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# Chromosome counts of flowering plants from N. Cyrenaica

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## RÉSUMÉ

BRULLO, S., A. GUGLIELMO, P. PAVONE & M. C. TERRASI (1990). Comptages chromosomiques de phanérogames de la Cyrénaïque du Nord. *Candollea* 45: 65-74. En anglais, résumés français et anglais.

Nombres chromosomiques de 49 espèces de la Cyrénaïque du Nord, dont 22 sont signalés pour la première fois. Bref commentaire des espèces qui présentent un intérêt particulier.

## ABSTRACT

BRULLO, S., A. GUGLIELMO, P. PAVONE & M. C. TERRASI (1990). Chromosome counts of flowering plants from N. Cyrenaica. *Candollea* 45: 65-74. In English, French and English abstracts.

The chromosome numbers of 49 species of phanerogams from N. Cyrenaica are reported, 22 of which are new records. A short comment on some interesting species is given.

## Introduction

The flora of N. Cyrenaica, though not very rich (about 1300 species), has a remarkable importance for the occurrence of a lot of Cyrenaic and Libyan endemics and of several quite rare species with S-E Mediterranean distribution.

Few caryological investigations on the flora of this territory were published until now. Generally they regard a single species, such as *Cyclamen rohlfsianum* Aschers. (GLASAU, 1939; LEGRO, 1959), *Crepis libyca* (Pamp.) Babcock ex Shabet and *C. senecioides* Delile (HOLLINGSHEAD & BABCOCK, 1930), *Cicerbita haimanniana* (Aschers. ex Dur. & Barr.) Beauverd (BABCOCK & al., 1937) and *Carthamus divaricatus* Béguinot & Vacc. (ESTILAI & KNOWLES, 1976). Besides other contributions on some phanerogams were published by BRULLO & PAVONE (1977) and BARTOLO & al. (1984).

In this work 49 species are examined, of which only 2 are Monocotyledons and the rest are Dicotyledons, mainly *Asteraceae*.

The chromosome record of 22 species is reported for the first time. The species with an unpublished number and with a taxonomical interest are commented.

The chromosome numbers of all the studied species are listed in the Table 1, while the drawings of metaphasic plates are reported in Fig. 1-2.

Table 1. — Chromosome counts of flowering plants from N Cyrenaica.  
 Status: endemic (E), non endemic (N). New counts are marked with asterisk.

