BioOne COMPLETE

Chromosome numbers of the Kuwaiti flora, III.

Authors: Malallah, Ghanima A., Masood, Muhammad, and Al-Dosari, Modi

Source: Willdenowia, 31(2) : 411-418

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.31.31208

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

GHANIMA A. MALALLAH, MUHAMMAD MASOOD & MODI AL-DOSARI

Chromosome numbers of the Kuwaiti flora, III.

Abstract

Malallah, G. A., Masood, M. & Al-Dosari, M.: Chromosome numbers of the Kuwaiti flora, III. – Willdenowia 31: 411-418. 2001. – ISSN 0511-9618.

Chromosome numbers (somatic and gametic) of 21 species of eight families of angiosperms, collected in the wild in Kuwait, are reported. Most of them are the first counts in Kuwaiti populations. Included are the first report for *Anisosciadium lanatum* (2n = 18) and new numbers for *Aizoon hispanicum* (2n = 18), *Astragalus annularis* (2n = 24) and *Pallenis hierochuntica* (2n = 12). The karyotypes of *Astragalus annularis* and *A. spinosus* are illustrated.

Introduction

This third instalment in a series of papers dealing with cytological investigations in the cytologically hitherto little known Kuwaiti flora provides chromosome counts for 21 species of eight angiosperm families, viz. *Aizoaceae, Apiaceae, Asteraceae, Cistaceae, Fabaceae, Geraniaceae, Liliaceae* and *Primulaceae*. For the previous instalments see Malallah & Brown (1999) and Malallah & al. (2001).

Material and methods

The material, seeds and buds, used for this study was collected in various localities in Kuwait. Each report is based on material from at least three different plants of the population investigated and is documented by vouchers deposited in the Kuwait University Herbarium (KTUH) and in our laboratory. The nomenclature of the species investigated follows, unless otherwise stated, the floras by Daoud & Al-Rawi (1985), Al-Rawi (1987) and Boulos & Al-Dosari (1994). The taxa are listed in alphabetical order.

Chromosome numbers were obtained from root tip mitoses of seeds germinated in Petri dishes and from pollen mother cells of flower buds collected in the wild and fixed in Carnoy's fixative, respectively. For the standard techniques used to stain the chromosomes see Malallah & al. (2001).

For previous chromosome number reports of the species investigated by us, the indexes of plant chromosome numbers (Ornduff 1967-69, Fedorov 1969, Moore 1973-77, Goldblatt 1981-88, Goldblatt & Johnson 1990-2000) were consulted.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Results

Aizoaceae

Aizoon hispanicum L.
n = 9. – King Fahad Road near Ahmadi, 29°03'N, 48°03'E, 7.2.2000, *M. Masood 250* (KTUH).

The pollen mother cells show nine bivalents (Fig. 1A-B). Our counts of n = 9 are new for this species, for which so far n = 16 or c. 16, respectively (Amin 1973, sec. Moore 1977, Bittrich 1986, sec. Goldblatt & Johnson 1990) were reported.

Apiaceae

Anisosciadium lanatum Boiss.
n = 9, 2n = 18. – Abdally, Ajaib farm, 30°05'N, 47°43'E, 10.4.2000, *G. Malallah & M. Masood 256* (KTUH).

Our counts of n = 9 (Fig. 1D) and 2n =18 are the first for this annual species. For *A. orientale* DC. the gametic number of n = 11 (Ghaffari 1986, sec. Goldblatt & Johnson 1990; Ghaffari & al. 1987, sec. Goldblatt & Johnson 1991) has been reported. This indicates the existence of two different basic numbers (x = 9 and 11) in *Anisosciadium.*

Asteraceae

Anvillea garcinii (Burm. f.) DC.
n = 7, 2n = 14. – Al-Salmi border area with Saudi Arabia, 29°06'N, 47°39'E, 18.3.1999, *M. Al-Dosari 4068* (KTUH).

Our gametic (Fig. 1C) and somatic counts corroborate the previous reports of 2n = 14 for this species (Anderberg 1982, sec. Goldblatt 1985; Brullo & al. 1990, sec. Goldblatt & Johnson 1994; Diaz Lifante & al. 1992, sec. Goldblatt & Johnson 1996).

Filago pyramidata L.
n = 14. – Jahra-Subiya road, escarpment on the right side of the road, 29°24'54"N, 47°42'25"E, 2.3.2000, *K. T. Mathew 4698* (KTUH).

