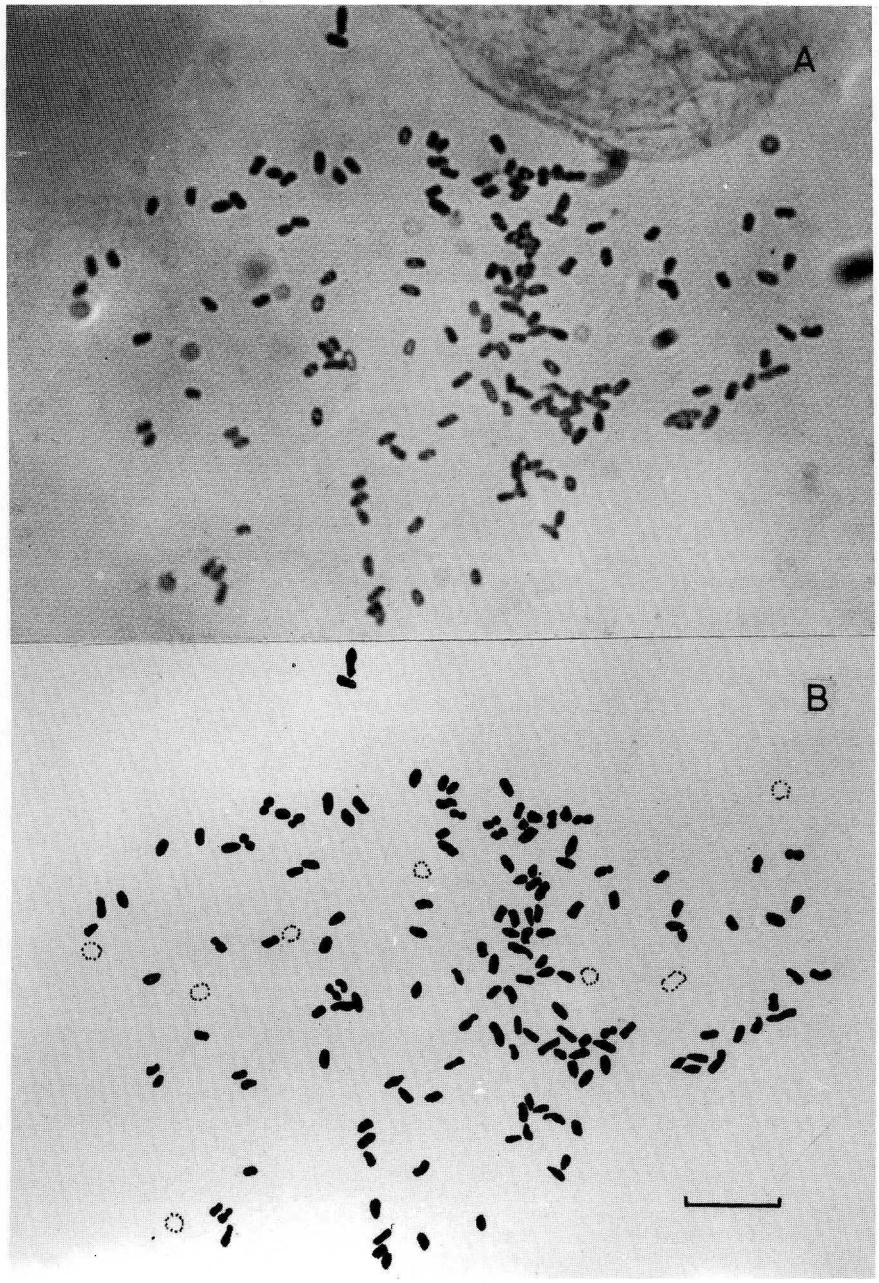

Fig. 2. **A,** photograph and **B,** drawing of root tip mitosis of *Asplenium trichomanes* subsp. *quadrivalens*, $2n = 144$. — Scale bar = 10 µm.

The diploid chromosome number of $2n = 58$, reported here for the first time from Bulgaria, is in accordance with reports by Fabbri (1957), Vida & al. (1970) and Khullar & al. (1988), who counted $n = 29$ bivalents during meiosis.

963. ***Asplenium trichomanes*** L. subsp. ***quadrivalens*** D. E. Meyer emend. Lovis — $2n = 4x = 144$ (Fig. 2A, B).

Bu: Rila Mt., above Mala Tzarkva, along Levi Iskar river, 42°15'N, 23°31'E, spruce forest, 1200 m, on silicate, 28 May 1994, *Petkova DI-5.94* (SOM).

One of the most widespread members of *Asplenium trichomanes* complex is subsp. *quadrivalens* distributed throughout Europe (except Sb).

Populations of *Asplenium trichomanes* subsp. *quadrivalens* from different countries have proved to be tetraploid with meiotic chromosome number of $n = 72$ bivalents (Manton 1950, Lovis 1955, Fabbri 1963, Bouharmont 1968, Manton & al. 1986, Queirós & Ormonde 1989, Cubas & al. 1989, Bennert & al. 1989, Queirós 1991, Roselló & al. 1991, Viane & al. 1996), and mitotic number of $2n = 144$ (Meyer 1952, 1959, 1962, Emmott 1964, Tigerschiöld 1981, Brullo & al. 1982, Manton & al. 1986, Queirós & Ormonde 1989).

Many authors reported $n = 72$ bivalents or $2n = 144$ chromosomes for *A. trichomanes* L. from North America, Asia and Europe: Britton (1964), Wagner & Chen (1964), Cody & Mulligan (1982), Tsai & Shieh (1983), Razdan & al. (1986) as $n = 72$; Sušnik & Lovka (1973) and Laane & Lie (1985) as $2n = 144$.

The tetraploid chromosome number $2n = 144$ has been confirmed by our record, the first from Bulgaria.

964. ***Phyllitis scolopendrium*** (L.) Newm. subsp. ***scolopendrium*** — $2n = 2x = 72$ (Fig. 3A, B).
(syn.: =*Asplenium scolopendrium* L.)

Bu: Western Balkan Foothill Region, Vrachanski Balkan, loc. Skaklya, 43°11'N, 23°36'E, shady places in a groove beside the waterfall, c. 600 m, 04 Jul 1997, *Petrova DI-10.97* (SOM).

— Central Balkan Range, above Beli Osam (Troyan district), loc. Zelenika, 42°48'N, 24°37'E, in offshoot *Fagus* forest, 900 m, 30 Jun 1996, *Valchev DI-26.96* (SOM).

Our results correspond with reports for this taxon cited in Ivanova (1997) for material from Bulgaria (Strandza Mt) and elsewhere.

965. ***Polystichum setiferum*** (Forssk.) Woynar — $2n = 2x = 82$ (Fig. 3C, D).

Bu: Vitosha Mt, near Boyana waterfall, 42°38'N, 23°16'E, in a deciduous forest, 1200 m, 07 Aug 1997, *Ivanova DI-17.97* to *19.97* (SOM).

The diploid chromosome number $2n = 82$ confirms our previous counts from other parts of Bulgaria (Ivanova 1997), as well as these of other authors (see Ivanova 1997: 230-231, for references).

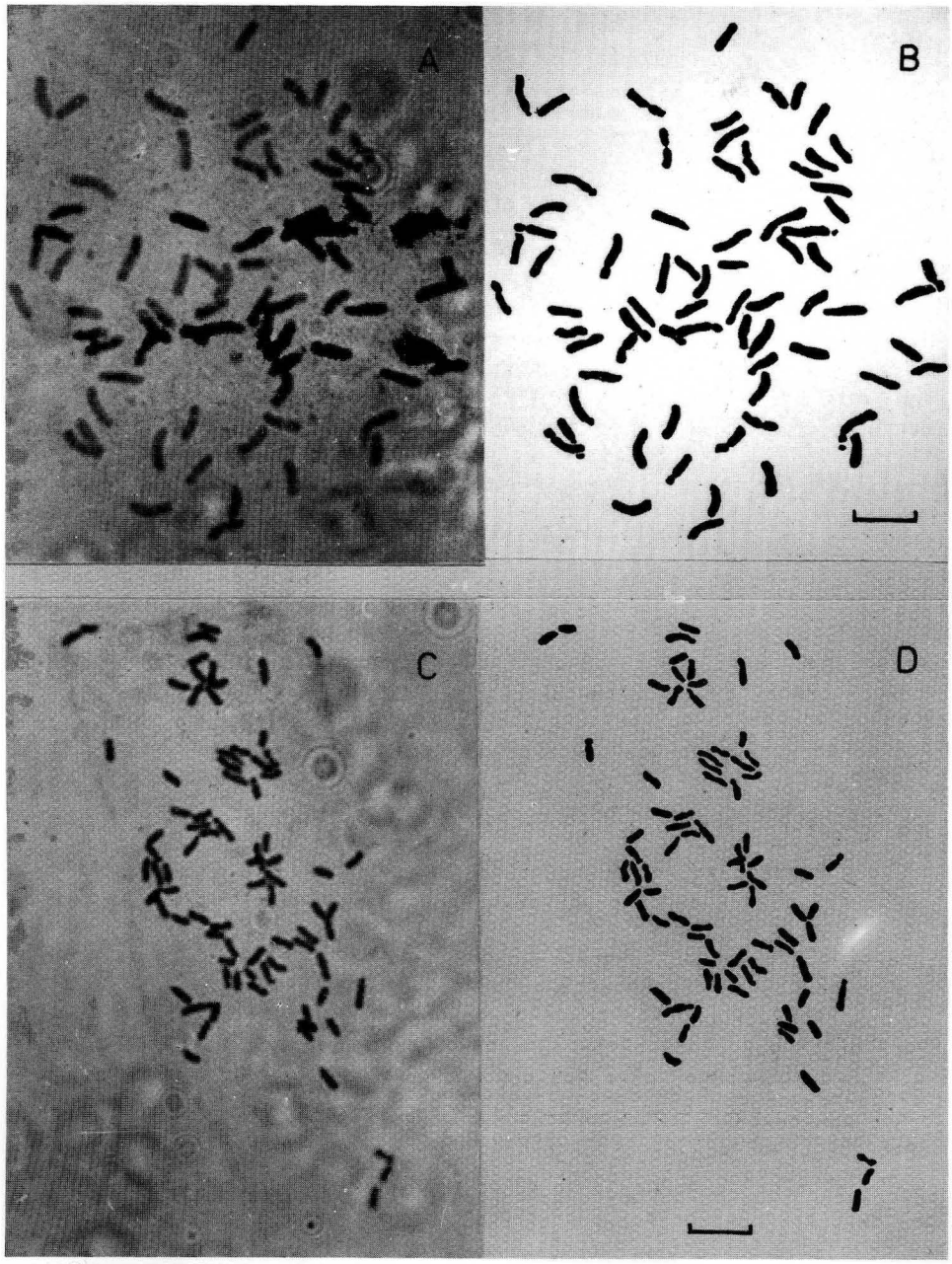

Fig. 3. Photographs and drawings of root tip mitosis: **A, B,** *Phyllitis scolopendrium* subsp. *scolopendrium*, $2n = 72$; **C, D,** *Polystichum setiferum*, $2n = 82$. — Scale bars = 10 µm.

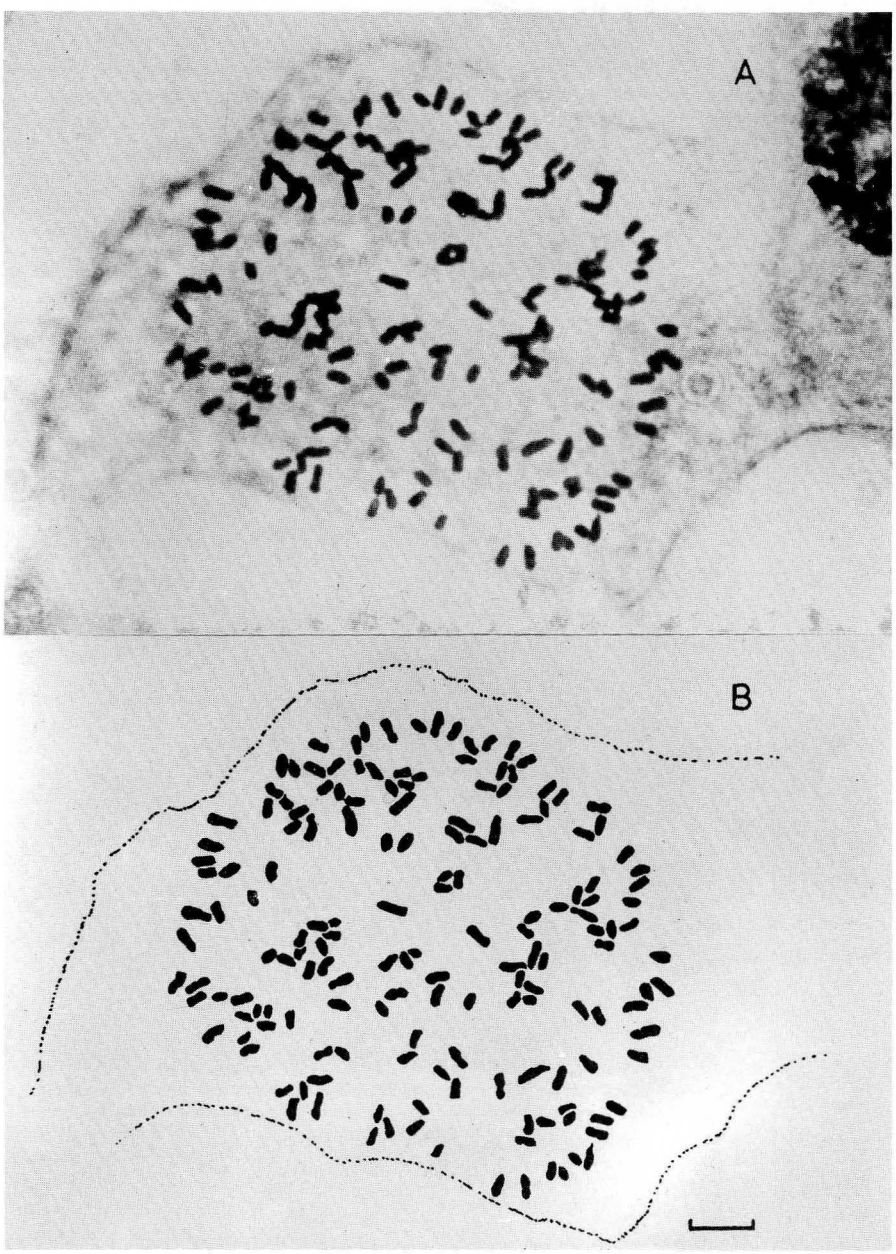

Fig. 4. **A,** photograph and **B,** drawing of root tip mitosis of *Polystichum aculeatum*, $2n = 164$. — Scale bar = 10 µm.

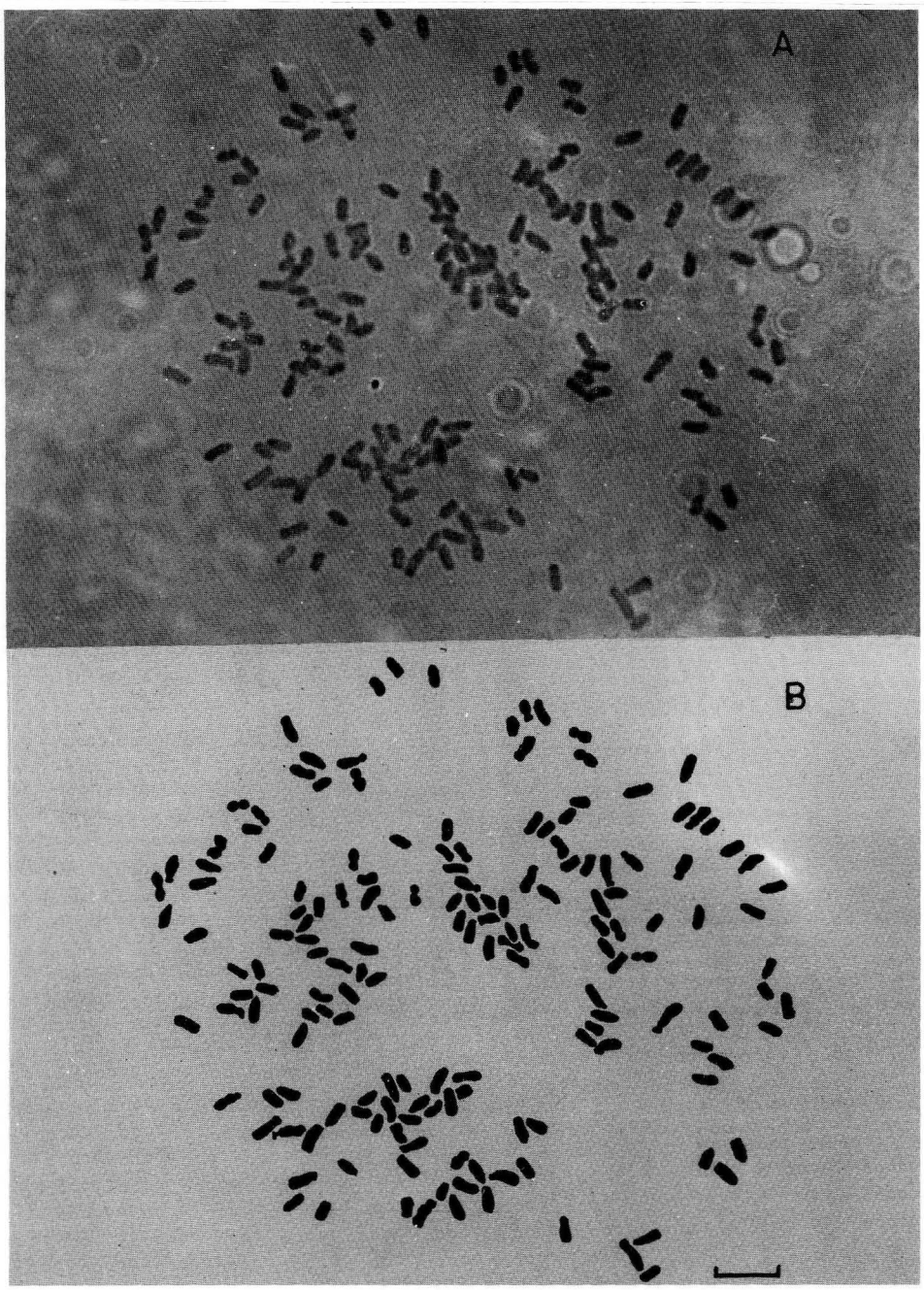

Fig. 5. **A,** photograph and **B,** drawing of root tip mitosis of *Dryopteris filix-mas*, $2n = 164$. — Scale bar = 10 µm.