Taxon	Status	2n	Fig.	Origin
<b>Dicotyledons</b>				
<b>Asteraceae</b>				
<i>Aegialophila pumilio</i> (L.) Boiss. ....	N	22	1F	Bengasi, 24.3.1975
* <i>Amberboa libyca</i> (Viv.) Alavi .....	E	26	1G	El Abiar, 1.4.1974
<i>Anacyclus clavatus</i> (Desf.) Pers. ....	N	18	1H	Piana di Barce, 11.5.1974
* <i>Anacyclus monanthos</i> (L.) Thell. subsp. <i>monanthos</i> ...	N	18	1K	Bengasi (Rahaba), 24.3.1975
* <i>Anthemis cyrenaica</i> Cosson .....	E	18	1C	Benina, 27.3.1974
* <i>Anthemis kruegeriana</i> Pamp. ....	E	18	1D	Ajedabia, 19.5.1981
<i>Anthemis pseudocotula</i> Boiss. ....	N	18	1E	Ajedabia, 19.5.1981
* <i>Anthemis taubertii</i> Dur. & Barr. subsp. <i>taubertii</i> .....	E	18	1B	Tocra, 23.3.1974
* <i>Anthemis taubertii</i> Dur & Barr. subsp. <i>arenicola</i> (Pamp.) Brullo & Furnari .....	E	18	1A	Tolmeta, 4.4.1974
<i>Anvillea garcinii</i> (Burm. f.) DC. subsp. <i>radiata</i> (Coss. & Dur.) A. Anderb. ....	N	14	1L	Msus, 17.5.1981
<i>Atractylis carduus</i> (Forsskål) Christ. ....	N	20	1I	Bengasi, 15.5.1974
<i>Centaurea cyrenaica</i> Béguinot & Vacc. ....	E	18	1M	Barce, 14.5.1974
<i>Centaurea glomerata</i> Vahl .....	N	20	1N	Ajedabia, 19.5.1981
<i>Cicerbita haimanniana</i> (Ascherson ex Dur. & Barr.) Beauverd .....	E	16	10	Wadi el Kuf, 16.5.1974
<i>Crepis libyca</i> (Pamp.) Babcock ex Shabet .....	E	8	1P	Bengasi (Rahaba), 24.3.1975
<i>Crepis senecioides</i> Delile .....	N	8	1Q	Barce, 24.3.1974
<i>Crepis vesicaria</i> L. subsp. <i>vesicaria</i> .....	N	8	1S	Msus (Rabat al Magur), 2.4.1981
<i>Hedypnois tubiformis</i> Ten. ....	N	16		Piana di Soluch, 1.4.1980
<i>Hyoseris lucida</i> L. ....	N	16	1R	Sidi Califa, 27.3.1975
<i>Launea nudicaulis</i> (L.) Hook. f. ....	N	18	2A	Ajedabia, 19.5.1981
<i>Leontodon hispidulus</i> (Delile) Boiss. ....	N	12	2B	Wadi el Bab, 28.3.1981
<i>Mantisalca salmantica</i> (L.) Briq. & Cavillier .....	N	22	2D	Barce, 5.5.1974
* <i>Picris mauginiana</i> Pamp. ....	E	10	2C	Rovine Tolmeta, 16.3.1982
<i>Reichardia picroides</i> (L.) Roth. ....	N	14	2E	Tocra, 15.5.1981
<i>Scorzonera alexandrina</i> Boiss. ....	N	28	2F	Wadi el Bab, 28.3.1981
* <i>Scorzonera serrulata</i> Viv. ....	E	14	2G	Wadi Tolmeta, 16.3.1982
* <i>Senecio trilobus</i> L. ....	E	20	2H	Driana, 28.3.1981
<i>Stiptorhamphus tuberosus</i> (Jacq.) Grossh. ....	N	16	2I	Wadi Bakur, 10.5.1974
* <i>Thrinicia tripolitana</i> Schultz Bip. ex Ascherson in Rohlf's	N	8	2J	Wadi el Bab, 30.3.1981
* <i>Tolpis virgata</i> Bert. subsp. <i>apolloniae</i> Brullo & Furnari	E	54		Cirene, 13.5.1974
<b>Cistaceae</b>				
* <i>Helianthemum cyrenaicum</i> (Grosser) Brullo & Furnari	E	20	2K	Tecnis, 26.3.1975
<b>Fabaceae</b>				
* <i>Astragalus caprinus</i> L. ....	N	16	2L	Ras el Hilal, 23.3.1975
* <i>Astragalus cyrenaicus</i> Cosson .....	E	16	2M	Gebel sopra Barce, 20.3.1975
<i>Astragalus lanigerus</i> Desf. ....	N	16	2N	Ajedabia, 19.5.1981
<i>Astragalus peregrinus</i> Vahl .....	N	16	20	Msus, 29.3.1981
<i>Astragalus spinosus</i> (Forsskål) Muschler .....	N	16	2P	Msus, 29.3.1981
* <i>Lotus polyphyllus</i> Clarke .....	N	12		Bengasi, 24.3.1975
<b>Lamiaceae</b>				
* <i>Phlomis floccosa</i> D. Don .....	N	20	2Q	Piana di Soluch, 30.3.1981
<b>Plumbaginaceae</b>				
* <i>Limonium cyrenaicum</i> (Rouy) Brullo .....	E	54	2R	Susa, 25.5.1974
<i>Limonium lobatum</i> (L. f.) Chaz. ....	N	12	2S	Wadi el Bab, 16.5.1981
* <i>Limonium subrotundifolium</i> (Béguinot & Vacc.) Brullo	E	32	2T	Scogliera ad Ovest di Derna, 23.5.1974
* <i>Limonium teuchirae</i> Brullo .....	E	27	2U	Sebchet el Cuz (Bengasi), 15.9.1974
* <i>Limonium tubiflorum</i> (Delile) O. Kuntze subsp. <i>tubiflorum</i> .....	N	18	2V	Ajedabia, 19.5.1981
<b>Polygonaceae</b>				
<i>Rumex vesicarius</i> L. ....	N	18	2W	Msus, 17.5.1981
<b>Ranunculaceae</b>				
* <i>Ranunculus bullatus</i> L. subsp. <i>cyrenaicus</i> (Pamp.) Maire	E	16	2Y	Gebel sopra Barce, 1.12.1973
* <i>Ranunculus cyclocarpus</i> Pamp. ....	E	16	2X	Bosco tra Barce e Tolmeta, 24.3.1974

Table 1. — Suite et fin.