Our gametic counts of n = 14 (Fig. 1F) agree with the previous reports for this tetraploid species (Bjorkqvist & al. 1969, sec. Moore 1971; Queiros 1973, Dahlgren & al. 1971, sec. Moore 1977; Vogt & Oberprieler 1994, sec. Goldblatt & Johnson 1998).

Ifloga spicata (Forssk.) Sch. Bip.
n = 7, 2n = 14. – Doha, 13 km west of Kuwait city, Sheikh Zaidh preservative area near the entertainment city, 29°23'N, 47°49'E, 3.1.1998, *M. Al-Dosari 2625* (KTUH).

Our gametic (Fig. 2A) and somatic counts are consistent with the reports of 2n = 14 in previous studies (Nordenstam 1972, sec. Moore 1977; Dalgaard 1986, sec. Goldblatt & Johnson 1990).

Launaea nudicaulis (L.) Hook. f.
n = 9, 2n = 18. – Failka Island, 29°26'N, 48°18'E, 23.3.2000, *M. Al-Dosari 4796* (KTUH).

Our gametic (Fig. 2B-C) and somatic counts agree with numerous earlier reports. Besides the common diploid cytotype, sometimes with an accessory B-chromosome (Oberprieler & Vogt (1993, sec. Goldblatt & Johnson 1996), from Tunisia also a rare tetraploid cytotype was reported by Kilian & al. (1995), who state that reports under this name from India and Pakistan (also including a tetraploid count) are due to misidentification.

Pallenis hierochuntica (Michon) Greuter [Syn.: *Asteriscus hierochunticus* (Michon) Wiklund, *Asteriscus pygmaeus* (DC.) Cosson & Durand]
n = 6, 2n = 12. – Failka Island, 29°26'11.4"N, 48°18'02.9"E, 9.3.2000, *G. Malallah & M. Masood 251* (KTUH).