966. *Polystichum aculeatum* (L.) Roth — $2n = 4x = 164$ (Fig. 4A, B).

Bu: Vitosha Mt, near Boyana waterfall, 42°38'N, 23°16'E, in a deciduous forest, 1200 m, 07 Aug 1997, *Ivanova DI-12.97, 16.97, 20.97* (SOM).
— Slavyanka Mt, above Paril (Blagoevgrad district), loc. Hambar dere, 41°25'N, 23°41'E, in *Fagus* forest, 1300 m, 14 Jun 1995, *Ivanova DI-93.95* (SOM).

This species is distributed in many parts of Europe except for the east and extreme north, in Anatolia, Elburz, Syria, Lebanon, Algeria, Morocco.

No former record of a chromosome number of this taxon is known from Bulgaria. Previous counts from other countries also confirmed the number $n = 82$ or $2n = 164$ (Manton 1950, Vida 1966, Al-Bermani & al. 1993).

967. *Dryopteris filix-mas* (L.) Schott — $2n = 4x = 164$ (Fig. 5A, B).

Bu: Vitosha Mt, between loc. Zlatnite mostove and Kumata hut, nearby Vladayska reka river, 42°37'N, 23°15'E, 1500 m, 26 Sep 1994, *Ivanova DI-223.94* (SOM).
— Belasitza Mt, above Skrat (Petrich district), 41°21'N, 22°59'E, in open places along the path, 1450 m, 30 Aug 1994, *Ivanova DI-127.94* (SOM).
— Northern Pirin Mt, near Demjanitza hut, along Demjanitza river, 41°44'N, 23°27'E, in *Pinus peuce* forest, c. 1900 m, 18 Jul 1994, *Kachaunova DI-41.94* (SOM).

Our record of $2n = 164$ chromosomes agrees with the count indication for this species made by Löve & Kjellqvist (1972), as well as with those made by many other authors (see Ivanova 1997: 229-230, for references).

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Reports (968-969) by Minčo Ančev, Nermin Orcan & Valentina Goranova

968. ***Alyssum meniocoides*** Boiss. — $2n = 14$ (Fig. 1A, B).

Tu: B3: Eskişehir: Çifteler: Çifteler - Kaymaz, 39°27'N, 31°07'E, stony slopes, 750 m, 09 May 1991, *H. Misirdali, N. Orcan* (AUF* 5892, 5898, 6265).
— Eskişehir: Kaymaz, Kaymaz - Okçular, 39°33'N, 31°11'E, stony hill, 1000 m, 09 May 1991, *H. Misirdali, N. Orcan* (AUF 5863, 5864, 5868).

Distributed in C. and S. E. Turkey, Syrian Desert, Iran, Afghanistan (Dudley 1965: 362, Orcan 1993: 11). To our knowledge the chromosome number $2n = 2x = 14$ is reported here for the first time. Chromosome numbers $n = 8$ (Al-Shehbaz & Al-Omar 1982: 588; see Goldblatt & Johnson 1990: 58, for references) and $n = 20$ (see Goldblatt 1984: 115, for references) were also reported for *A. meniocoides*. The karyotype consists of small close in lenght chromosomes. They are mostly of m- and sm-type in seedlings studied from the locality of Çifteler (Fig. 1A). In some of the observed chromosome sets a pair of SAT-chromosomes with microsatellites was found. The chromosomes in all observed metaphase plates from the locality of Okçular were very small and the position of the centromeres was not expressed in most of them (Fig. 1B).

969. ***Alyssum huetii*** Boiss. — $2n = 14$ (Fig. 1C).

Tu: B3: Eskişehir: Eskişehir - Seyitgazi, 39°36'N, 30°37'E, stony step field, 970 m, 26 May 1987, *H. Misirdali, E. Yücel*, (AUF 2017).

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* AUF means Anadolu Üniversity, Science Faculty Herbarium.

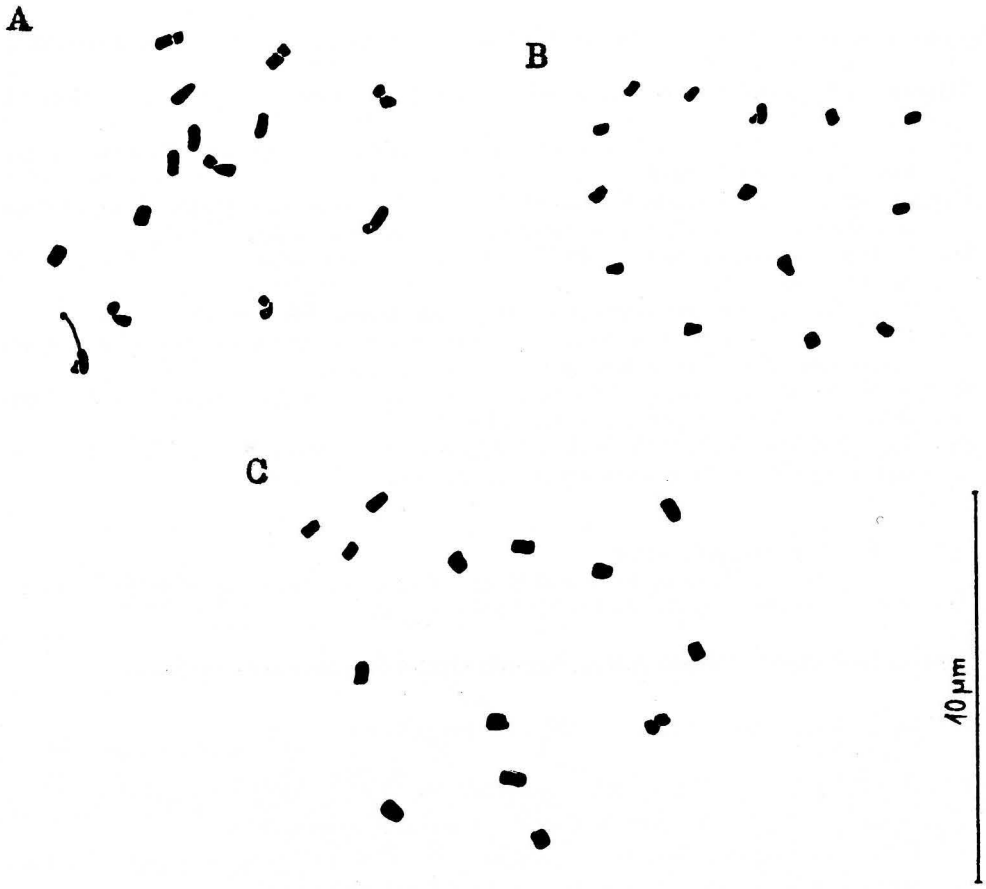

Fig. 1. Karyotypes of: **A**, **B**, *Alyssum meniocoides*, $2n = 14$; **C**, *Alyssum huetii*, $2n = 14$.

A. huetii is endemic to Turkey, scattered in its distribution, mainly in Inner Anatolia (Dudley 1965: 374, Orcan 1993: 13).

The chromosome number $2n = 2x = 14$ is probably a first record for this species. The chromosomes within the numerous studied metaphase plates were very small, close in lenght, with not expressed or faint position of the centromere.

Acknowledgements

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Reports (970-976) by Svetlana T. Bancheva

970. ***Centaurea cyanus*** L. — $2n = 24$ (Fig. 1).

Bu: Eastern Stara Planina Mt, the locality Kachoula, above the village of Sadovo, near the town of Sliven, 900 m, 42°53'N, 26°36'E, dry, open grassy places, 18 Jun 1996, *Bancheva Sh9617* (SOM).

Native in S. E. Europe, Sicily and Asia Minor.

The somatic chromosome number, $2n = 24$, agrees with the numbers given for this taxon by the authors cited in Ornduff (1967, 1969), Fedorov (1969), Moore (1970, 1977), Goldblatt (1981, 1984, 1985, 1988), Goldblatt & Johnson (1990, 1991, 1994), Loon (1987), Sharkova (1996), Sharkova & Peev (in press).

In the mitotic metaphase plates reported here the submetacentric and acrocentric chromosomes are prevailing. There are three pairs of SAT-chromosomes.

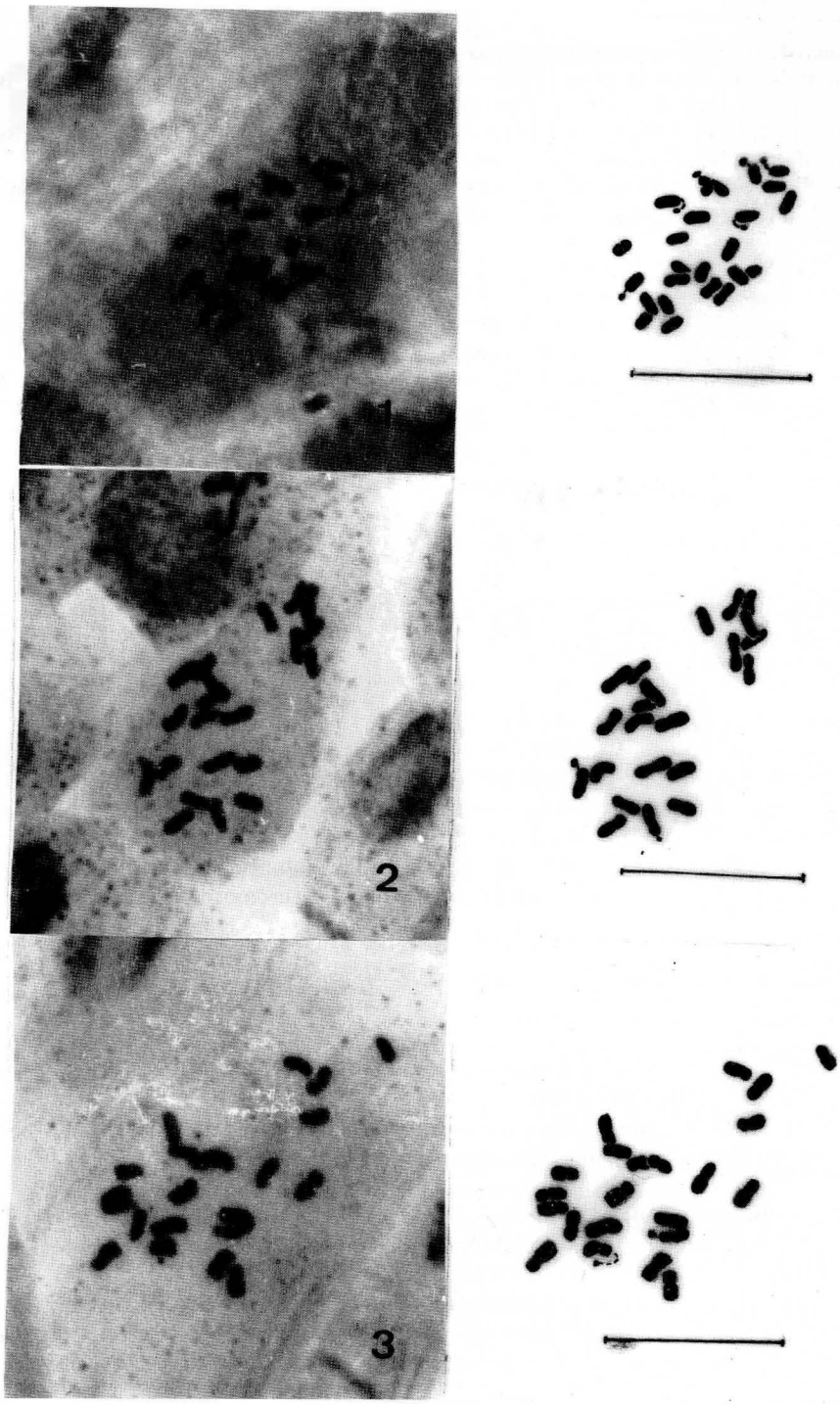
971. ***Centaurea kerneriana*** Janka subsp. ***gheorghieffii*** (Halácsy) Dostál — $2n = 22$ (Figs. 2, 3).

Bu: Rila Mt, near the village of Kostenets, 900 m, 42°14'N, 23°35'E, rocky places, Aug 1996, *Bancheva Sh9648* (SOM).
— Rila Mt, above the Musala Hut, the locality "Zhenskiya oulei", 42°11'N, 23°35'E, subalpine rocky places, Aug 1996, *Bancheva Sh9666* (SOM).

Endemic to Bulgaria (Rila Mt).

This is the first publication of a chromosome number for this rare subspecies of *C. kerneriana*.

This count, $2n = 22$, is in accordance with the report for the typical subspecies (Sharkova 1996). *Centaurea kerneriana* subsp. *gheorghieffii* has $2n = 2x = 18$ sm + 2 st + 2 m – SAT = 22 chromosomes, with 1 pair less than *C. kerneriana* subsp. *kerneriana*.



Figs. 1-3. Mitotic metaphase plates and drawings of: **1,** *Centaurea cyanus*, $2n = 24$; **2, 3,** *C. kerneriana* subsp. *gheorghieffii*, $2n = 22$. — Scale bars = 10 µm.

972. ***Centaurea napulifera*** Rochel subsp. ***thirkei*** (Schultz. Bip.) Dostál — $2n = 20 + 1B$ (Fig. 4).

Bu: Northern Black Sea coast, between the village of Bulgarevo and the Cape Kaliakra, 70 m, 43°22'N, 28°25'E, 17 May 1996, *Bancheva & Denchev Sh9604* (SOM).

This subspecies has a limited distribution in E. part of the Balkan Peninsula, extending northwards S. Moldavia. The count is the first record for this subspecies. The karyotype consists of $2n = 2x = 6m + 10\ sm + 2\ st + 2\ st - SAT + 1\ B = 20 + 1B$ - chromosomes.

973. ***Centaurea stenolepis*** A. Kerner subsp. ***stenolepis*** — $2n = 22$ (Fig. 5).

Bu: The Eastern Rhodopes, Muglenishki Rid, above the village of Gorni Yuroutsi, 630 m, 41°19'N, 25°54'E, open grassy places in the forest, 04 Aug 1996, *Denchev Sh9655* (SOM).

Endemic to Europe (Au, Bu, Cz, Gr, Hu, It, Yu, Rm, Ukraine).

Our indication is in agreement with chromosome number reports given by Guinochet & Foissac (1962), Kuzmanov & Georghieva (1977, 1990), Sharkova (1996) and Sharkova & Peev (in press). The chromosomes are small and mostly of sm–type. The tetraploid chromosome number $2n = 44$ was reported by Lovric (1982) for *Centaurea stenolepis* subsp. *joannis* Kappot.

974. ***Centaurea triumfettii*** All. subsp. ***pirinensis*** (Degen, Urum. & H. Wagner) Dostál — $2n = 22$ (Fig. 6).

Bu: Pirin Mt, Banski Souhodol, 1700 m, 41°48'N, 23°27'E, Jul 1996, *Bancheva Sh9668* (SOM).

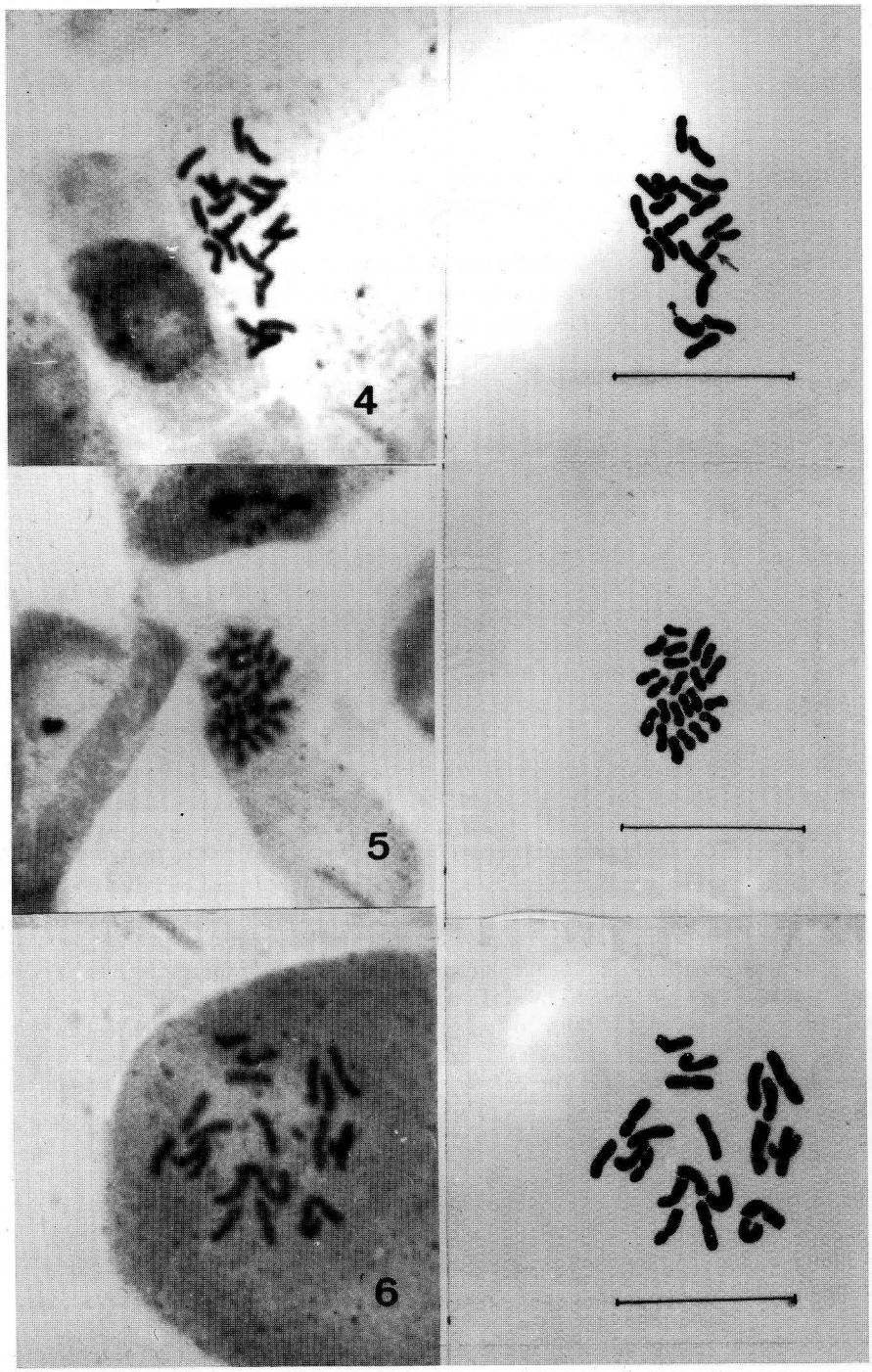
It is a Bulgarian endemic subspecies known only from Pirin Mt.