<i>Taxon</i>	<i>Status</i>	<i>2n</i>	<i>Fig.</i>	<i>Origin</i>
<b>Rubiaceae</b>				
<i>Crucianella aegyptiaca</i> L.....	N	22	2Z <sub>1</sub>	Ajedabia, 19.5.1981
<b>Monocotyledons</b>				
<b>Iridaceae</b>				
<i>Gynandris monophylla</i> (Boiss. & Heldr.) Klatt .....	N	24	1J	Wadi el Bab, 28.3.1981
<b>Poaceae</b>				
<i>Catapodium marinum</i> (L.) C. E. Hubbard .....	N	28	2Z	Tolmeta, 10.5.1974

### Materials and methods

The chromosome counts were made from seeds collected by S. Brullo and F. Furnari in N. Cyrenaica.

The root-tips of germinating seeds were pretreated with 0.2% colchicine, fixed in Carnoy and stained according to the Feulgen technique. Voucher specimens are deposited in CAT.

### Discussion

#### *Asteraceae*

***Aegialophila pumilio* (L.) Boiss.** —  $2n = 22$  (Fig. 1F).

This species is a psammophyte distributed along the sandy coast of E. Mediterranean region.

Its chromosome number confirms the previous count on Crete material reported by KAMARY & MATTHAS (1986) sub *Centaurea pumilio* L.

*A. pumilio* is closely related to *A. cretica* L. (= *Centaurea aegialophila* Wagenitz) showing the same chromosome number (RUNEMARK, 1967), which occurs in Cyrenaica too, according to ALAVI (1983).

***Amberboa libyca* (Viv.) Alavi** —  $2n = 26$  (Fig. 1G).

This species, distributed in N. Libya and N. Egypt, was not previously studied cytologically. The chromosome number,  $2n = 26$ , is not in accordance with previous reports for other species of the genus (NORDENSTAM, 1972; BRULLO & al., 1978; GUPTA & GILL, 1981).

***Anacyclus monanthos* (L.) Thell. subsp. *monanthos*** —  $2n = 18$  (Fig. 1K).

According to HUMPHRIES (1979) this subspecies occurs in N. Africa from NE. Egypt to Tunisia.

The investigated population is characterized by a somatic chromosome number  $2n = 18$  which is the first record for this species. The karyotype consists of metacentric and sub-metacentric chromosomes as well as in the other studied species of the genus (NAGL & EHRENDORFER, 1974; SCHWEIZER & EHRENDORFER, 1976; HUMPHRIES, 1981).

The chromosome formula is:  $2n = 2x = 18: 12m + 6sm$ .

***Anthemis cyrenaica* Cosson** —  $2n = 18$  (Fig. 1C).

It is a therophyte endemic of the pre-desertic countries of Cyrenaica, taxonomically related to *A. muricata* Guss. from Sicily.

The chromosome number  $2n = 18$ , which is the first record for this species, is very common in the genus.

The formula is:  $2n = 2x = 18: 8m + 4sm + 4st + 2t^t$ .