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

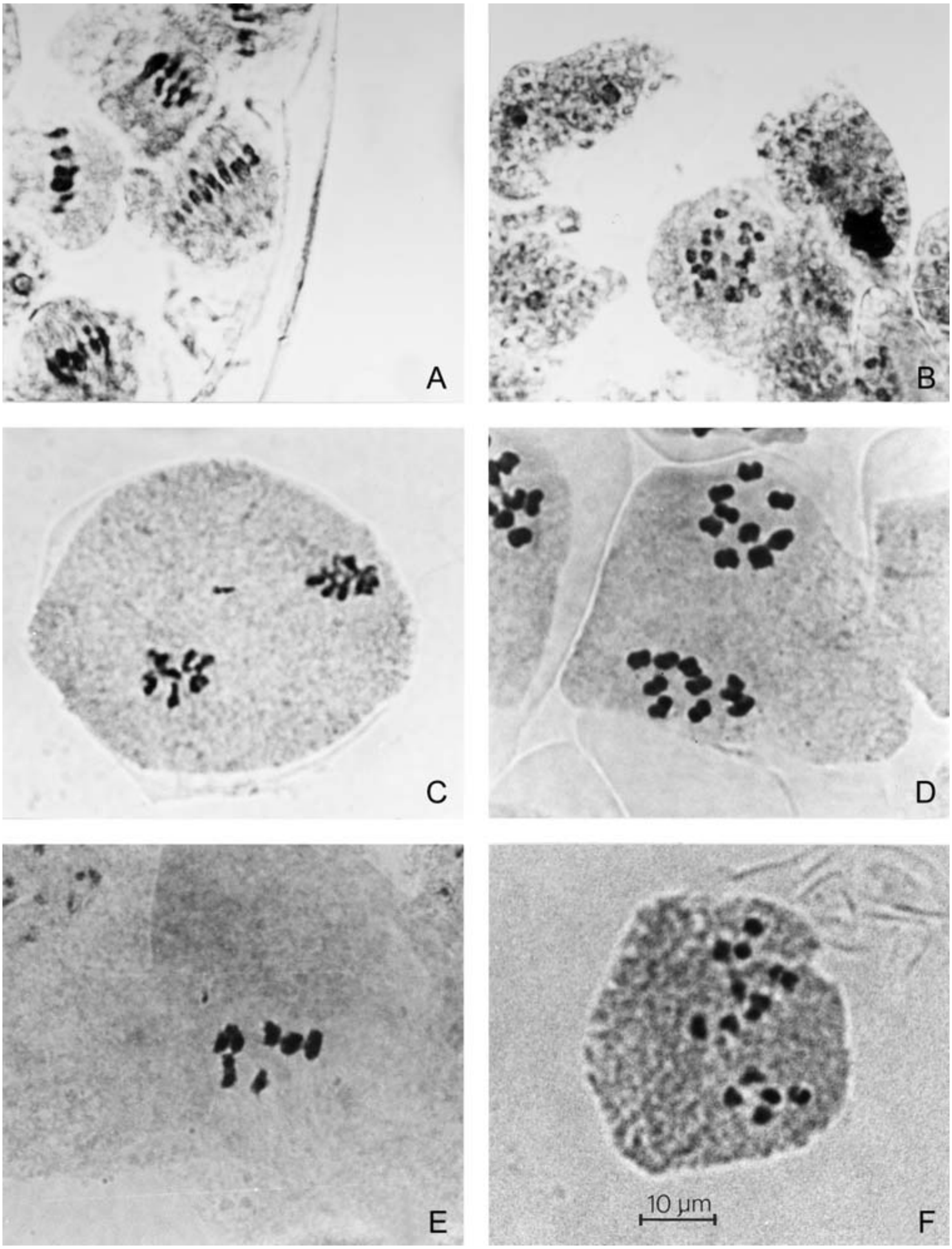

Fig. 1. Meiotic stages of pollen mother cells – A-B: *Aizoon hispanicum,* n = 9; C: *Anvillea garcinii,* n = 7; D: *Anisosciadium lanatum,* n = 9; E: *Pallenis hierochuntica,* n = 6; F: *Filago pyramidata,* n = 14.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

For the correct name of this species see Greuter (1997). Our gametic (Fig. 1E, showing 5 bivalents and 2 univalents) and somatic counts of this species deviate from previous reports of 2n = 10 by Wiklund (1985, sec. Goldblatt 1988) and Humphries & al. (1978, sec. Goldblatt 1981). In the mitoses analysed we found cells with twelve chromosomes of 3-5 μm and others with 10 chromosomes of that size plus 2 chromosomes of only c. 1 μm length.

Urospermum picroides (L.) F. W. Schmidt
n = 5, 2n = 10. – Khairan, 28°39'N, 48°42'E, 17.2.2000, *M. Masood 417* (KTUH).

Our counts in plants from Kuwait, where the species occurs as an uncommon weed in irrigated cultivations and gardens, are consistent with the many reports for this species from other regions.

Cistaceae

Helianthemum ledifolium (L.) Mill.
n = 10, 2n = 20. – Al-Salmi, 29°06'N, 47°39'E, 17.2.1999, *M. Masood 348* (KTUH).

Our somatic and gametic (Fig. 2D) counts in Kuwaiti plants corroborate the reports from other regions (Luque & Mejias 1986 and Sanchez Anta & al. 1985, sec. Goldblatt & Johnson 1990).

Fabaceae

Astragalus annularis Forssk.
n = 8, 2n = 16, 24. – Failka Island, 29°26'11.4"N, 48°18'02.9"E, *G. Malallah & M. Masood 269* (KTUH).

We obtained two different somatic counts from two different individual plants, which appeared morphologically indistinguishable. The counts of n = 8 and 2n = 16 (Fig. 3A) agree with a previous report for this species by Maassoumi (1987, sec. Goldblatt & Johnson 1991). A second number of 2n = 14 was established by Badr & al. (1996) from samples collected in three different localities in Egypt. Our other count of 2n = 24 is the third number obtained for this species.

Astragalus corrugatus Bertol. [Syn.: *A. tenuirugis* Boiss.]
n = 16, 2n = 32. – Subiya coastal area, 29°35'N, 48°10'E, 17.1.2001, *M. Masood 74* (KTUH).

Our gametic and somatic (Fig. 2E) counts corroborate the report by Ledingham & Rever (1963). A deviating count of 2n = 24 was reported by Badr & al. (1996, sec. Goldblatt & Johnson 2000) under the synonym *A. tenuirugis*.

Astragalus sieberi DC.
n = 8, 2n = 16. – Al-Salmi border area with Saudi Arabia, 29°06'N, 47°39'E, 17.2.1999, *G. Malallah & M. Masood 283* (KTUH).