This is the first determination of the chromosome number for the subspecies. It agrees with observations on *C. triumfetii* by Baksay (1956, 1957), Siljak (1977), Kieft & Loon (1978), Monti & al (1978), Chichiricco & Tammaro (1980), Baltisberger & Huber (1987), Pogan & al. (1989), Sharkova (1996) and Sharkova & Peev (in press) with the corresponding result of $2n = 22$. The caryotype consists of $2n = 2x = 4m + 14sm + 4st = 22$. However, other chromosome numbers were also reported: $2n = 22 + 0 - 1$ (Damboldt & Matthäs 1975), $2n = 20$ (Cesmedziev 1976).

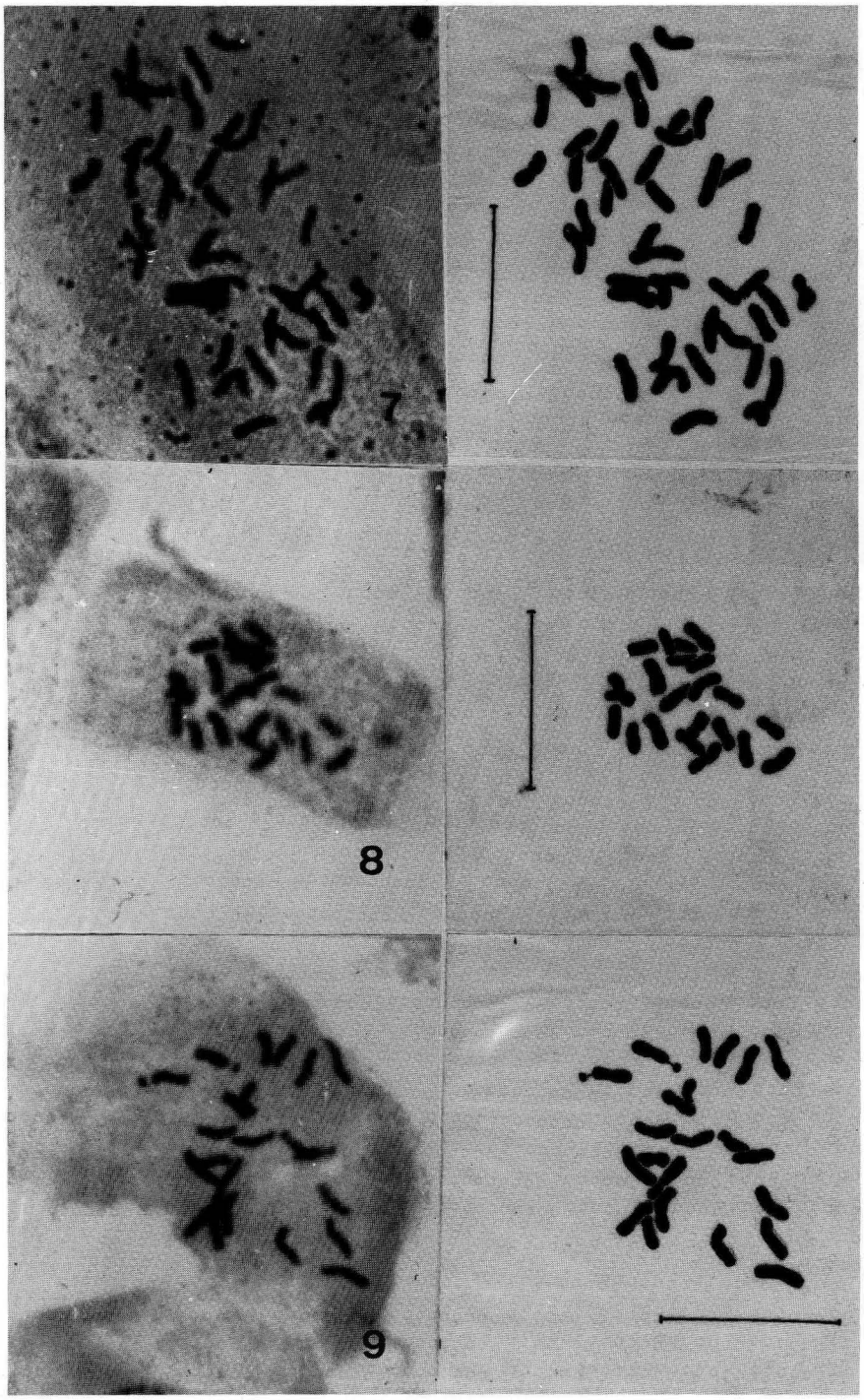
975. ***Centaurea uniflora*** Turra subsp. ***davidovii*** (Urum.) Dostál — $2n = 44$ (Fig. 7).

Bu: Central Balkan Mt, above Rai Hut, 42°42'N, 24°56'E, rocky slopes, 22 Sep 1997, *Bancheva Sh9735* (SOM).

A local endemic for the Western and Central Balkan Mt. It is the second chromosome report of this taxon. Sharkova & Peev (in press) recorded $2n = 4x = 44$ based on material from another locality of Central Balkan Mt. The karyotype consists of comparatively similar in lenght chromosomes of sm–type.



Figs. 4-6. Mitotic metaphase plates and drawings of: **4,** *C. napulifera* subsp. *thirkei*, $2n = 20 + 1B$; **5,** *C. stenolepis* subsp. *stenolepis*, $2n = 22$; **6,** *C. triumfettii* subsp. *pirinensis*, $2n = 22$. — Scale bars = 10 µm.



Figs. 7-9. Mitotic metaphase plates and drawings of: **7,** *C. uniflora* subsp. *davidovii*, $2n = 44$; **8, 9,** *Centaurea uniflora* subsp. *nervosa*, $2n = 22$. — Scale bars = 10 μm.

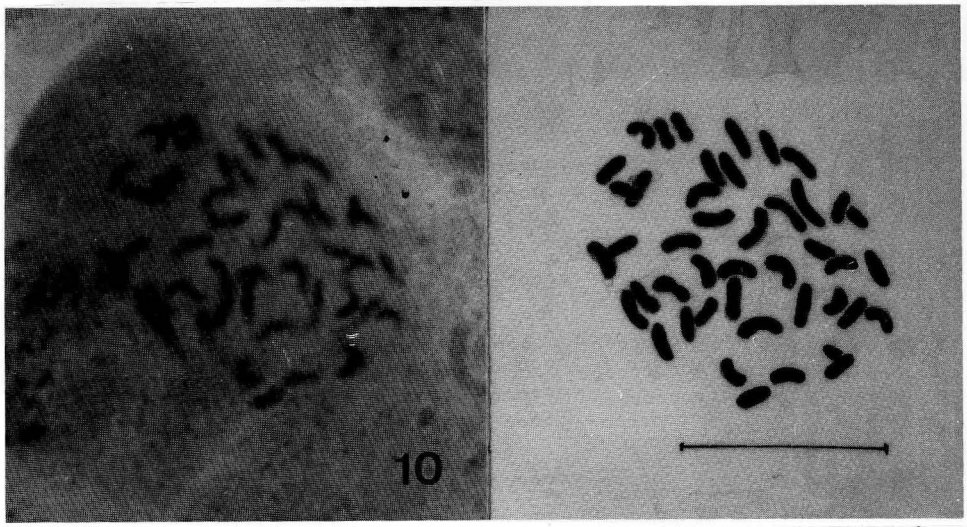


Fig 10. Mitotic metaphase plate and drawing of *Centaurea uniflora* subsp. *nervosa*, $2n = 44$. — Scale bar = 10 µm.

976. *Centaurea uniflora* Turra subsp. ***nervosa*** (Willd.) Bonnier & Layens — $2n = 22, 44$ (Figs. 8-10).

Bu: Rila Mt, above the Marichini Ezera Lake, 2600 m, 42°10'N, 23°35'E, subalpine grasslands, Jul 1996, *Bancheva Sh9645* (SOM). [$2n = 22$].
— Rila Mt, below the Ravni Chal Peak, 2500 m, 42°11'N, 23°45'E, subalpine grasslands, Aug 1996, *Bancheva Sh9650* (SOM). [$2n = 22$].
— Rila Mt, above the Suhoto Ezero Lake, 1950 m, 42°10'N, 23°25'E, subalpine grasslands, Sep 1996, *Dimitrov Sh9669* (SOM). [$2n = 44$].

This subspecies is distributed in Central and Southeastern Europe.

The somatic number $2n = 22$ has been observed in two populations. It agrees with the literature data of various authors (Favarger 1953, Gadella & Kliphus 1970, Kuzmanov & Georghieva 1983, 1990, Huber & Baltisberger 1992, Sharkova & Peev, in press) on plants from diverse localities of Europe.

In the mitotic metaphase plates (Figs. 8, 9) the submetacentric chromosomes are prevailing and there is only one pair SAT-chromosomes.

The tetraploid chromosome number $2n = 4x = 44$ is reported for the first time. The position of the centromere is not always clear.

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Reports (977-991) by M. Boscaiu, J. Riera, E. Estrelles & J. Güemes

977. ***Lathyrus latifolius*** L. — $2n = 14$ (Fig. 1).

Hs: Alacant, Benialí, Vall de Gallinera, 38°50'N, 0°13'W, 500 m, 5 Jul 1996, *J. Güemes & al.* (VAL 37103).

Lathyrus latifolius is widely distributed in Central and Southern Europe. The observed chromosome number $2n = 14$ confirms many previous reports. The same chromosome number was indicated from the Iberian Peninsula by Fernandes & Santos (1971, 1975) on material from Portugal, and by Santa Bárbara & al. (1994) on plants from Huelva, Spain. The majority of the chromosomes are submetacentric, the karyotype formula being: $2n = 4m + 6sm + 4st = 14$ chromosomes. In some of the metaphase plates we could distinguish that one pair of subtelocentric chromosomes bears satellites.

978. ***Lathyrus tremolsianus*** Pau — $2n = 14$ (Fig. 2).

Hs: València, Dos Aguas, Fuente del Real, 39°17'N, 0°43'W, 540 m, 28 Jun 1996, *J. Riera* (VAL 37104).

The species is an Ibero-levantine endemic, restricted to a few provinces in the S. E. Spain. *L. tremolsianus* was hitherto not karyologically studied. The somatic chromosome number $2n = 14$ that we found characterises the majority of *Lathyrus* L. species of the Mediterranean region. The karyotype formula is the same as for the previous taxon: $2n = 4m + 6sm + 4st = 14$ chromosomes. In all metaphase plates was clear that one pair of subtelocentric chromosomes bears satellites.

979. ***Erodium celtibericum*** Pau — $2n = 20$ (Fig. 3).

Hs: Teruel, Camarena de la Sierra, pico de Javalambre, 2000 m, 40°08'N, 0°03'W, 9 Sep 1997, *M. C. Escrivá* (cult. Centre Recuperació de El Saler, València).

The species is an endemic of the E. Iberian Mountain range. This is the second cytological report for the species. Our result agrees with the report published by Guittonneau (1967) also on material from Teruel. The majority of the chromosomes are metacentric or submetacentric, and two pairs of chromosomes bear satellites.

980. ***Erodium saxatile*** Pau — $2n = 20$ (Fig. 4).

Hs: Murcia, Moratalla, Sierra de la Muela, 38°15'N, 1°57'W, 1200 m, 12 Sep 1997, *J. Güemes* (cult. Jardí Botànic de València 1227).

Erodium saxatile is restricted to the S. E. Iberian Peninsula. The chromosome number is determined for the first time. In several individuals from one locality we found the somatic chromosome number $2n = 20$, which is the most frequent number within this genus. The chromosomes are like in the previous taxon, mostly metacentric or slightly submetacentric. One pair of satellited chromosomes has been observed.

981. *Fumana fontanesii* Clauson ex Pomel — $2n = 32$ (Fig. 5).

Hs: Murcia, Sierra de Espuña, Alhama de Murcia, 37°54'N, 1°37'W, 700 m, 15 Mar 1988, *M. L. Manso & al.* (VAL 10835).

Fumana fontanesii is distributed in S. E. Spain (limited to the Sierra de Espuña in the province of Murcia) and N. Africa (Algeria, Morocco and Tunisia). This is the first chromosome number report for the species. One previous count, under *Fumana calycina* (Dunal) Clauson by Haifa & Joumena (1991) cannot be attached to the genus *Fumana* (Dunal) Spach. The chromosome number $2n = 18$ reported by these authors completely disagrees with other counts in Mediterranean *Fumana*, which all indicate the somatic chromosome number $2n = 32$. It is very likely that the count of $2n = 18$ has been carried out on material of *Halimium calycinum* (L.) K. Koch. The metaphase plates were difficult to analyse, but we could distinguish the presence of at least one pair of satellited chromosomes.

982. *Biscutella valentina* (Loefl. ex L.) Heywood — $2n = 36$ (Fig. 6).

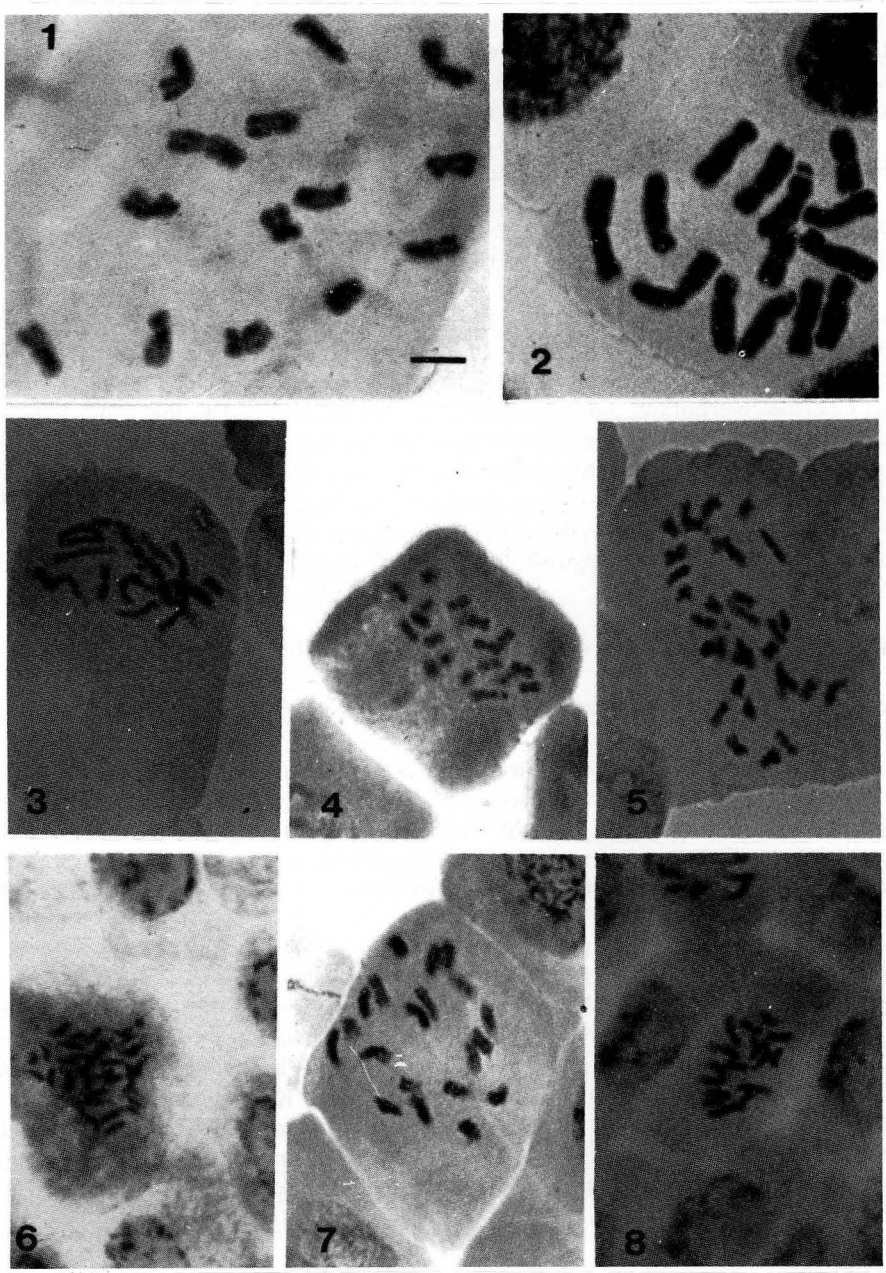
Hs: Alacant, Pego, 38°50'N, 0°08'W, 390 m, 5 Aug 1996, *J. Riera & al.* (VAL 37104).