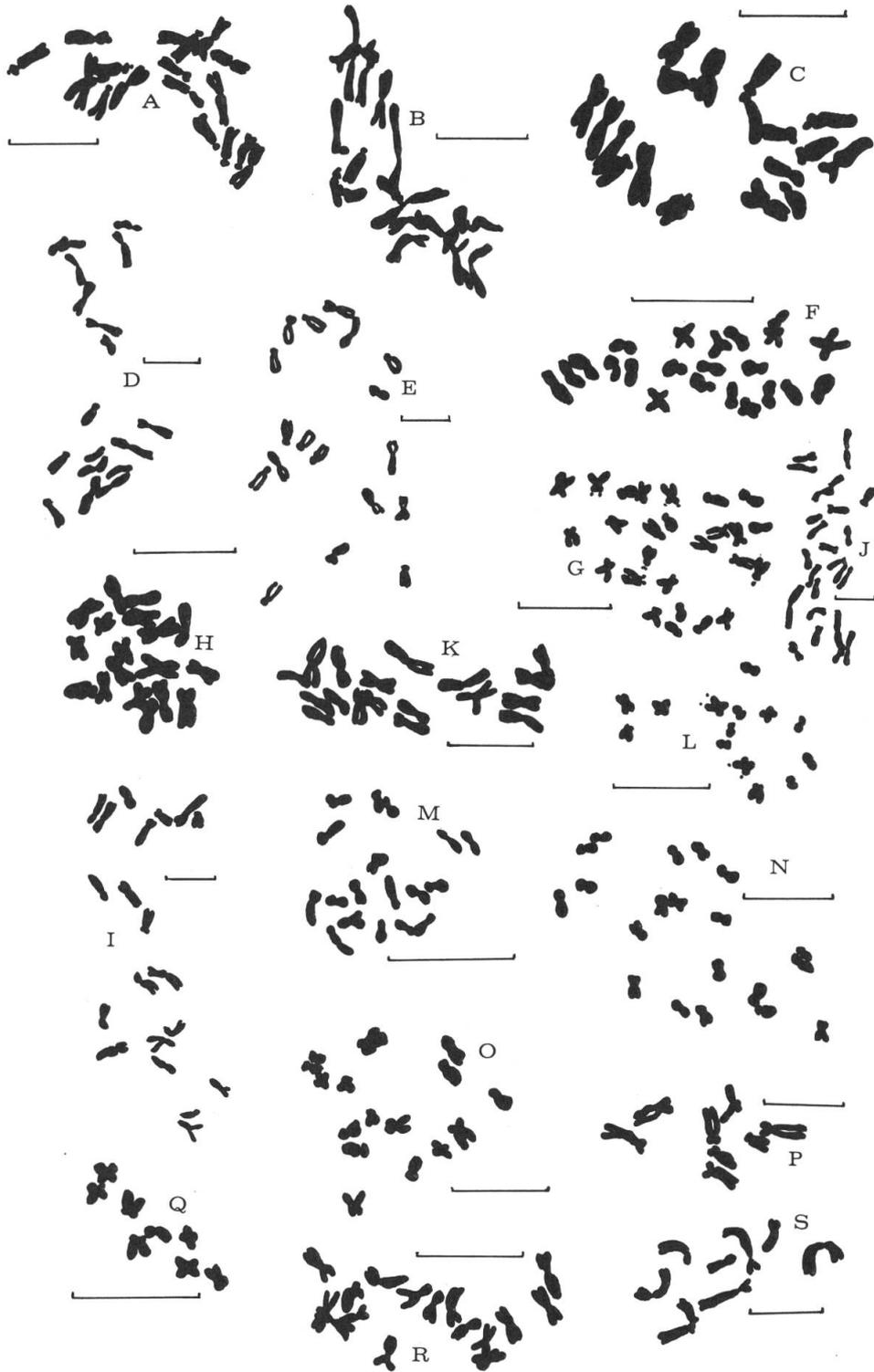


Fig. 1. — Metaphase plates.

A, *Anthemis taubertii* subsp. *arenicola*; B, *Anthemis taubertii* subsp. *taubertii*; C, *Anthemis cyrenaica*; D, *Anthemis kruegeriana*; E, *Anthemis pseudocotula*; F, *Aegialophila pumilio*; G, *Amberboa libyca*; H, *Anacyclus clavatus*; I, *Atractylis carduus*; J, *Gynandriris monophylla*; K, *Anacyclus monanthos* subsp. *monanthos*; L, *Anvillea garcinii* subsp. *radiata*; M, *Centaurea cyrenaica*; N, *Centaurea glomerata*; O, *Cicerbita haimanniana*; P, *Crepis libyca*; Q, *Crepis senecioides*; R, *Hyoseris lucida*; S, *Crepis vesicaria* subsp. *vesicaria*. Scale 10  $\mu$ .