Our counts agree with earlier counts in plants from other regions (Ledingham & Rever 1963 and Badr & al. 1996, sec. Goldblatt & Johnson 2000).

Astragalus spinosus (Forssk.) Muschl.
n = 8, 2n = 16. – Nuwaseeb border area with Saudi Arabia 100 km from Kuwait city, 28°39'N, 48°42'E, 25.2.1999, *M. Al-Dosari 3833* (KTUH).

Our counts (Fig. 3B, showing the karyotype) agree with the previous reports for this species (Murin & Chaudhri 1970, sec. Moore 1973; Brullo & al. 1990, sec. Goldblatt & Johnson 1994).

Astragalus tribuloides Delile
n = 8, 2n = 16. – Failka Island, 29°26'11.4"N, 48°18'02.9"E, 23.1.2001, *M. Masood 93* (KTUH).

Our counts (Fig. 2F) agree with previous reports for this species (Ledingham & Rever 1963, Kliphius & Barkoudah 1977, sec. Goldblatt 1981; Maassoumi 1987, sec. Goldblatt & Johnson

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

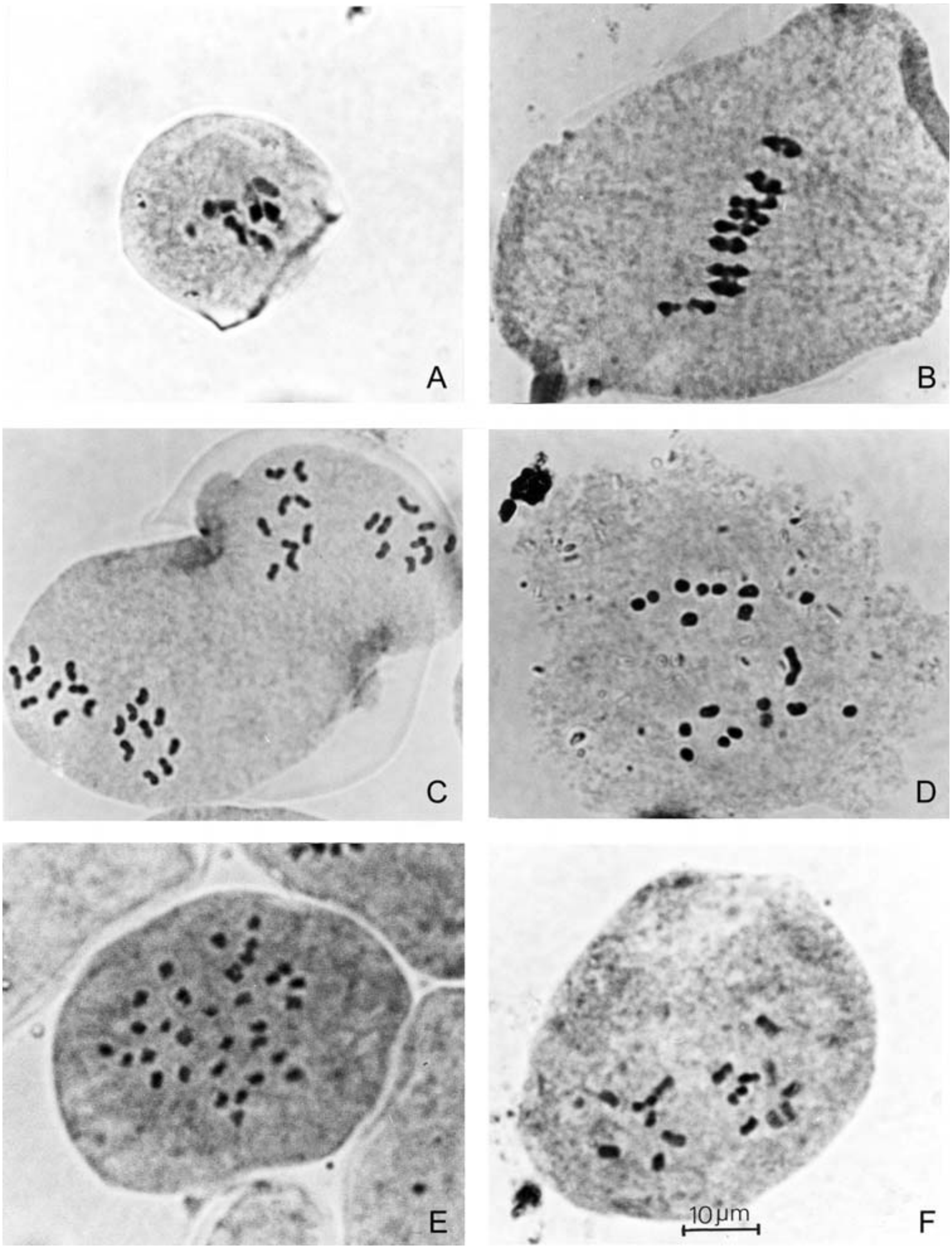

Fig. 2. Meiotic stages of pollen mother cells (A-D) and metaphases of root tip cells (E-F) – A: *Ifloga spicata,* n = 7; B-C: *Launaea nudicaulis,* n = 9; D: *Helianthemum ledifolium,* n = 10; E: *Astragalus corrugatus,* 2n = 32; F: *Astragalus tribuloides,* 2n = 16.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Fig. 3. Karyotypes – A: *Astragalus annularis,* 2n = 16; B: *A. spinosus,* 2n = 16.

1991). Deviating counts of 2n = 14 were reported by Badr & al. (1996, sec. Goldblatt & Johnson 2000) for three different varieties of *A. tribuloides* from two different localities in Egypt.

Geraniaceae

Erodium bryoniifolium Boiss. [Syn.: *E. oxyrhynchum* subsp. *bryoniifolium* (Boiss.) Schönb.-Tem.]
n = 10, 2n = 20. – Khairan coastal area, 28°39'40"N, 48°21'04"E, 14.2.200, *M. Masood 321* (KTUH).