Biscutella valentina has been cited from the whole Iberian Peninsula, but according to Crespo & al. (1992) the taxon is restricted to the S. and S. E. Spain. We counted $2n = 36$ on plants from «the ancient kingdom of València», which is the locus classicus of *B. valentina*. Our result coincides with three previous counts, two on material from the province of Cuenca, by Schonfelder (1968) and by Fernández Casas & al. (1977), and one from Portugal by Queirós (1973).

In our opinion it is very likely that the two chromosome counts from Cuenca refer to *B. valentina* s. str., but the report from Portugal obviously belongs to a different taxon. Heywood & Olowokudejo (1984) reported the number $2n = 18$ for plants from Jaén, identified as var. *valentina* (which cannot correspond to *B. valentina* s. str.) and for plants from Cuenca and València determined as var. *leptophylla* (Pau) Olow. (= *B. leptophylla* Pau). Besides the two numbers mentioned above, Grau & Klingenberg (1993) cited in Flora Iberica the number $2n = 54$ for some varieties of this species. We could say that the taxonomy of the genus *Biscutella* in the Iberian Peninsula, and especially of the species *B. valentina* is still confused. It is very likely that different cytotypes reported for *B. valentina* should be ascribed to different taxa.

983. *Pseudoscabiosa saxatilis* (Cav.) Devesa — $2n = 20$ (Fig. 7).

Hs: Alacant, Castell de Castells, Sierra de la Xortà, Font del Teix, 38°42'N, 0°10'W, 1040 m, 5 Sep 1996, *E. Estrelles & al.* (VAL 37105).



Figs. 1-8. Somatic metaphase plates of: **1**, *Lathyrus latifolius*, $2n = 14$; **2**, *L. tremolsianus*, $2n = 14$; **3**, *Erodium celtibericum*, $2n = 20$; **4**, *E. saxatile*, $2n = 20$; **5**, *Fumana fontanesii*, $2n = 32$; **6**, *Biscutella valentina*, $2n = 36$; **7**, *Pseudoscabiosa saxatilis*, $2n = 20$; **8**, *Scabiosa turolensis*, $2n = 16$. — Scale bar = 10 µm.

The species grows near the Eastern coast of the Iberian Peninsula, from Valencia to Alacant. The reported chromosome numbers for the genus *Pseudoscabiosa* Devesa are heterogenous. There are several previous reports indicating $2n = 18$ for species of this genus, namely that by Fernández Casas (1977) on plants from Granada, identified as *S. saxatilis* subsp. *grosii* Font Quer, reconsidered today as *Pseudoscabiosa grosii* (Font Quer) Devesa, and that by Francini & Messeri (1956) for *P. limonifolia* (Vahl) Devesa (under *Scabiosa limonifolia* Vahl).

On the contrary Verlaque (1982) published under *Scabiosa saxatilis* Cav. the somatic chromosome number $2n = 20$ for material from Alacant. Recent studies (V. Mayer pers. comm.) confirm this number both for *Pseudoscabiosa saxatilis* and *P. grosii*. Mayer & Ehrendorfer (1997) consider that it is possible that the basic chromosome number varies in different populations, or that «robersonian events» (= fusion or fision of chromosomes) occur frequently. Further karyological investigation on this genus is necessary, but it is obviously that besides the basic number $x = 9$ cited by Devesa (1984), the basic number $x = 10$ has to be linked to this genus. In the metaphase plates which we analysed the chromosomes are mostly metacentric or submetacentric, and one pair of chromosomes bears satellites.

984. ***Scabiosa turolensis*** Pau — $2n = 16$ (Fig. 8).

Hs: València, Ayora, carretera Euguera - Ayora, 38°58'N, 0°57'W, 1000 m, 15 Jul 1982, *J. Mansanet & A. Aguilella* (VAL 282).

The species is restricted to S. and C. Spain. The somatic chromosome number $2n = 16$ confirms one previous count by Fernández Casas (1977) from the province of Granada. Regarding the variation of the chromosome numbers within the genus *Scabiosa* L., there are reports of two ploidy levels (2x and 4x) and of two basic numbers ($x = 8$ and $x = 9$). According to Mayer & Ehrendorfer (1997) there is a correlation between sections and basic chromosome numbers, all members within one section being characterised by the same x.

985. ***Caralluma munbyana*** subsp. ***hispanica*** (Coincy) M. B. Crespo & Mateo — $2n = 22$ (Fig. 9).

Hs: Alacant, Altea, Serra Gelada, Penyes de l'Albir, 38°33'N, 0°03'W, 20 m, 2 Sep 1997, *M. C. Escrivá* (cult. Centre Recuperació de El Saler, València).

The taxon is restricted to the S. E. Iberian Peninsula (Alacant and Murcia). We counted $2n = 22$ in various plants of one population from Alacant, confirming a previous count by Albers & Delfs (1983). The chromosomes are small and rather homogenous in size and shape.

986. ***Echium saetabense*** Peris, Figuerola & Stübing — $2n = 16$ (Fig. 10).

Hs: València, Ayora, Cueva Horadada, 39°02'N, 0°54'W, 1000 m, 27 Jul 1995, *J. Riera & J. Güemes* (VAL 3710).

The species is endemic to the E. Iberian Peninsula (province of València). This is the first chromosome number determination for the species. There are reports of different

ploidy levels and even of different base numbers within this genus, but our count corrresponds to most reports from the Iberian Peninsula. All chromosomes are metacentric or submetacentric.

987. ***Antirrhinum hispanicum*** Chav. — $2n = 16$ (Fig. 11).

Hs: Granada, Órgiva, cruce de la carretera de Órgiva a Mecina Bombarón, taludes pedregosos de la carretera, 36°53'N, 03°25'W, 800 m, 19 Apr 1995, *J. Güemes 982* (VAL 35185).

The taxon is endemic to the S. Iberian Peninsula, limited to the province of Granada. There are three previous counts for *A. hispanicum*, by Heitz (1927), Baur (1932), and Löve & Kjellquist (1974). The first two counts lack the source of material, and the last one is obviously erroneous. Considering the origin of the material, the report by Löve & Kjellquist should be attached to *A. australe* Rothm. Our result confirms the somatic chromosome number of $2n = 16$, which is the single number reported within this genus. In the analysed metaphase plates the chromosomes are mostly metacentric or slightly submetacentric.

988. ***Antirrhinum molle*** L. — $2n = 16$ (Fig. 12).

Hs: Huesca, Sopeira, monasterio abandonado, sobre los muros del cementerio, 42°19'N, 0°44'E, 800 m, 25 Aug 1994, *J. Güemes 974* (VAL 35176).

The taxon is endemic to the N. E. Iberian Peninsula, growing in the Pyrenees and adjoining mountains (Huesca and Lleida provinces). There is only one previous report on this species, namely that of Heitz (1927), in which neither locality or voucher specimen are indicated. Our chromosome count confirms the number determined by Heitz and is in agreement with all reports for the genus *Antirrhinum*. Due to the small size of the chromosomes it is difficult to analyse the karyotype of this species. We could only observe that the majority of chromosomes are metacentric.

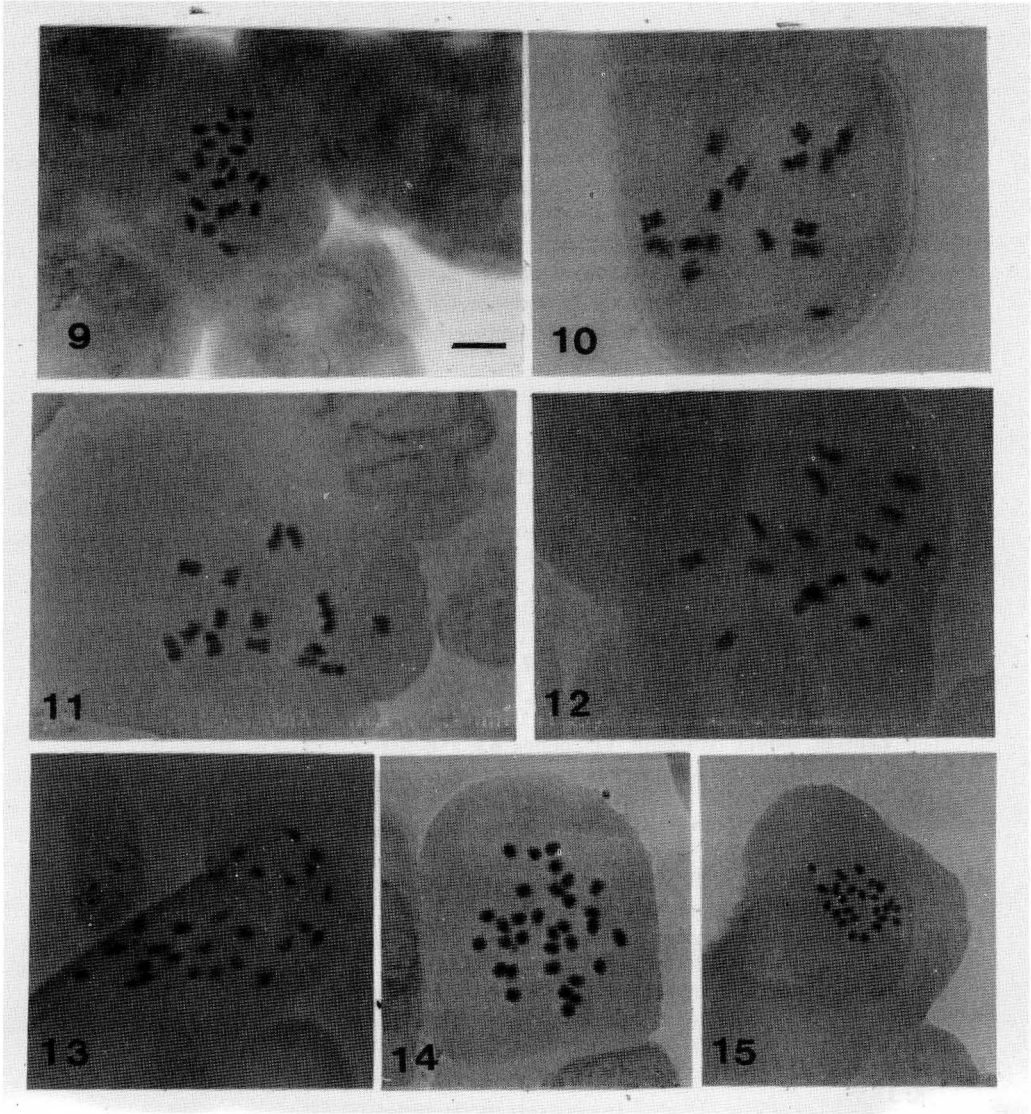
989. ***Sideritis leucantha*** subsp. ***albicaulis*** Obón & Rivera — $2n = 26$ (Fig. 13).

Hs: Alacant, Finestrat, pr. Tapiada, 38°34 N, 0°10'W, 340 m, 17 Jun 1997, *J. Riera & al.* (VAL 37058).

The taxon is restricted to the E. Iberian Peninsula (provinces of Alacant, Castelló, València and Tarragona). Two different chromosome numbers have been previously reported, $2n = 26$ by Gómez García (1970) and $2n = 24$ (+ 2B) by Fernández Peralta (1981). Our result confirms the report published by Gómez García under *S. tragoriganum* Lag., and revised as *S. leucantha* subsp. *albicaulis* by Obón & Rivera (1994). We could distinguish two satellited chromosomes in the metaphase plates observed.

990. ***Teucrium flavum*** subsp. *glaucum* (Jordan & Fourr.) Ronniger — $2n = 32$ (Fig. 14).

Hs: Alacant, Dénia, El Montgó, 38°48'N, 0°08'E, 400 m, 5 May 1980, *A. Aguilella* (VAL 7362).



Figs. 9-15. Somatic metaphase plates of: **9**, *Caralluma munbyana* subsp. *hispanica*, $2n = 22$; **10**, *Echium saetabense*, $2n = 16$; **11**, *Antirrhinum hispanicum*, $2n = 16$; **12**, *A. molle*, $2n = 16$; **13**, *Sideritis leucantha* subsp. *albicaulis*, $2n = 26$; **14**, *Teucrium flavum*, subsp. *glaucum* $2n = 32$; **15**, *T. lepicephalum*, $2n = 26$. — Scale bar = 10 µm.

Teucrium flavum is a W. Mediterranean taxon. In the Iberian Peninsula it is restricted to the Alacant province in the E. Spain and in the Balearic Isles to the island of Eivissa (Ibiza). There are several chromosome number reports for this taxon. The chromosome number observed, $2n = 32$, corresponds to the previous reports from the Iberian Peninsula by Báyon (1989) and by Fernández Casas & al. (1980), both on material from Alacant. Báyon (1990) repeatedly found $2n = 20$ on plants from Corsica. The chromosomes are homogenous in size and shape; one pair bears satellites.

991. ***Teucrium lepicephalum*** Pau — $2n = 26$ (Fig. 15).

Hs: Alacant, Finestrat, Baranc Salat, 38°34'N, 0°14'W, 260 m, 16 Jul 1997, *J. Riera & J. Güemes* (VAL 37062).

The species is a S. E. Iberian endemic, restricted to a few localities in the province of Alacant. The somatic chromosome number $2n = 26$ we determined corresponds to previous counts by Valdés Bermejo & Sánchez Crespo (1978) and by Fernández Casas & al. (1980). The chromosomes are homogenous in size and shape, but much smaller as compared to *T. flavum*.

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Reports (992-993) by Dessislava Dimitrova

992. ***Crepis viscidula*** Froelich — $2n = 12$ (Fig. 1A, B, C, D, E, F, G); $2n = 12+0-1B$.

Bu: Vitosha Mt, open grassy places above Aleko hut, along the path to Tcherni vrah, 42°35'N, 23°18'E, 1800 m alt., silicate, *Dimitrova DD4441* (SOM).
— Vitosha Mt, open grassy places on the ski-track Konyarnika, 42°36'N, 23°16'E, 1500 m alt., silicate, *Dimitrova DD4444* (SOM).
— Vitosha Mt, in the meadows around village Zheleznitsa, near the spout Boryana, 42°33'N, 23°22'E, c. 800 m alt., silicate, *Tsoneva DD45267* (SOM).
— Slavyanka Mt, in a forest of *Pinus heldreichii* in the locality Vapata above village Paril, 41°25'N, 23°40'E, 1700 m alt., limestone, *Dimitrova DD4546* (SOM)*.
— Rila Mt, open grassy places near Beli Izkar dam, 42°09'N, 23°24'E, 2000 m alt., silicate, *Dimitrova DD45247* (SOM).
— Rila Mt., open grassy places around Suhoto lake, 42°08'N, 23°35'E, 1450 m alt., silicate, *Dimitrova DD45250* (SOM).
— Pirin Mt., locality Bansky Suhodol, in a *Pinus heldreichii* forest, 41°49'N, 23°27'E, 1750 m alt., limestone, *Dimitrova DD45269* (SOM).

* The species is reported here for the first time for Slavyanka Mt.

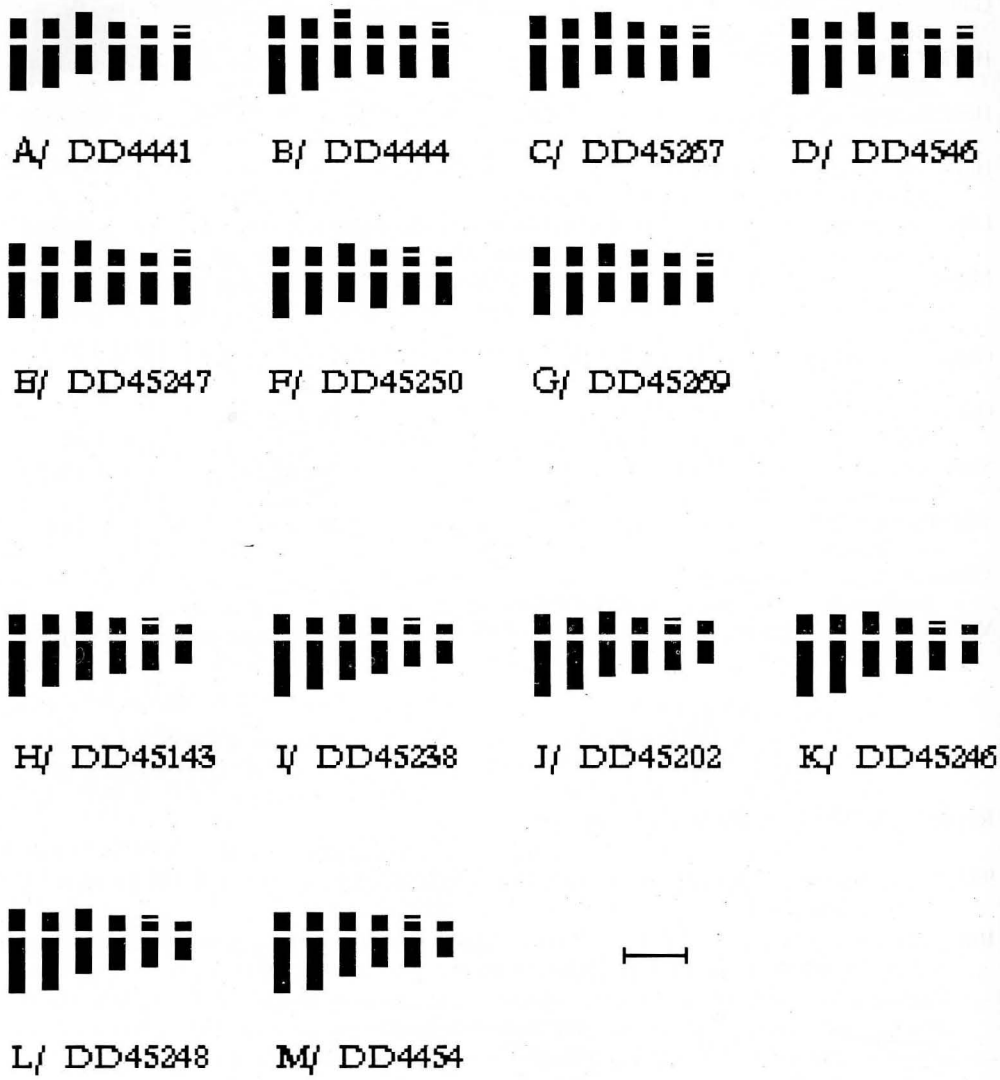

Fig. 1. Idiograms of: **A-G,** *Crepis viscidula*, $2n = 12$; **H-M,** *C. paludosa*, $2n = 12$. The idiograms are drawn using the relative length values calculated on the basis of five metaphase plates, the total karyotype length (without Bs) taken as 200 %. — Scale bar = 20 relative units.