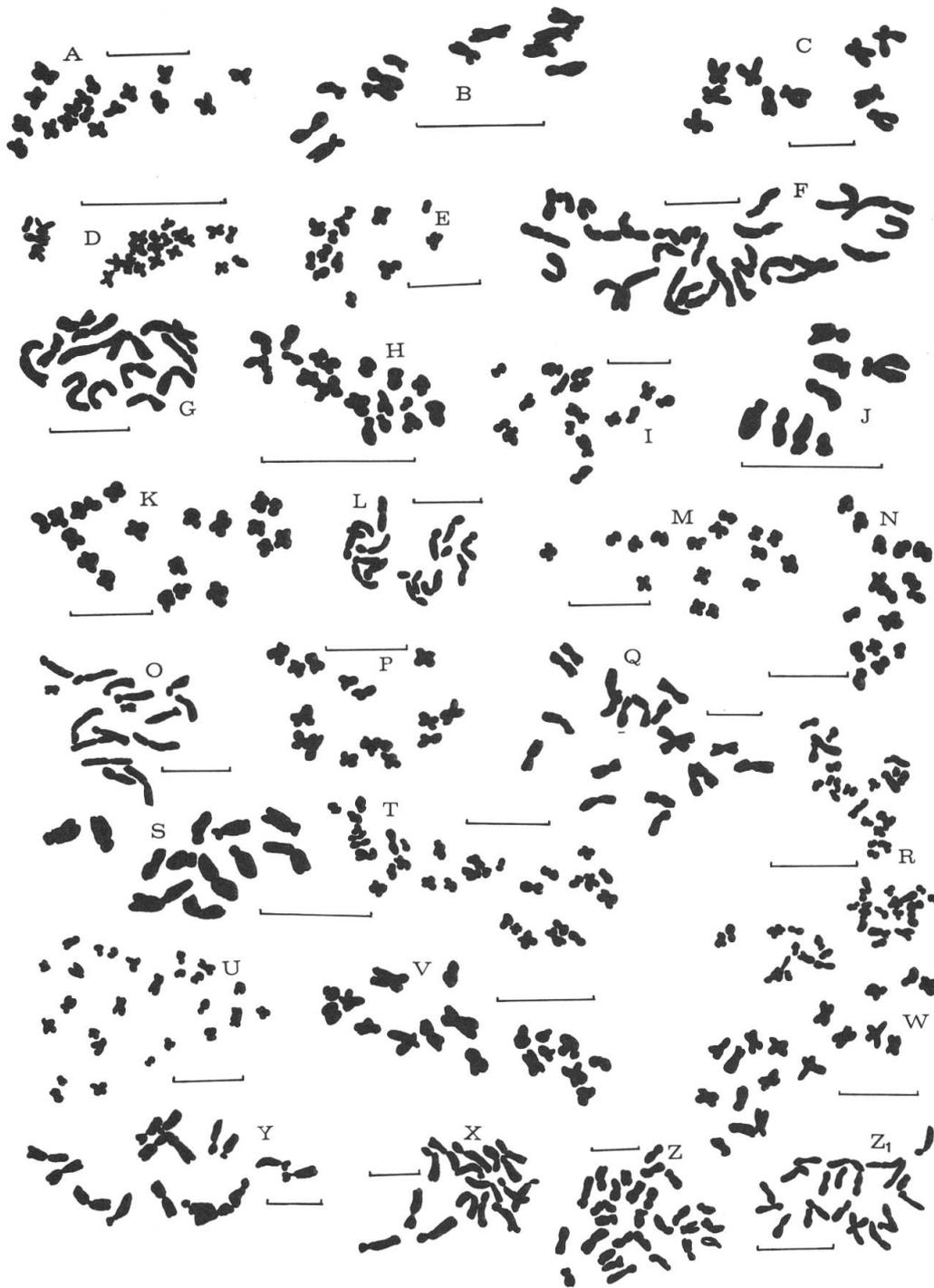


Fig. 2. — Metaphase plates.