Our counts (Fig. 4A-B) confirm a previous report by Díaz Lifante & al. (1992, sec. Goldblatt & Johnson 1996) under the above cited synonym.

Erodium ciconium (L.) L'Hér.
n = 10, 2n = 20. – Khaldiya, 29°19'N, 48°03'E, 7.2.2000, *M. Masood 324* (KTUH).

Two different numbers have been reported for this species, viz. 2n = 18 and 2n = 20, both confirmed by several studies (see chromosome number indexes). In the Kuwaiti plants studied, we found the latter number only (Fig. 4C).

Erodium cicutarium (L.) L'Hér.
n = 10, 2n = 20. – Khaldiya Jamiah, 29°19'N, 48°03'E, 8.2.2000, *M. Masood 421*(KTUH).

Some 30 reports of the tetraploid cytotype of this species are listed in the chromosome number indexes, compared with only four for the diploid cytotype, to which also the plants investigated by us belong.

Erodium glaucophyllum (L.) L'Hér.
n = 10, 2n = 20. – Al-Salmi, 29°06'N, 47°39'E, 17.1.2000, *M. Masood 328* (KTUH).

Our gametic (Fig. 4D) and somatic counts corroborate the previous reports for this species quoted by Fedorov (1969), Ornduff (1969), Goldblatt (1988) and Goldblatt & Johnson (1991).

Erodium laciniatum (Cav.) Willd.
n = 10, 2n = 20. – Failka Island, 29°26'N, 48°18'E, 2.3.2000, *M. Masood 335* (KTUH).

Our gametic (Fig. 4E) and somatic counts agree with the numerous previous reports for this species from other regions.

Liliaceae

Asphodelus tenuifolius Cav.
n = 14, 2n = 28. – Shuwaikh, university campus, 29°17'N, 47°56'E, 28.1.2001, *M. Masood 107* (KTUH).

Previous reports give a diploid chromosome complement and a basic number of either x = 14, as in the Kuwaiti plants studied by us, or x = 15 (Díaz Lifante & Valdés 1996). Only Al-Turki & al. (2000) reported a count of 2n = 52, thus a basic number of x = 13 and a tetraploid chromosome complement.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