The species is a Balkan subendemic distributed in the southern part of Central Europe (Hungary, Rumania) and the Balkan peninsula: Bulgaria, the territory of former Yugoslavia, Albania, extending southwards to North Greece occupying mesophytic subalpine meadows, mostly on silicate, but sometimes on limestone, too.

The chromosome number $2n = 12$ confirms the previous counts of Kuzmanov & al. (1981) for a population from Rila Mt, and these of Babcock & Cameron (1934), Babcock

(1942, 1947a, b) from foreign localities. The karyotypes of pops. DD4441, DD4546, DD45250 consist of one metacentric, three submetacentric, and two subtelocentric pairs (Levan & al. 1964), and one pair of chromosomes wearing the satellites. The SAT-pair in pops. DD4441 and DD4546 is of subtelocentric type, while in pop. DD45250 it is of submetacentric type.

The karyotypes of pops. DD4444, DD45267, DD45247, DD45269 consist of one metacentric and eight submetacentric pairs, and a SAT-pair which is submetacentric in all populations but in DD4444 it is of metacentric type. In all karyotypes the first two pairs are submetacentrics of similar length followed by the third, always metacentric, pair. The rest three pairs are shorter and much alike. Only in one of the examined metaphase plates of pop. DD45269 a B-chromosome was observed. It was well distinguished from the rest chromosomes in the set - much shorter and of metacentric type. Similar Bs were observed by Tsitlyonok & Pulkina (1991) for *C. sibirica* L.

993. *Crepis paludosa* Moench — $2n = 12$ (Fig. 1H, I, J, K, L, M); $2n = 12+0-1B$.

Bu: Western Stara Planina Mt, damp places by the river above the rest-house in the foothills of Midzur peak, 43°24'N, 22°43'E, 700 m alt., silicate, *Dimitrova DD45143* (SOM).
— Vitosha Mt, by a stream in a spruce forest in Bistrishko braniste reserve, 42°35'N, 23°18'E, 1450 m alt., silicate, *Dimitrova DD45238* (SOM).
— Osogovska Mt, damp places along the road near the rest house Trite buki, 42°12'N, 22°22'E, silicate, *Dimitrova DD45202* (SOM).
— Rila Mt, damp places near Beli Izkar dam, 42°08'N, 23°35'E, 2000 m alt., silicate, *Dimitrova DD45246* (SOM).
— Rila Mt, along the path from locality Kirilova polyana to Suhoto lake, 42°06'N, 23°23'E, damp places in a mixed spruce-beech forest, 1450 m alt., silicate, *Dimitrova DD45248*, (SOM).
— Rhodopi Mt, Pamporovo vacation complex, damp places at the beginning of the lift-track in the foothills of Snezhanka peak, 41°42'N, 24°39'E, 1400 m alt., silicate, *Dimitrova DD4454* (SOM)

The distribution range of this Euro-Siberian element covers Europe, Caucasia and Siberia. The territory of Bulgaria is one of the most southern parts of the distribution area, due to which the species populations are found only in the mountains, often at considerable altitude (up to c. 2000 m alt.).

Its preferable habitats are damp places along mountain streams in mixed or *Abies* forests on silicate terrains.

The chromosome number $2n = 12$ is published for the first time from Bulgarian localities in the current paper.

It confirms the counts of Babcock (1947b), Majovsky & al. (1970), Dvorak & Dadakova (1977a, b), Morton (1977), Mizianty & al. (1983), Lavrenko & Serditov (1987), Lavrenko & al. (1990, 1991) for elsewere.

The karyotypes of all studied populations could be summarized under the formula $2n = 2x = 2m + 8sm + 2sm\text{-}SAT = 12$ chromosomes.

Exceptions are only pops. DD45238 and DD4454 where no metacentric pair was found but still the arm ratio (r=l/s) for the third in length chromosome pair is about 1.9 which value is close to the metacentric range.

The karyotypes of all studied populations consist of four "long" submetacentrics of similar length followed by a metacentric pair, and then come the rest three "short" submetacentric pairs, the last sometimes 2.54 fold shorter than the longest one. It could be assumed that this grouping of the chromosomes of *C. paludosa* marks the beginning of asymmetrization fully exhibited in the more advanced *Crepis* taxa.

Only in one of the studied metaphase plates of pop. DD4454 a metacentric B-chromosome was observed which was well distinguished being much shorter than the rest of the chromosomes. Lavrenko & al. (1988) also have reported Bs from populations in the Urals.

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Reports (994-995) by T. Cusma Velari, L. Feoli Chiapella & C. Cristin

994. ***Genista umbellata*** (L'Hér.) Poiret — $2n = 46$ (Fig. 1a, b).

Hs: Ronda, P.to de las Abejas, near the road, on limestone soil, 36°45'N, 4°56'W, 820 m, 3 Aug 1989, *L. Feoli Chiapella et E. Feoli* (TSB) s.n.
— Marbella, Málaga, 36°28'N, 4°53'W, 1997, seeds obtained from Jardín Botánico - Historico La Concepción (Málaga) (s.n., s. coll., s. exsicc.)

Genista umbellata grows in the southern and southeastern part of the Iberian Peninsula and on the Mediterranean coast of Morocco and of western Algeria (Willkomm 1880, Jahandiez & Maire 1932, Quezel & Santa 1962, Maire 1987).

The chromosome number of $2n = 46$ confirms the reference reported by Sañudo (1973): $n = 23$, on samples from Almería (Hs), while Santos (1945) counted $2n = \pm 42$ on material from "Hort. Bot. Univ. Coimbra". Furthermore Sañudo (1973) found $n = 23$ on specimens of *Genista umbellata* subsp. *equisetiformis* (Spach) Rivas Goday & Rivas Martínez [sub var. *equisetiformis* (Spach) Ceballos y C. Vic.]. Chromosome size ranges between 0.6 and 1.83 µm. The chromosome number $2n = 46$ may be considered a case of hypoaneuploidy (descending aneuploidy) with the basic number $x = 12$ and is not frequently found in *Genista*. It was sporadically found in *G. germanica* L. ($2n = 46$-48) and in *G. sagittalis* L. [= *Chamaespartium sagittale* (L.) P. Gibbs; $2n = \pm 46$, 48, Santos 1945 e $2n = 44$ (46), Gadella & Kliphuis 1972].

Genista umbellata is the only kariologically studied species within sect. *Cephalospartum* Spach. The section has a western Mediterranean distribution. It includes six species limited to northern Africa, from Morocco to Libya: *G. capitellata* Cosson, *G. cephalantha* Spach, *G. clavata* Poiret, *G. demnatensis* Murb. [= *G. cephalantha* subsp. *demnatensis* (Murb.) C. Raynaud], *G. microcephala* Cosson & Durieu e *G. quadriflora* Munby, and *G. umbellata*, the only species present in Europe (Gibbs 1966, Greuter & al. 1989).

995. ***Genista tenera*** (Jacq. ex Murray) O. Kuntze — $2n = 48$, 72 (Fig. 1c).

Lu: Madeira, 32°40'N, 16°57'W, seeds obtained from Jardim Botânico da Madeira (s.n.).

Genista tenera is endemic to Madeira (Hansen 1970, Hansen & Sunding 1985). Both chromosome numbers $2n = 48$ (Fig. 1c) and $2n = 72$ were counted. Chromosome size ranges between 0.63 and 1.50 µm.

The number $2n = 48$ confirms the reference reported by Dalgaard (1986) on material from Boca da Encumeada (Madeira).

Furthermore it is worth noting that $2n = 48$ is by far the most common chromosome number, both in *Genista* and in the whole *Genisteae* tribe (Sañudo 1979).

The number $2n = 72$ for this taxon is new; besides, it is rarely reported for the genus *Genista*. It was found by Sañudo (1972), on material coming from Sierra Segura (Jaén, Hs), for *G. pseudopilosa* Cosson, a western Mediterranean species known for southern and southeastern Spain, for Morocco and Algeria (Willkomm 1880, Gibbs 1966, Greuter & al. 1989) and belonging to sect. *Spartioides*.

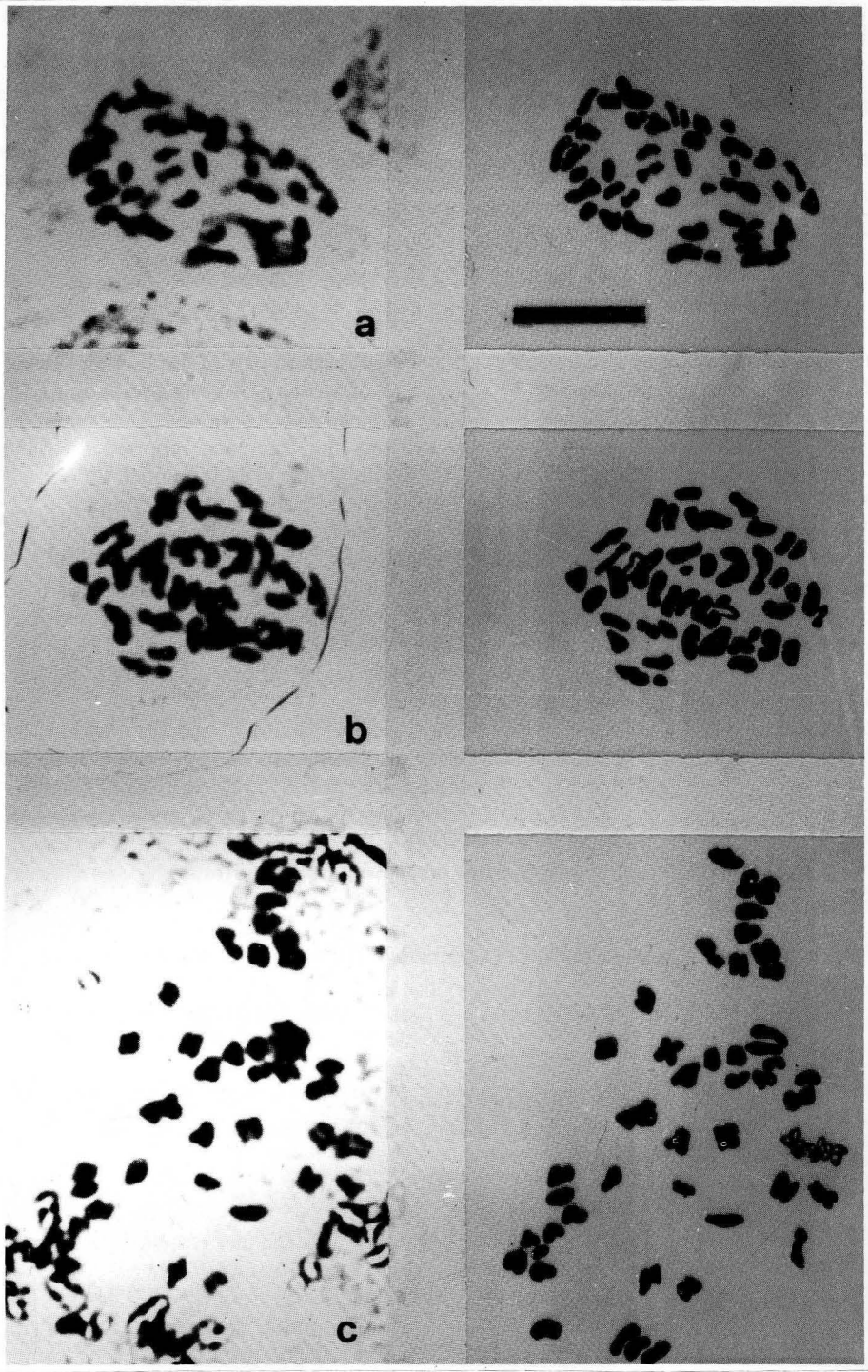

Fig. 1. A photomicrograph and a drawing of somatic metaphase plate of: **a,** *Genista umbellata* - Ronda and **b,** *G. umbellata* - Marbella, $2n = 46$; **c,** *Genista tenera*, $2n = 48$. — Scale bar = 5 µm.

The same number was counted once again by Sañudo (1972) for *G. tridens* (Cav.) DC., on material from S. Carbonera (Cádiz, Hs) and by Humphries & al. (1978) for *G. triacanthos* Brot. subsp. *vepres* (Pomel) P. Gibbs, on material from Essaouira - Saji (Morocco). The last two taxa belong to sect. *Voglera* (Gaertn., Mey. & Schreb.) Spach and are spread in the southern part of the Iberian Peninsula and in northwestern Africa (Gibbs 1966, Maire 1987).

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Report (996) by T. Cusma Velari, L. Feoli Chiapella & L. Mangiavacchi

996. ***Genista lobelii*** DC. var. ***mauritanica*** Batt. [= *G. lobelii* subsp. *longipes* (Pau) Heywood var. *mauritanica* Batt. apud Raynaud; *G. aspalathoides* Lam. subsp. *erinaceoides* (Loisel.) Maire var. *mauritanica* (Batt.) Maire apud Maire — $2n = 96$ (Fig. 1).

Ma: Azrou, Ifrane, limestone rocks, 33°32'N, 4°57'W, 1600 m ca., 3 Jul 1989, *L. Feoli Chiapella et E. Feoli* (TSB) s.n.

This taxon belongs to a group of species with a western Mediterranean distribution (*Genista aspalathoides* aggr., Greuter & al. 1989) belonging to sect. *Erinacoides* Spach.

G. aspalathoides Lam., growing in Algeria, Tunisia, Pantelleria and southwestern Sicily (Pignatti 1982, Maire 1987) has not been examined karyologically yet.

The chromosome number $2n = 96$ was found; chromosome size ranges between 0.20 and 0.85 µm.

There is no reference for karyological data of this taxon, which is endemic to the Middle Atlas Mountains and to the "Hauts Plateaux" of central-eastern Morocco and eastern Algeria (Raynaud 1979, Maire 1987).

Several Spanish endemic taxa (Gibbs 1966) show chromosome numbers deriving from the basic number $x = 9$. In fact Sañudo (1971, 1973) found $n = 9$, $2n = 18$ in populations of *Genista lobelii* DC. subsp. *longipes* (Pau) Heywood from Sierra Espuña (Murcia) and M. Maimón (Almería).

Sañudo (1974) and Sañudo & Ruiz Rejon (1975) counted $n = 18$, $2n = 36$ on populations of same species from Sierra Tejeda (Granada), regarded by Vicioso (1953) as a distinct taxonomic unit, *G. tejedensis* (Porta & Rigo) Vicioso.

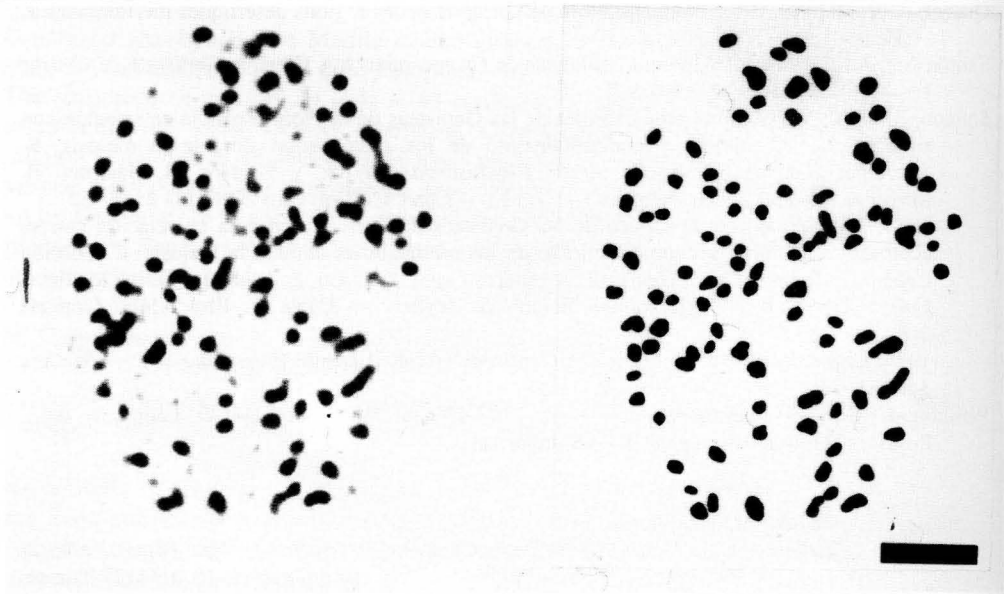

Fig. 1. A photomicrograph and a drawing of somatic metaphase plate of *Genista lobelii* var. *mauritanica*, $2n = 96$. — Scale bar = 5 µm.