A, *Launaea nudicaulis*; B, *Leontodon hispidulus*; C, *Picris mauginiana*; D, *Mantisalca salmantica*; E, *Reichardia picroides*; F, *Scorzonera alexandrina*; G, *Scorzonera serrulata*; H, *Senecio trilobus*; I, *Steptorhamphus tuberosus*; J, *Thrinacia tripolitana*; K, *Helianthemum cyrenaicum*; L, *Astragalus caprinus*; M, *Astragalus cyrenaicus*; N, *Astragalus lanigerus*; O, *Astragalus peregrinus*; P, *Astragalus spinosus*; Q, *Phlomis floccosa*; R, *Limonium cyrenaicum*; S, *Limonium lobatum*; T, *Limonium subrotundifolium*; U, *Limonium teuchirae*; V, *Limonium tubiflorum* subsp. *tubiflorum*; W, *Rumex vesicarius*; X, *Ranunculus cyclocarpus*; Y, *Ranunculus bullatus* subsp. *cyrenaicus*; Z, *Catapodium marinum*; Z<sub>1</sub>, *Crucianella aegyptiaca*. Scale 10  $\mu$ .

**Anthemis kruegeriana** Pamp. —  $2n = 18$  (Fig. 1D).

This species, endemic of E. Syrte, shows some relations with *A. glareosa* Dur. & Barr. from Tripolitania.

It was not previously investigated from the caryological point of view.

**Anthemis pseudocotula** Boiss. —  $2n = 18$  (Fig. 1E).

The chromosome count of this species, which has a W. Mediterranean and Irano-Turanian distribution, agrees with that reported by YAVIN (1970) from Israel material.

**Anthemis taubertii** Dur. & Barr. —  $2n = 18$  (Fig. 1A, 1B).

This species, endemic of the Gebel-el-Akhdar, is represented by two subspecies: subsp. *taubertii* and subsp. *arenicola* (Pamp.) Brullo & Furnari. The type is very common in the ephemeral meadows, while the subsp. *arenicola* is localized along the coast on sandy soils.

The two taxa are diploid with  $2n = 18$  and the karyotype is characterized by the following formula:  $2n = 2x = 18: 6m + 2sm + 4st + 2st^t + 4t$ .

**Anvillea garcinii** (Burm. f.) DC. subsp. **radiata** (Coss. & Dur.) A. Anderb. —  $2n = 14$  (Fig. 1L).

According to ANDERBERG (1982), *A. garcinii* is represented in Africa by the subsp. *radiata*, while the type is distributed in the Middle East.

The present diploid number is in accordance with the previous count reported by ANDERBERG (l.c.) for the same subspecies. The chromosomes are all small and one pair is satellited in the long arm. This chromosome pattern is unusual in the *Inuleae* tribe which is normally characterized by 18 chromosomes, while it occurs only in some species of the related genus *Asteriscus* (REESE, 1957; DAHLGREN & al., 1971).

**Atractylis carduus** (Forsskål) Christ. —  $2n = 20$  (Fig. 1I).

WASEL (1962) reports for this species, sub *A. flava* Desf. on material from Israel, the same somatic number.

**Centaurea glomerata** Vahl —  $2n = 20$  (Fig. 1N).

This species, endemic to Libya and Egypt, where it occurs in pre-desertic territories, was previously studied caryologically by BRULLO & PAVONE (1977) sub *C. contracta* Viv. from another locality of Cyrenaica. Its chromosome number  $2n = 20$  is common in the genus.

**Centaurea cyrenaica** Bég. & Vacc. —  $2n = 18$  (Fig. 1M).

This perennial species, exclusive of the Gebel-el-Akhdar area, occurs in the garigue with other shrubs. Its diploid number was reported by BRULLO & PAVONE (1977).

**Crepis libyca** (Pamp.) Babcock ex Shabet —  $2n = 8$  (Fig. 1P).

This species, previously considered as endemic of Cyrenaica (PAMPANINI, 1931), was found in Tripolitania, near Gharian by Ali (ALAVI, 1983) and in Egypt (TÄCKHOLM, 1974). It is closely related to *C. vesicaria* L.

The chromosome number  $2n = 8$  is in accordance with that reported by HOLLINGSHEAD & BABCOCK (1930) and BABCOCK & JENKINS (1943).

**Crepis senecioides** Delile —  $2n = 8$  (Fig. 1Q).

This species distributed in N. Africa (from Tunisia to Egypt) and Palestine, is characterized by a diploid number  $2n = 8$ . The present record is in accordance with BABCOCK & MANNLESLEY (1926) and NORDENSTAM (1972).

**Hedypnois tubiformis** Ten. —  $2n = 16$ .

This species is well differentiated both morphologically and caryologically from the related *H. cretica* (L.) Willd.

In fact *H. tubiformis* is a tetraploid species, with  $2n = 16$ , according to STEBBINS & al. (1953) and NORDENSTAM (1971), while *H. cretica* (incl. *H. rhagadioloides* (L.) Willd.) is diploid or aneuploid with a somatic chromosome number from 8 to 14.

**Hyoseris lucida** L. —  $2n = 16$  (Fig. 1R).

According to BRULLO & PAVONE (1988), *H. lucida* is a psammophyte localized along the shoreline of Libya and Egypt. The present count is in agreement with a previous one reported by NORDENSTAM (1972) from Egyptian material.

**Leontodon hispidulus** (Delile) Boiss. —  $2n = 12$  (Fig. 2B).

This species, living in desertic territories, was previously studied, from a caryological point of view, by NORDENSTAM (1972) who reports, for the Egyptian populations, the same chromosome number.

**Mantiscalca salmantica** (L.) Briq. & Cavillier —  $2n = 22$  (Fig. 2D).

From the literature data, several counts are reported for this species.

In particular, the present record ( $2n = 22$ ) confirms that published by GUINOCHET & FOISSAC (1962) and RASHID (1974); while the diploid numbers  $2n = 18$  (CHIAPPINI, 1954) and  $2n = 20$  (GUINOCHET, 1957) are probably mistaken.

**Picris mauginiana** Pamp. —  $2n = 10$  (Fig. 2C).

This endemic species, common in the Gebel-el-Akhdar, is related to *P. asplenioides* L.

The chromosome number  $2n = 10$  which is the most frequent in the genus, is unedited; the chromosome formula is the following:  $2n = 2x = 10: 2m + 4sm + 4st$ .

**Scorzonera alexandrina** Boiss. —  $2n = 28$  (Fig. 2F).

This species, with a S.-E. Mediterranean distribution, belongs to *S. undulata* group.

The chromosome count  $2n = 28$  is reported for the first time.

**Scorzonera serrulata** Viv. —  $2n = 14$  (Fig. 2G).

This species is a very rare endemic which occurs in a narrow area between Barce (El Merj) and Tolmeta. Previously this plant was attributed to *S. trachysperma* Gunther ex Sprengel (PAMPANINI, 1931; MAIRE & WEILLER, 1939) or to *S. hispanica* L. (BOULOS, 1979; ALAVI, 1983), but, according to GUGLIELMO (1984), the correct name is *S. serrulata* Viv. This species is morphologically well differentiated from *S. hispanica*, which is distributed in C. and S. Europe, as well as from *S. trachysperma* nom. inval., whose correct name is *S. neapolitana* Grande localized in S. Italy.

The chromosome number,  $2n = 14$ , which is unedited, is the same of *S. hispanica* (STRID & FRANZEN, 1981).

**Senecio trilobus** L. —  $2n = 20$  (Fig. 2H).

The chromosome number of this species, endemic of N. Cyrenaica, was not previously investigated. Taxonomically it shows some relations with the species belonging to *S. leucanthemifolius* group (ALEXANDER, 1979).

**Thrinicia tripolitana** Schultz Bip. ex Ascherson in Rohlfs —  $2n = 8$  (Fig. 2J).

This species, showing some relationships with *T. tuberosa* DC., is quite diffused in N. Cyrenaica and occurs in Marmarica and Egypt too.

It was previously uninvestigated cytologically and the count,  $2n = 8$ , is the same observed in *T. tuberosa* from Egypt by NORDENSTAM (1972).

**Tolpis virgata** Bert. subsp. **apolloniae** Brullo & Furnari —  $2n = 54$ .

It is a species endemic of the Gebel-el-Akhdar area.