The basic chromosome number $x = 9$ is thus by far the most frequent in sect. *Erinacoides*, particularly in a series of species endemic to southern and eastern Spain (*Genista lobelii* subsp. *longipes, G. mugronensis, G. versicolor* subsp. *versicolor* and subsp. *pumila*), with diploids placed in the southeastern part of the Iberian Peninsula and tetraploids reaching southern and northern areas as well. Another phytogeografic district characterized by the basic number $x = 9$ is the Sardinian – Corsican district. All Sardinian endemic taxa are diploids, as well as *Genista desoleana*, the only species that reaches the Italian Peninsula. *G. salzmannii* has diploid populations in Corsica and tetraploid populations in Sardinia.

Some Iberian taxa (*Genista hystrix, G. polyanthos* and *G. sanabrensis*), with a mainly western distribution, show a basic number $x = 12$. *G. legionensis*, endemic to limited area of northern Spain (Cordillera Cantábrica) differs from the previous species for its basic number $x = 10$.

Genista lobelii var. *mauritanica* shows octoploid features with a basic number $x = 12$ and thus seems connected to the taxa of the western Iberian Peninsula.

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Reports (997-1000) by Levent Şik & Orhan Küçüker

997. ***Colchicum bivonae*** Guss. — $2n = 36$ (Fig. 1a).

Tu: Çanakkale (Turkey), Küçükkuyu, 39°33'N, 26°26'E, streamsides, among *Olea* and *Platanus*, 100-150 m, 20 Oct 1995, *L. Şik.*

Karyological investigations were made on metaphases of meristematic cells from root tips of plants. After pretreatment with 8-hydroxyquinoline for 3 hours at room temperature, the root tips were fixed in Carnoy 3:1 for 24 hours at +4° C and staining with 2% acetocarmine. Squashes were made in 45% acetic acid.

The determination of centomeric position was not possible because some chromosomes were too small. However, it was possible to classify the chromosomes within three groups as "long", "middle (or medium)" and "short" (Levan 1940, Küçüker 1985, 1990).

The same method has been applied also to the next taxa. We couldn't recognize any of the satellite in the chromosomes of all examined species.

Distributed in Sicily, Italy, Corsica, Sardinia, Yugoslavia, Greece, Bulgaria.

The chromosome number $2n = 36$ confirms the number cited in the literature (Levan 1940, Sato 1942 and D'Amato 1956). The morphology of the chromosomes was determined as follows: 2 pairs longer than the others (c. 4.5-6.0 µm); 7 pairs in medium length (c. 2.2-3.7 µm); 9 pairs short (c. 0.7-1.5 µm).

998. ***Colchicum boissieri*** Orph. — $2n = 46$ (Fig. 1b).

Tu: Manisa (Turkey), Spil Dağı, Atalani, 38°34'N, 27°27'E, *Pinus* and *Juniperus* scrub, 1250 m, 28 Sep 1994, *L. Şik.*

Distributed mainly in Greece.

The chromosome number of *C. boissieri* was found to be $2n = 46$. This count is the first record for the species. Its karyotype morphology was determined as follows: 3 pairs longer than the others (c. 3.2-3.6 µm); 5 pairs in medium length (c. 2.2-2.9 µm); 15 pairs short (c. 0.6-1.0 µm).

999. ***Colchicum triphyllum*** G. Kunze — $2n = 42$ (Fig. 1c).

Tu: Manisa (Turkey), Spil Dağı, Kizilbel, 38°34'N, 27°27'E, open slopes near melting snow, 1200 m, 03 Feb 1996, *L. Şik.*

Distributed in N. W. Africa, C. & S. Spain, Greece to S. Russia.

The chromosome number of *C. biebersteinii* Rouy. (= *C. triphyllum*) was reported $2n = 20$-21 (D'Amato 1956). The chromosome number $2n = 60$ has been found in *C. triphyllum* according to Persson (1992) in Greece. Differences in the chromosome numbers are the result of poliploidy. Its karyotype morphology was determined as follows: 3 pairs longer than the others (c. 4.5-6.0 µm); 10 pairs in medium length (c. 3.0-3.7 µm); 8 pairs short (c. 1.5-2.2 µm).

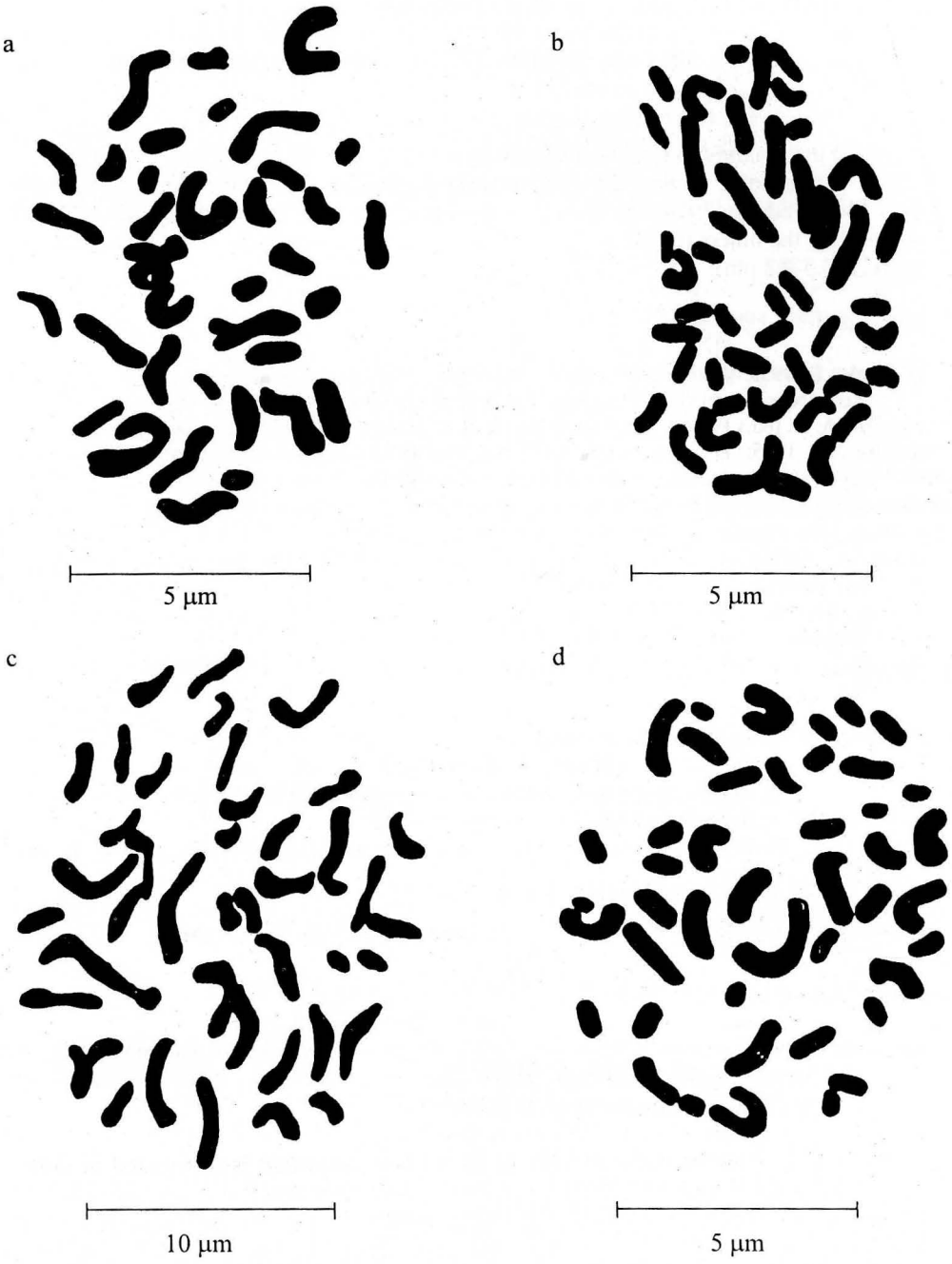

Fig. 1. Karyotypes of: **a,** *Colchicum bivonae*; **b,** *C. boissieri*; **c,** *C. triphyllum*; **d,** *C. variegatum*.

1000. ***Colchicum variegatum*** L. — $2n = 44$ (Fig. 1d).

Tu: Izmir (Turkey), Nif Dağı, 38°23'N, 27°22'E, *Arbutus* and *Juniperus* scrub, 150 m, 20 Sep 1994, *L. Şik.*

Distributed mainly in Greece (Cyclades).

The chromosome number $2n = 44$ confirms the counts cited in literature (Levan 1940, Sato 1942, Fedorov 1974). Its karyotype morphology was determined as follows: 4 pairs longer than the others (c. 3.2-3.6 µm); 8 pairs in medium length (c. 1.7-2.4 µm); 10 pairs short (c. 0.5-0.8 µm).

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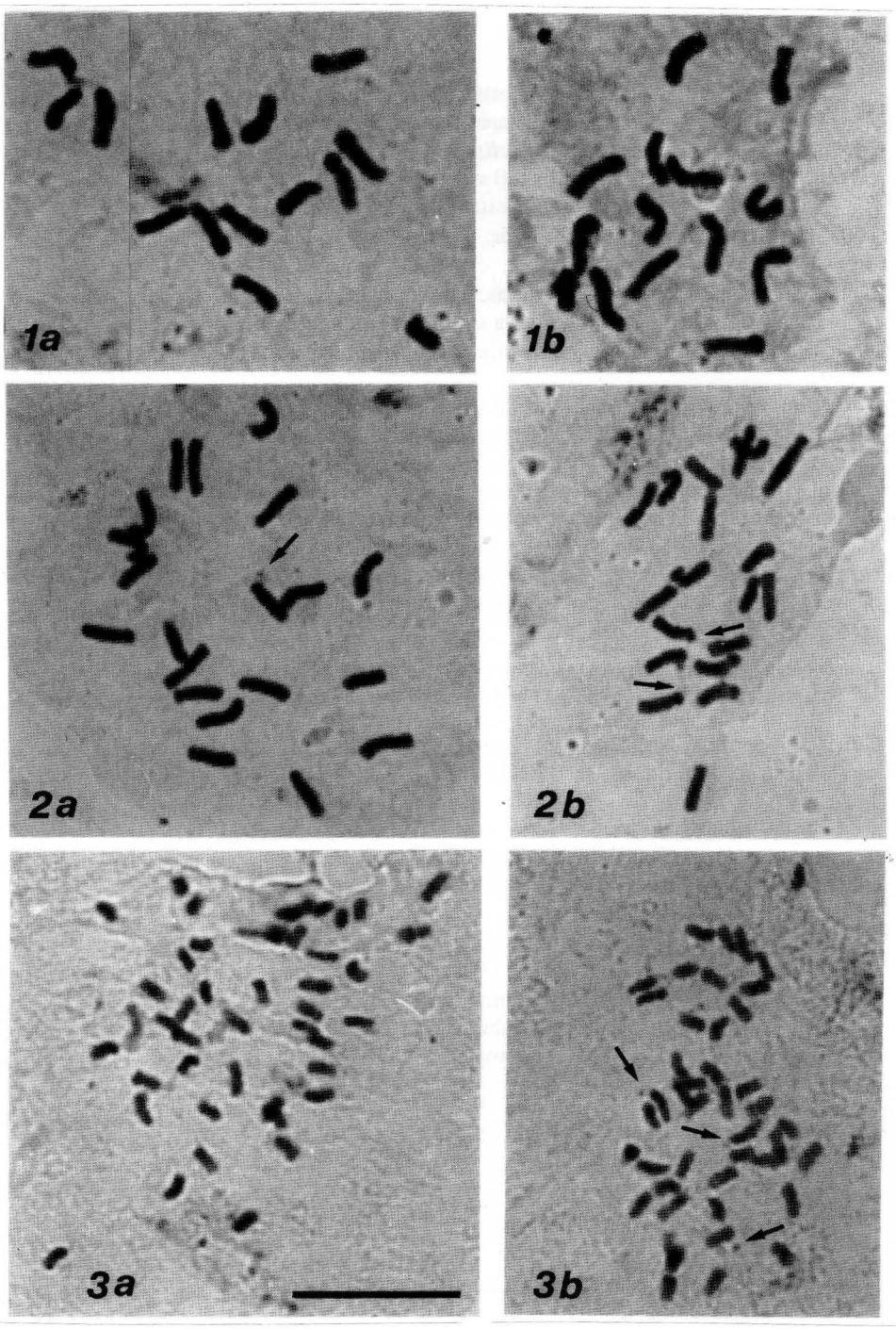
Reports (1001-1008) by E. P. Bareka, T. Constantinidis & G. Kamari

1001. ***Anthriscus tenerrima*** Boiss. & Spruner — $2n = 14$ (Fig. 1a, b).

Gr: Sterea Ellas, Nomos Attikis, Mt Pastra, Choni ravine between the summits Plagia and Stefani, stony limestone slopes and scree, 38°11'N, 23°23'E, 500-650 m, 24 Apr 1996, *Constantinidis 6240* (UPA).

An annual species of sect. *Anthriscus, Anthriscus tenerrima* is distributed in Greece and Anatolia. Its chromosome number of $2n = 14$, already reported earlier (Spalik 1996, origin of material not specified), is confirmed here, and microphotographs of the karyotype are presented. Most of the chromosomes in the karyotype (Fig. 1a, b) are submetacentric (sm), with two chromosome pairs being metacentric (m). The chromosome size ranges from 4.2 to 2.9 µm.



Figs. 1-3. Mitotic metaphase plates of: **1a, b,** *Anthriscus tenerrima*, $2n = 14$; **2a, b,** *Carum rupestre*, $2n = 20$; **3a, b,** *Centaurea sonchifolia*, $2n = 44$. Arrows indicate SAT-chromosomes. — Scale bar = 10 µm.

Three different chromosome numbers are known in the genus *Anthriscus*, namely $2n = 14$, 16 and 18. *A. tenerrima* shares the same number with the relatively widespread and taxonomically related *A. caucalis* M.-Bieb., while $2n = 16$ is the most common chromosome number in the genus.

1002. *Carum rupestre* Boiss. & Heldr. — $2n = 20$ (Fig. 2a, b).

Gr: Peloponnisos, Nomos Korinthias, Mt Killini, S. S. W. parts of Megali Ziria summit, rocky slopes and a ravine with a small stream, mainly limestone, 38°54'N, 22°23'E, 1750 m, 14 Aug 1997, *Constantinidis & Dardioti cult. K 61*.

Carum rupestre is distributed in montane areas of Greece, Albania and former Jugoslavia. Previous counts include those of Strid & Franzén (1981) from Mt Olimbos as *C. adamovicii* Halácsy, and Franzén & Gustavsson (1983) from Mt Timfristos, both in central Greece. Our count comes from the type locality of the species (Mt Killini) and confirms the already known chromosome number. Moreover, a microphotograph of the karyotype is presented here. Two chromosome pairs of the complement are metacentric (m), one is submetacentric (sm), while the rest are acrocentric (st). Their size ranges between 3.5 to 2.5 µm. Two small satellites were observed on the short arm of an acrocentric chromosome pair.

1003. *Centaurea sonchifolia* L. — $2n = 44$ (Fig. 3a, b).

Gr: Peloponnisos, Nomos Achaias, close to the village of Metochi, Strofilia *Pinus pinea* forest, in sand dunes, 38°07'N, 21°24'E, 10 m, 22 May 1996, *Kamari & al. 26260* (UPA).

Centaurea sonchifolia is a Mediterranean element. In Greece it occurs in the Ionian Islands, W. Sterea Ellas and W. & S. Peloponnisos.

The chromosome number $2n = 4x = 44$ confirms previous counts from Greece; from approximately the same locality Routsi & Georgiadis (1988) and from a southern population Damboldt & Matthäs (1975) have reported the same chromosome number. A karyotype microphotograph is presented here, which is similar to the karyotype drawing given by Damboldt & Matthäs (l.c.) but differs in the existence of two pairs of sm-SAT chromosomes. The karyotype is symmetrical and consists of small, 2.3-1.1 µm, mostly metacentric chromosomes.

1004. *Crepis incana* Sm. — $2n = 4x = 16$ (Figs. 4a, b & 9c).

Gr: Sterea Ellas, Nomos Attikis, Mt Gerania, Makriplagi summit, stony calcareous slopes, 38°01'N, 23°07'E, 1320 m, 20 Jun 1992, *Constantinidis 2633* (UPA).

An endemic *Crepis* species distributed in the mountains of N. Peloponnisos, C. & E. Sterea Ellas and Evvia (Babcock 1947b, Kamari 1991). From 13 different populations investigated cytologically so far (Babcock 1947a, Kamari 1992), only three from two mountains (Parnitha and Klokos) are tetraploid with $2n = 4x = 16 + 0$-1B-chromosomes, while all the others are diploid with $2n = 8$ chromosomes.