The chromosome number of the investigated material is  $2n = 54$ ; therefore it is an hexaploid population. This number, which is very rare in the genus *Tolpis*, was previously reported only by BRULLO & al. (1977) in *Tolpis virgata* var. *sexaristata* (Biv.) Fiori from Sicily.

#### *Cistaceae*

**Helianthemum cyrenaicum** (Grosser) Brullo & Furnari —  $2n = 20$  (Fig. 2K).

This species is a rare endemic confined in Benghazi area and it is related to *H. virgatum* (Desf.) Pers.

It was previously unknown cytologically, however the chromosome number  $2n = 20$  is very common in the genus *Helianthemum*.

#### *Fabaceae*

**Astragalus caprinus** L. —  $2n = 16$  (Fig. 2L).

This perennial species, which is very rare in Cyrenaica, where it is localized in the garigues of the Gebel-el-Akhdar, was not caryologically studied before.

**Astragalus cyrenaicus** Cosson —  $2n = 16$  (Fig. 2M).

It is a segetal species endemic of the Gebel-el-Akhdar which shows close relations with *A. graecus* Boiss. of which it is considered a synonym by JAFRI (1980).

The diploid chromosome number  $2n = 16$  is new and it is rather common in the genus *Astragalus*.

**Astragalus lanigerus** Desf. —  $2n = 16$  (Fig. 2N).

This species, which is considered by several authors as a synonym of *A. caprinus*, is well differentiated from it both morphologically and ecologically.

Its chromosome number,  $2n = 16$ , is in accordance with the previous record on Algerian material (GUITTONEAU, 1978).

**Lotus polyphyllos** Clarcke —  $2n = 12$ .

This psammophyte, distributed from S. Tunisia to Egypt, was previously uninvestigated cytologically. The chromosome number  $2n = 12$  is rather common in the genus.

#### *Lamiaceae*

**Phlomis floccosa** D. Don —  $2n = 20$  (Fig. 2Q).

The chromosome count of this Mediterranean species was previously unrecorded: the diploid number  $2n = 20$  is in accordance with that normally occurring in the genus.

*Plumbaginaceae***Limonium cyrenaicum** (Rouy) Brullo —  $2n = 54$  (Fig. 2R).

This endemic species, circumscribed to the rocky coast of the Gebel-el-Akhdar area, belongs to the *L. graecum* group (BRULLO, 1978).

The present count  $2n = 54$  is unedited and must be considered as an hexaploid chromosome pattern with basic number  $x = 9$ .

**Limonium subrotundifolium** (Béguinot & Vacc.) Brullo —  $2n = 32$  (Fig. 2T).

It is a taxonomically very isolated species which is localized in a short stretch of the coast near Derna (BRULLO, 1978).

On the base of the present unedited count it appear to be a tetraploid with  $2n = 32$ .

**Limonium teuchirae** Brullo —  $2n = 27$  (Fig. 2U).

The chromosome number of this rare Cyrenaica endemic,  $2n = 27$ , is a new record. It must be considered a triploid species with  $x = 9$ .

**Limonium tubiflorum** (Delile) O. Kuntze subsp. **tubiflorum** —  $2n = 18$  (Fig. 2V).

This species, widespread in pre-desertic areas of Cyrenaica, was not previously studied cytologically. The diploid record,  $2n = 18$ , further confirms the old origin of this taxon.

*Ranunculaceae***Ranunculus bullatus** L. subsp. **cyrenaicus** (Pamp.) Maire —  $2n = 16$  (Fig. 2Y).

This species, endemic of the Gebel-el-Akhdar, shows the same chromosome number,  $2n = 16$ , as the type investigated by LANGLET (1932), MARCHI (1971), GOEPFERT (1974), VALDES BERNEJO (1980).

**Ranunculus cyclocarpus** Pamp. —  $2n = 16$  (Fig. 2X).

It is a species endemic of the Gebel-el-Akhdar where it occurs in the *Juniperus phoenicea* woods.

Its chromosome number  $2n = 16$ , was not previously studied and it is the same as that found in the closely related species *R. creticum* L. (GOEPFERT, 1974; MONTMOLLIN, 1986).

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