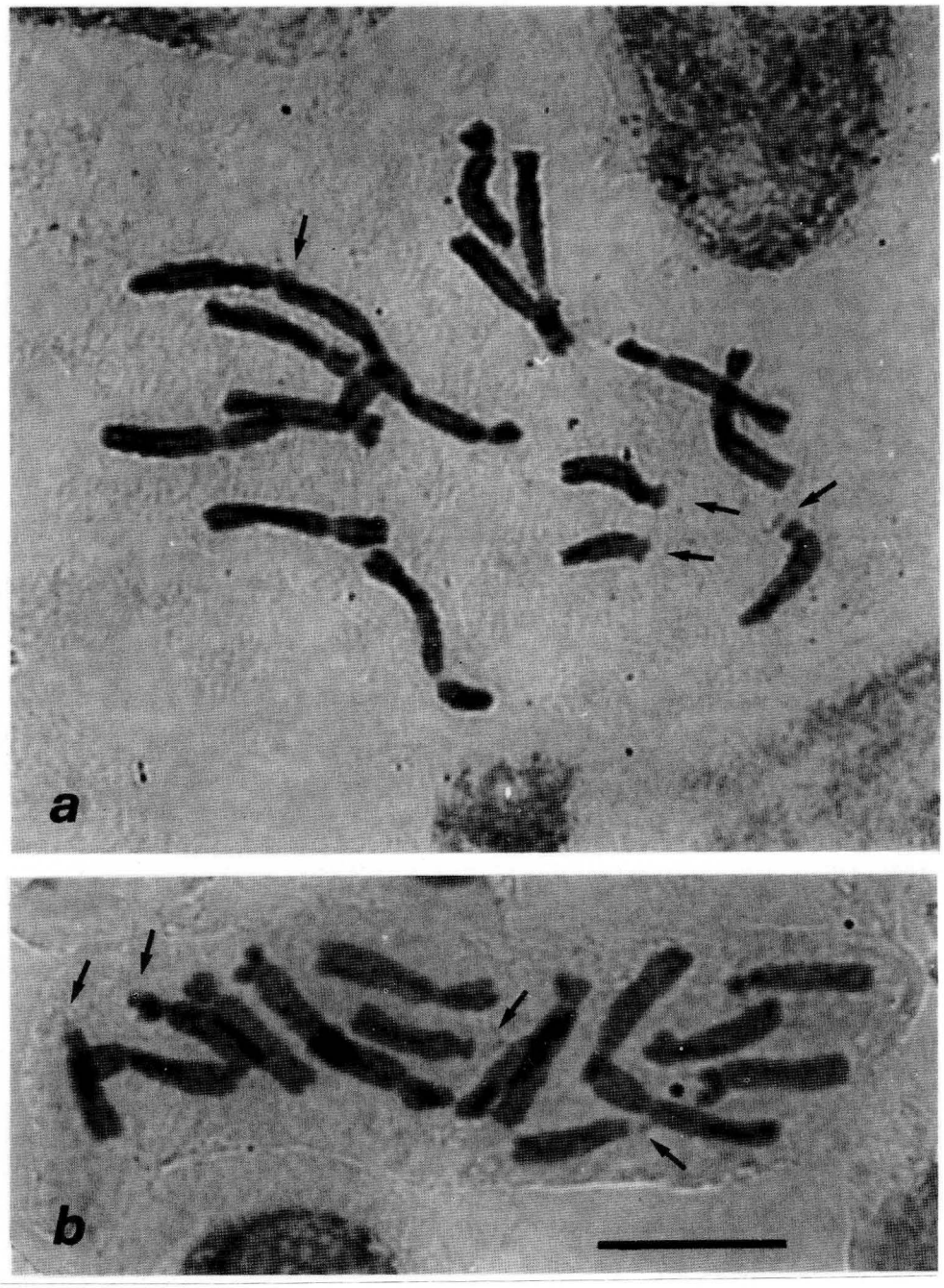


Fig. 4a, b. Mitotic metaphase plates of *Crepis incana*, $2n = 4x = 16$. Arrows indicate SAT-chromosomes. — Scale bar = 10 µm.

The population examined here was proved to be tetraploid (Fig. 9c). The karyotype formula $2n = 4x = 4sm + 8st + 4t\text{-}SAT = 16$ chromosomes is in accordance to those given by Kamari (l.c.). With the karyological study of this population all known populations of *C. incana* have been investigated.

The discovery of one more tetraploid population of *C. incana* is of considerable interest, as it shows a mosaic cytotype distribution of the tetraploid cytorace, which can most probably be explained by a polytopic creation.

1005. ***Allium guttatum*** Steven subsp. ***sardoum*** (Moris) Stearn — $2n = 16$ (Fig. 5).

Gr: Ionian Islands, Zakinthos island, place known as Pharos Keriou, phrygana vegetation, 50-150 m, 37°39'N, 20°48'E, 50-150 m, *Phitos & al. cult. K 20* (UPA).

A Mediterranean element, widespread in Greece.

The chromosome numbers of $2n = 16$, 32, & 48 have been reported for this taxon (see Sopova 1972, Stearn 1978 and Capineri & al. 1978 for references). Tzanoudakis (1985) reported the chromosome numbers of $2n = 2x = 16 + 0\text{-}1B$ and $2n = 3x = 24$ from several populations of continental Greece.

In a paper on the cytogeography of the genus *Allium* in Greece, Tzanoudakis & Vosa (1988) counted, among others, populations from the island of Kithira (tetraploids) and Zakinthos (diploids).

Karavokyrou & Tzanoudakis (1991) also reported the chromosome number of $2n = 16$ from several East Aegean islands. Our count confirms the existence of diploid cytotypes on the Ionian island of Zakinthos.

The karyotype of the population studied is symmetrical, with mostly metacentric chromosomes varying in size from 7.2 to 5 µm. Two chromosome pairs are SAT-chromosomes, with two different types of satellites (Fig. 5). The size of the satellites however varied in size, even in the same individual. The karyotype formula is $2n = 2x = 8m + 4m/sm + 2m\text{-}SAT + 2sm\text{-}SAT = 16$ chromosomes.

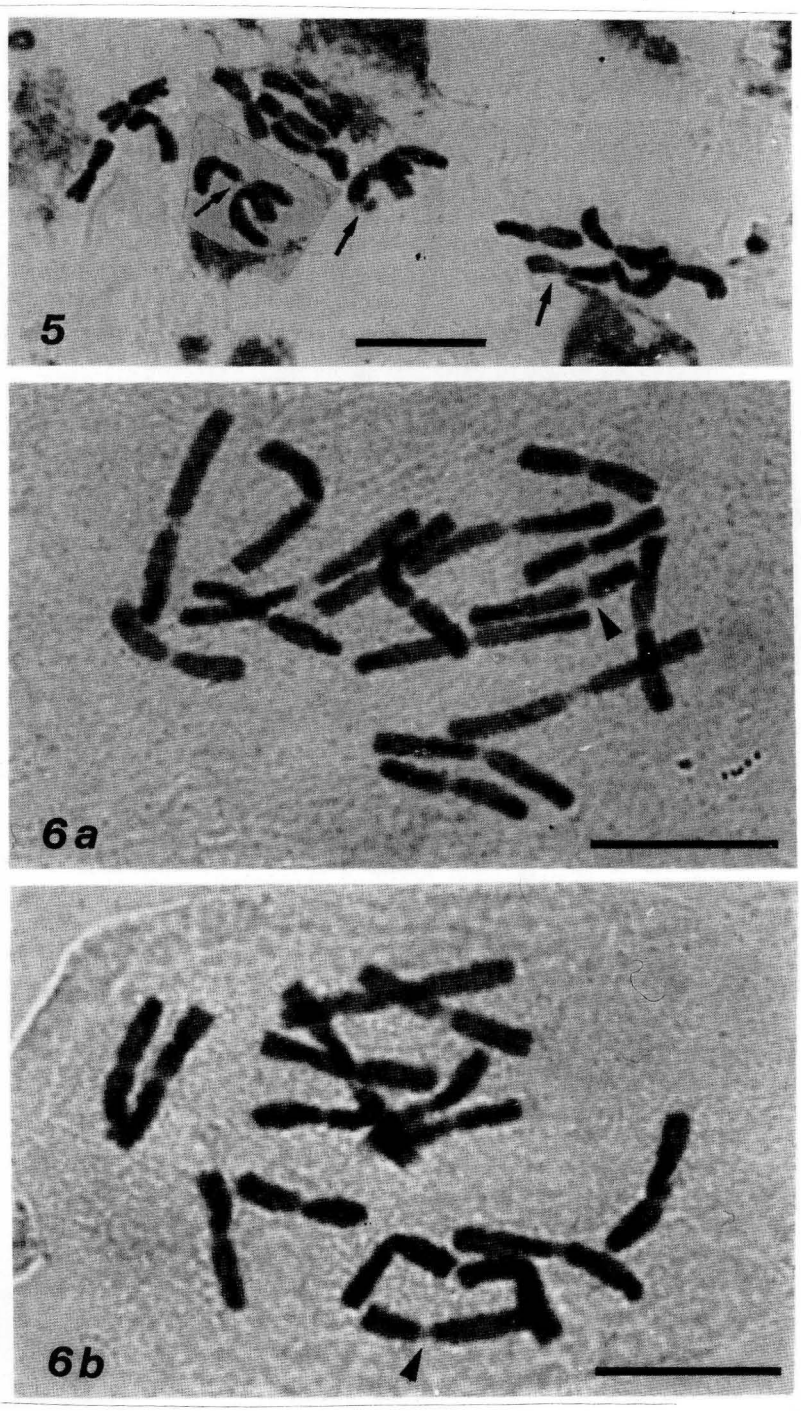
1006. ***Allium staticiforme*** Sm. — $2n = 16$ (Figs. 6a, b & 9b).

Gr: Nomos Evvias Evvia island, north of Kimi, place named Chili, in maritime rocky places, 38°39'N, 24°07'E, 0-5 m, 5 Oct 1997, *Phitos & Kamari cult. K 77* (UPA).

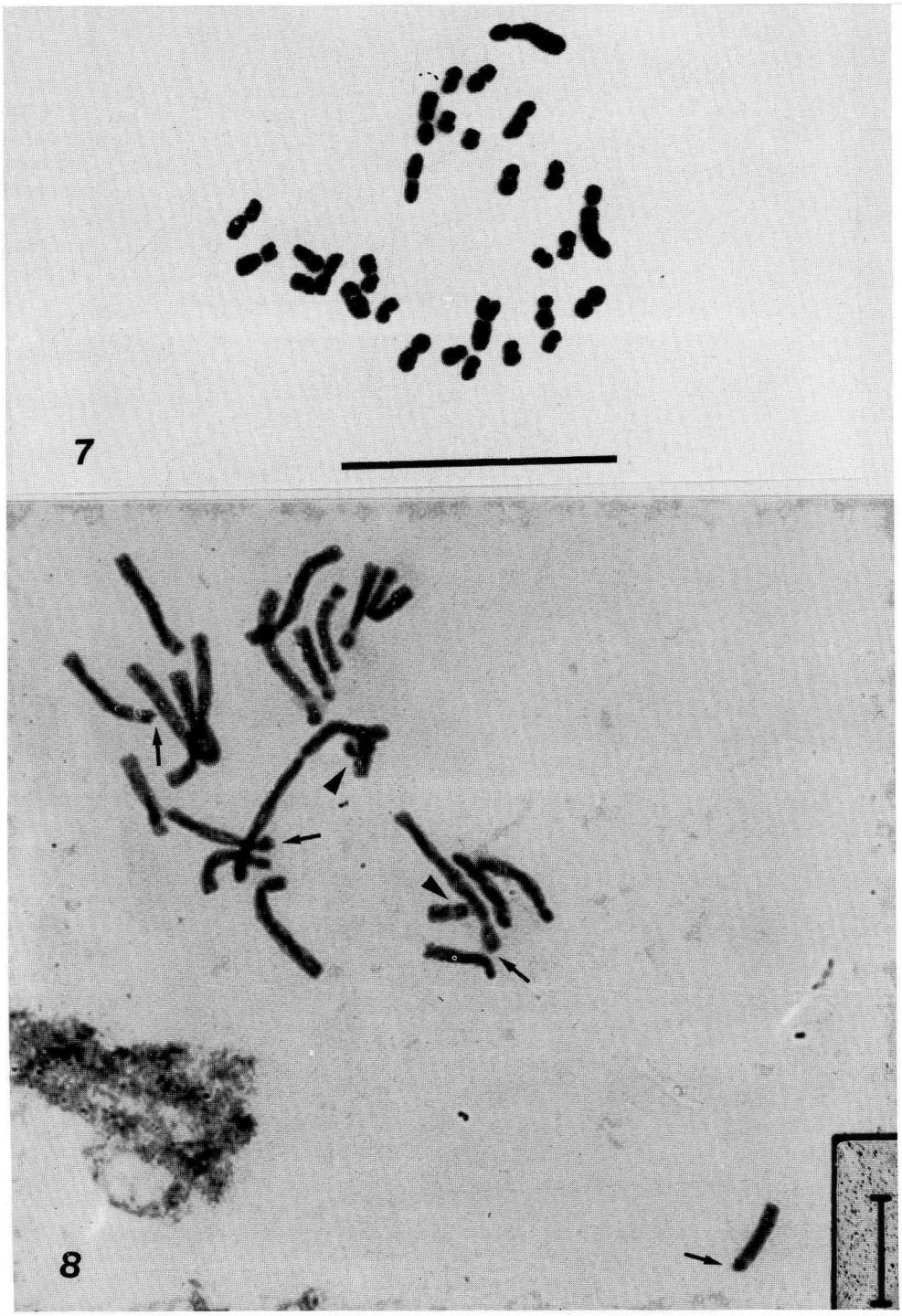
Allium staticiforme is an Aegean endemic species, distributed to Kiklades islands, Attiki, Evvia island, Skiros island and S. Peloponnisos.

The same chromosome number of $2n = 16$ and a similar symmetrical karyotype (Fig. 6a, b) and karyogram (Fig. 9b) are also reported by Stearn (1978) and Johnson (1982) in material from Attiki and by Tzanoudakis (1986) in material from some Kiklades islands, Skiros island and also W. Evvia. Our count completes the cytogeographical study of this taxon.

The karyotype of the species is characterized by an heteromorphous chromosome pair, which has one chromosome metacentric and the other submetacentric (Fig. 6a, b & 9b). The same phenomenon is also noticed by Johnson (l.c.) and Tzanoudakis (l.c.) and probably suggests that a stable pericentric inversion exists in one of the metacentric chromosomes.



Figs. 5-6. Mitotic metaphase plates of: **5,** *Allium guttatum* subsp. *sardoum*, $2n = 16$; **6a, b,** *A. staticiforme*, $2n = 16$. Arrows indicate SAT-chromosomes and arrow-head the submetacentric chromosome. — Scale bars = 10 µm.



Figs. 7-8. Mitotic metaphase plates of: **7,** *Gladiolus tristis* subsp. *spiralis* var. *aestivalis*, $2n = 30$; **8,** *Leucojum aestivum*, $2n = 22$. Arrows indicate SAT-chromosomes and arrow-heads the heteromorphous small chromosome pair. — Scale bars = 10 µm.

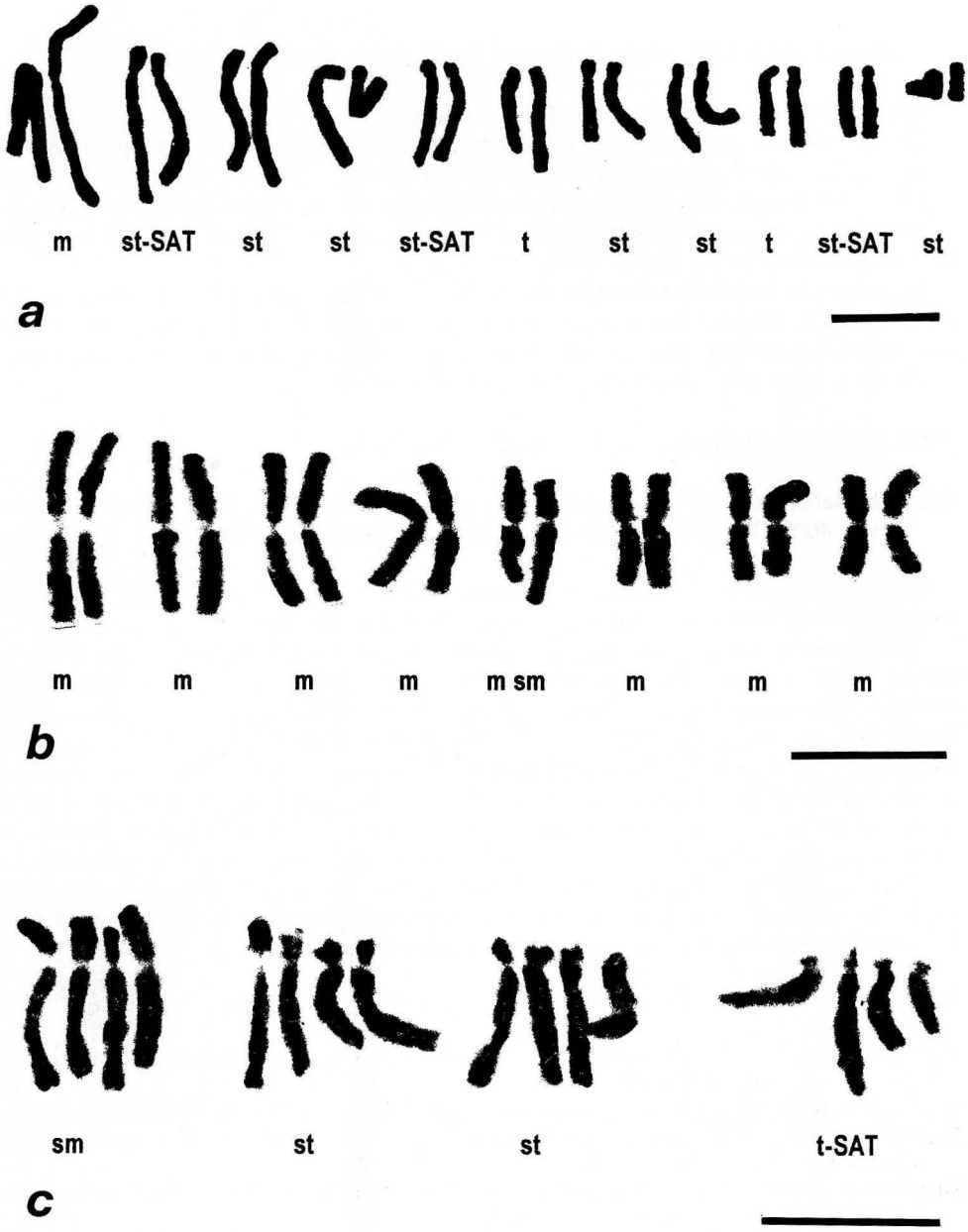


Fig. 9. Karyograms of: **a,** *Leucojum aestivum,* $2n = 22$; **b,** *Allium staticiforme,* $2n = 16$; **c,** *Crepis incana,* $2n = 16$. — Scale bars = 10 µm.

1007. ***Gladiolus tristis*** L. subsp. ***spiralis*** (Pers.) Maire & Weiller var. ***aestivalis*** (Ingram) Lewis — $2n = 30$ (Fig.7).

Gr: Peloponnisos, Nomos Ilias, close to the village of Krestena, 37°35'N, 21°37'E, 30-

50 m, 18 Mar 1989, *Phitos & Kamari 20325* (UPA, det. P. Goldblatt).

Distributed in S. Africa and naturalized in Greece.

Two populations of this attractive and fragrant species were found in Peloponnisos. Its chromosome number is already known since 1931 (Maire 1957, see also Goldblatt & al. 1993 for references). The number of $2n = 30$ is by far the most common one in *Gladiolus* (Verryn 1988), where, however, polyploid karyotypes of $2n = 60$ and $2n = 120$ have also been observed (Sušnik & Lovca 1973).

Its karyotype is ± asymmetrical, and consists of chromosomes which vary between 2.7 to 0.7 µm in length. The longest one is an acrocentric to submetacentric (st/sm) chromosome pair; five pairs are predominately metacentric (m) and of medium size, while the rest are very small, mostly metacentric or submetacetric.

1008. *Leucojum aestivum* L. — $2n = 22$ (Figs. 8 & 9a).

Gr: Thessalia, Nomos Pierias, close to the village of Litochoro, at the outlet of Enipeas river, 40°06'N, 22°30'E, 250-300 m, *Strid s.n, cult. L 345* (UPA).

Leucojum aestivum is widely distributed almost all over Europe, from Ireland to Crimea. Its most southern known distribution is in N. Peloponnisos.

No former records of a chromosome number or a karyotype analysis of this taxon is known from Greece. Previous counts from other countries also confirmed the chromosome number of $2n = 22$ reported here (Neves 1939, Garbari & Tornatore 1970, Sušnik & Lovka 1973, Sveshnikova 1975, Damboldt & Phitos 1975) as well as a similar karyotype formula. It is noteworthy that in the karyotype investigated, the smallest acrocentric chromosome pair is shared an extra heterozygosity: only a small part (Figs. 8 & 9a) of the homologous chromosome is always observed. The karyotype formula is $2n = 2m + 10st + 6st\text{-}SAT + 4t = 22$ chromosomes and the karyogram (Fig. 9a) shows an asymmetrical karyotype. Only the largest chromosome pair is metacentric, c. 21 µm long, while the rest are acrocentric (st) to subtelocentric (t), varying in size from 18.8 to 3.5 µm. The satellites (4-6) are very small and not always visible.

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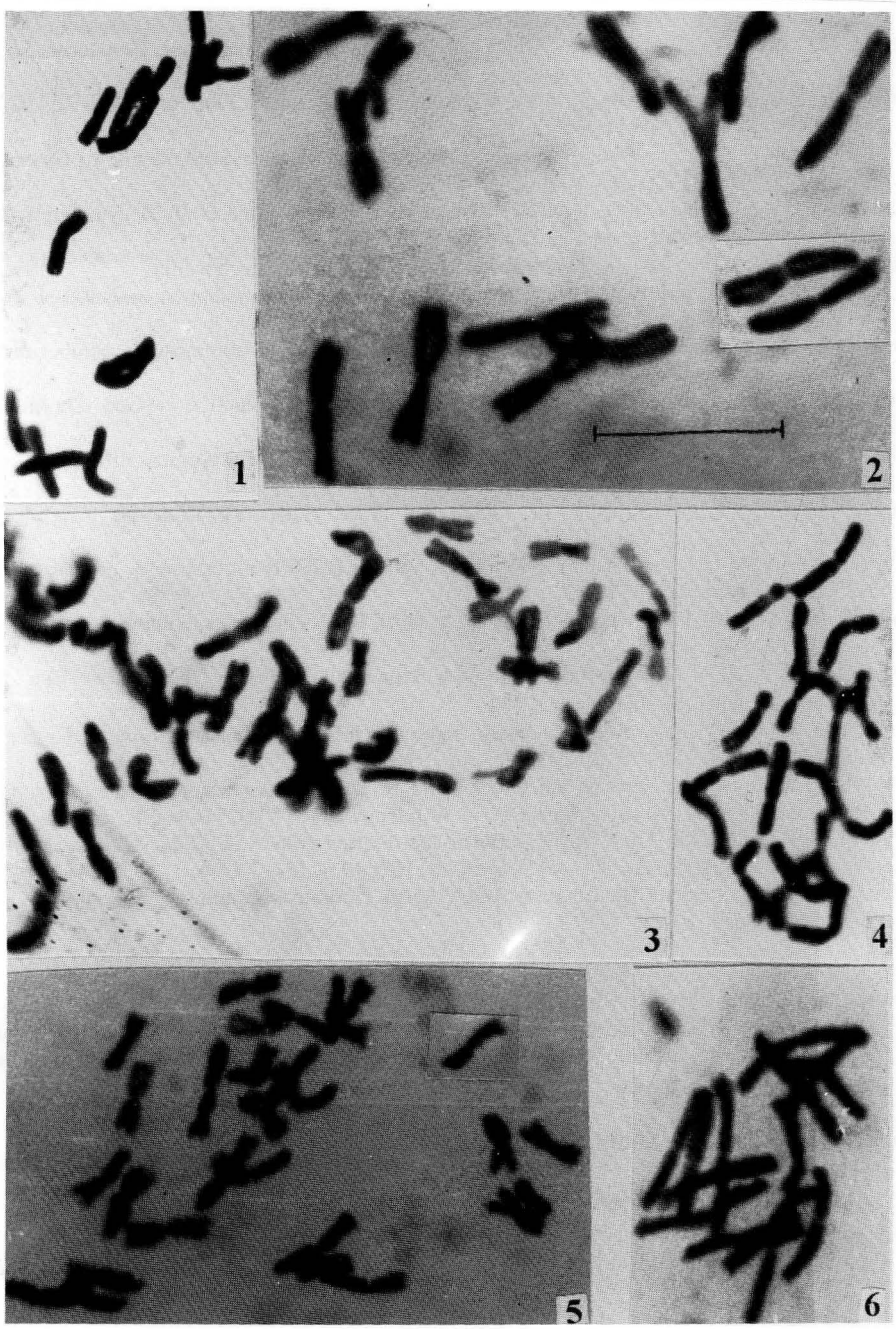
Reports (1009-1025) by Anahit Goukasian & Estella Nazarova

1009. ***Alopecurus myosuroides*** Huds. — $2n = 14$.

Cc: Armenia, Yerevan, Avan, 40°08'N, 44°32'E, 1250 m, 29 May 1996, *Nersesian 2296* (ERE).

The species is widely distributed in Eurasia. The observed chromosome number is in agreement with many previous records from different areas (see Fedorov 1969, Moore 1977, Goldblatt 1981, 1984, 1985, Goldblatt & Johnson 1994, Takhtajan 1993). Only the diploid cytotype is recorded for this species. This is the first count on Armenian material.



Figs. 1-6. Mitotic metaphase plates of: **1,** *Bromus briziformis*, $2n = 14$; **2,** *Bromus danthoniae*, $2n = 14$; **3,** *Elytrigia repens*, $2n = 42$; **4,** *Milium vernale*, $2n = 18$; **5,** *Polypogon monspeliensis*, $2n = 28$; **6,** *Bromus commutatus*, $2n = 14$. — Scale bar = 10 µm.

1010. ***Anisantha tectorum*** (L.) Nevski — $2n = 14$.

Cc: Armenia, Yerevan, Avan, 40°08'N, 44°32'E, 1250 m, 1 Jun 1991, *Manakyan 2076* (ERE).

This species is a very widespread in the Mediterranean, Irano-Turanian and Saharo-Sindian areas. It has been introduced and naturalized in many parts of the world. The observed chromosome number is in agreement with counts from elsewhere (see Fedorov 1969, Moore 1973, 1977, Goldblatt 1981, 1984, 1985, Goldblatt & Johnson 1990, 1994, Takhtajan 1993). Numerous investigators recorded a diploid cytotype for this species, although a tetraploid with $2n = 28$ is also indicated.

1011. ***Bromus briziformis*** Fisch. et Mey. — $2n = 14$ (Fig. 1).

Cc: Artsakh, Lachin, 39°38'N, 46°32'E, 1000 m, 5 Jun 1995, *Gabrielian & Fajvush 2208* (ERE).

The species is distributed in the Mediterranean region. This is the first count on Caucasian material. This result is in agreement with previous records from elsewhere (Abdulov 1928, Stahlin 1929, Schulz-Schaeffer 1960, Sakamoto & Muramatsu 1963, Chopanov & Yurtsev 1976, Sokolovskya & Probatova 1979).

1012. ***Bromus commutatus*** Schrad. — $2n = 14$ (Fig. 6).

Cc: Armenia, Ashtarak region, v. Dzorap, 40°17'N, 44°15'E, 1340 m, 3 Aug 1993, *Nazarova 2073* (ERE).

This species is rather widespread in Eurasia, America and N. Africa. Our data confirm those given in literature (Fedorov 1969, Goldblatt 1984, 1985, 1988, Takhtajan 1993). For this species a polyploid series with $2n = 14, 28, 56$ is recorded. This is the first count on Caucasian material.

1013. ***Bromus danthoniae*** Trin. — $2n = 14$ (Fig. 2).

Cc: Armenia, Ararat region, inner canyon of Erakh range, 39°53'N, 45°19'E, 850 m, 15 Jun 1994, *Fajvush 2120* (ERE).

— Armenia, Ashtarak region, v. Dzorap, 40°17'N, 44°15'E, 1340 m, 2 Jul 1995, *Nazarova 2241* (ERE).

This is mainly Irano-Turanian species of steppes and hammadas distributed in the W. Mediterranean area, reaching to Himalayas. It was first counted in Caucasian material. This result is in agreement with many other reports (see Fedorov 1969, Moore 1973, Goldblatt 1981, Takhtajan 1993). Only Chopanov & Yurtcev (1976) have found the tetraploid cytotype for this species ($2n = 28$) on Turkmenian material.

1014. ***Bromus scoparius*** L. — $2n = 14$.

Cc: Armenia, Yerevan, Botanical Garden, 40°08'N, 44°32'E, 1250 m, 21 Jun 1996, *Goukasian 2295* (ERE).

It is a Mediterranean, Irano-Turanian species extending to Europe and to North Africa, and introduced into the United States. Our data confirm those given in the literature (see Fedorov 1969, Moore 1973, 1977, Goldblatt & Johnson 1990, 1991, 1994). This is the first study on Caucasian material. The tetraploid cytotype for this species, with $2n = 28$ has been published by Queiros (1973) on Portuguese material, and Devesa & al. (1991) on material from Spain.

1015. ***Elytrigia repens*** (L.) Nevski — $2n = 42$ (Fig. 3).

Cc: Armenia, Yerevan, Avan, Botanical Garden, 40°08'N, 44°32'E, 1250 m, 9 Aug 1991, *Manakian 2077* (ERE).
— Armenia, Yerevan, Avan, Botanical Garden, 40°08'N, 44°32'E, 1250 m, 25 Oct 1991, *Nazarova 2060* (ERE).

This species is widely distributed in both hemispheres. The count made on the Armenian material for the first time, agrees with many other reports from elsewhere.

For this species a polyploid series with $2n = 21, 28, 42, 56, 63$ is reported in the literature. Only Petrova (1975) has reported $2n = 40$ on Ukrainian material.

1016. ***Eremopoa persica*** (Trin.) Roshev. — $2n = 14$.

Cc: Armenia, Sevan, Arthanish, 40°30'N, 45°23'E, 1750 m, 14 Sept 1994, *Gabrielian, 2192* (ERE).
— Armenia, Vaik region, in the neighbourhood v.Vaik, 39°41'N, 45°34'E, 7 Jun 1995, *Gabrielian & Fajvush 2220* (ERE).

This species is distributed in W. and S. Transcaucasia, Asia Minor and Iran. The chromosome number $2n = 14$ confirms previous counts (Tzvelen & Griff 1965, Podlech & Dieterle 1969, Mehra & Remanandan 1973). The tetraploid cytotype ($2n = 28$) is mentioned by Bowden (1960) and Podlech & Dieterle (1969).

1017. ***Eremopyrum bonaepartis*** (Spreng.) Nevski — $2n = 14$.

Cc: Armenia, Vaik region, in the neighbourhood v.Vaik, 39°41'N, 45°34'E, 1300 m, 7 Jun 1995, *Gabrielian & Fajvush 2221* (ERE).

This species is distributed in the W. Mediterranean area and its surroundings, up to the Himalayas. This first count on Caucasian material is in agreement with many previous records from different areas (see Fedorov 1969, Moore 1973, 1977, Goldblatt 1981, 1984, 1988, Takhtajan 1993). Many investigators have found a tetraploid cytotype with $2n = 28$.

1018. ***Eremopyrum orientale*** (L.) Jaub. et Spach — $2n = 28$.

Cc: Armenia, Yerevan, Avan, 40°08'N, 44°32'E, 1250 m, 27 Jun 1995, *Gambarian 2214* (ERE).

The species is widespread in Eurasia. This is the first count on Armenian material. Numerous investigators give also $2n = 28$ for this species (see Fedorov 1969,

Moore 1973, Goldblatt 1984, Takhtajan 1993) but only Sakamoto (1979) has reported $2n = 14$.

1019. ***Milium vernale*** Bieb. — $2n = 18$ (Fig. 4).

Cc: Artsakh, Badara, 39°50'N, 46°42'E, 1100 m, 3 Jun 1995, *Gabrielian 2235* (ERE).

The species is widely distributed in Eurasia. The chromosome number $2n = 18$ confirms previous counts from elsewhere (see Goldblatt & Johnson 1990, 1994, Takhtajan 1993). For this species an aneuploid series with $2n = 8, 10, 14, 18$ is recorded. The count made on the Armenian material agrees with many other reports.

1020. ***Polypogon fugax*** Nees ex Steud. — $2n = 42$.

Cc: Armenia, Yerevan, Razdan canyon, 45°09'N, 40°10'E, 942 m, 12 Jul 1996, *Goukasian 2306* (ERE).

This species is widely distributed. The observed chromosome number is in agreement with many previous records from different areas (see Fedorov 1969, Moore 1973, 1977, Goldblatt 1981, 1984, 1985, Goldblatt & Johnson 1990, 1994, Takhtajan 1993). This is the first count on Armenian material.

1021. ***Polypogon monspeliensis*** (L.) Desf. — $2n = 28$ (Fig. 5).

Cc: Armenia, Yerevan, Avan, 40°08'N, 44°32'E, 1250 m, 2 Sep 1994, *Gabrielian 2107* (ERE).

This species is widely distributed in Eurasia and North Africa. This count is in agreement with many previous records from elsewhere. Numerous investigators give the same chromosome number $2n = 28$ (see Fedorov 1969, Moore 1973, 1977, Goldblatt 1981, 1984, 1985, Goldblatt & Johnson 1990, 1994, Takhtajan 1993). A diploid cytotype with $n = 7$ has been published by Devesa & al. (1991) in material from Spain and Bir & Sahni (1986) found $n = 14, 21$ in Indian material. This is the first count made in Armenian material.

1022. ***Sclerochloa dura*** (L.) Beauv. — $2n = 14$.

Cc: Armenia, Yerevan, Avan, 40°08'N, 44°32'E, 1250 m, 3 May 1995, *Gambarian 2168* (ERE).

This rather small genus is mainly distributed in Eurasia. Our data given for the first time from Caucasia confirm those given in the literature (see Fedorov 1969, Moore 1973, 1977, Goldblatt 1981, Goldblatt & Johnson 1990, Takhtajan 1993).

1023. ***Tragus racemosus*** (L.) All. — $2n = 40$.

Cc: Armenia, Lori region, between Dilijan and Fioletovo, 40°54'N, 45°41'E, 1250 m, 24 Aug 1988, *Chandjan 2051* (ERE).

This species is widely distributed in the Mediterranean area, extending to South Europe. The observed chromosome number is in agreement with counts from elsewhere (Fedorov 1969, Moore 1977, Goldblatt 1981, 1984, 1985, Goldblatt & Johnson 1988, 1994, Takhtajan 1993). This is the first study on Armenian material.

1024. ***Vulpia myuros*** (L.) C. C. Gmel. — $2n = 42$.

Cc: Armenia, Kapan region, in the neighbourhood v. Tcav, 39°03'N, 46°27'E, 1050 m, 6 Sep 1995, *Gabrielian & Fajvush 2223* (ERE).

The species is distributed in Eurasia and North Africa. This is the first count on Armenian material. This result is in agreement with many previous records from different areas (see Fedorov 1969, Moore 1977, Goldblatt 1981, 1985, 1988, Goldblatt & Johnson 1991, 1994, Takhtajan 1993). For this species a polyploid series with $2n = 14, 28, 42$ is reported in the literature. Although many investigators have found a hexaploide cytotype with $2n = 42$ for this species.

1025. ***Vulpia persica*** (Boiss. et Buhse) V. Krecz. et Bobr. — $2n = 42$.

Cc: Armenia, Kapan region, in the neighbourhood c. Kapan, 39°11'N, 46°25'E, 900 m, 5 Jul 1995, *Gabrielian 2201* (ERE).

This species has a limited distribution in Transcaucasia, Iran and Middle Asia. The observed chromosome number is in agreement with counts from elsewhere (see Goldblatt 1981, Takhtajan 1993). This is the first study on Transcaucasian material.

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