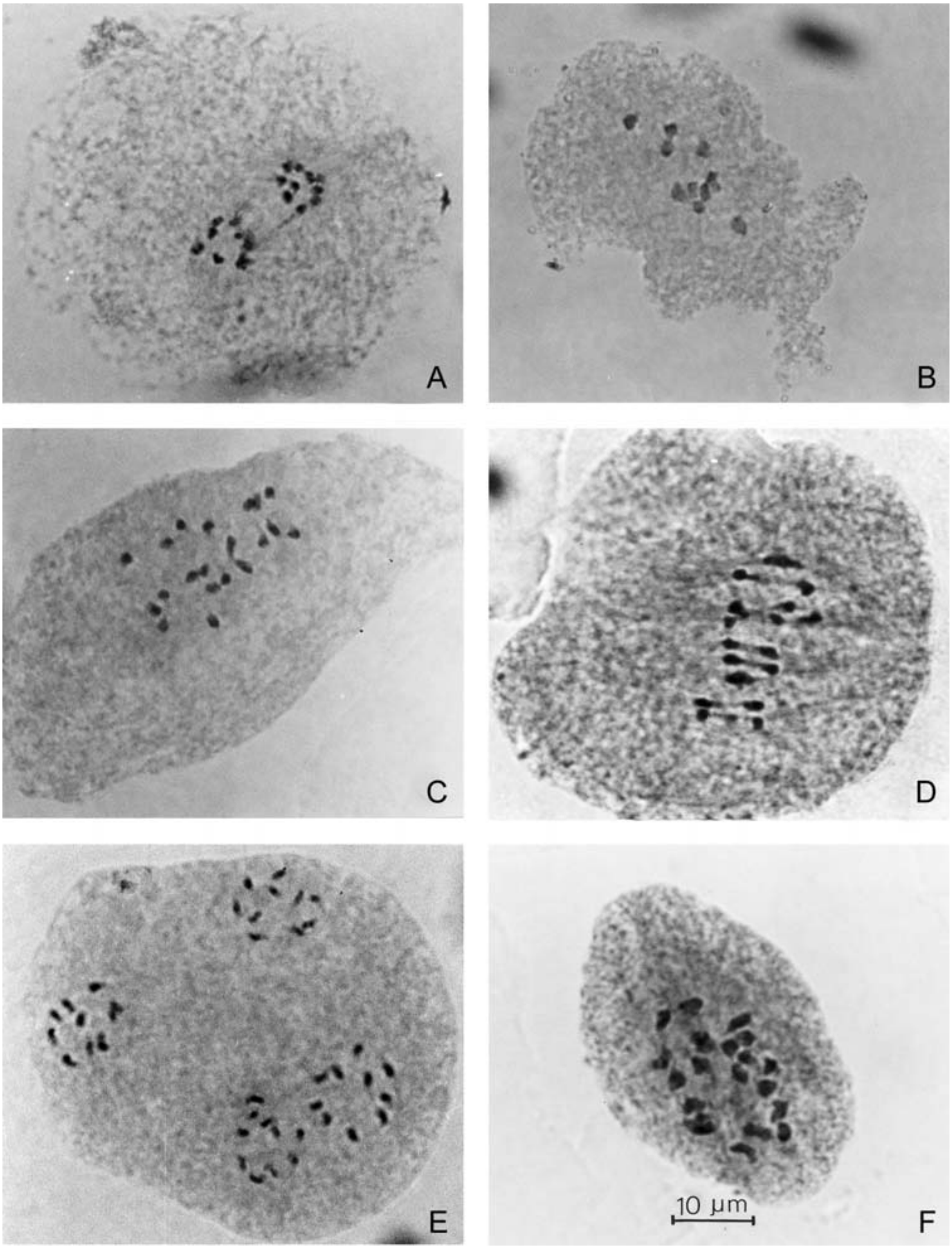

Fig. 4. Meiotic stages of pollen mother cells – A-B: *Erodium bryoniifolium,* n = 10; C: *E. ciconium,* n = 10; D: *E. glaucophyllum,* n = 10; E: *E. laciniatum,* n = 10; F: *Anagallis arvensis,* n = 20.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Primulaceae

Anagallis arvensis L.

n = 20. – Wafra, 28°32'42.6"N, 48°23'14"E, 24.2.2000, *M. Al-Dosari 4649* (KTUH).

The species is rare in Kuwait and our count (Fig. 4F) is based on material from a single plant only. The chromosome number found agrees with the majority of the numerous previous reports for this species.

Acknowledgement

We would like to thank Kuwait University for providing the financial assistance for this project no. SO 078.

References

Al-Rawi, A. 1987: Flora of Kuwait **2.** – Kuwait.

Al-Turki, T. A., Filfilan, A. & Mehmood, S. E. 2000: A cytological study of flowering plants from Saudi Arabia. – Willdenowia **30:** 339-358.

Boulos, L. & Al-Dosari, M. 1994: Checklist of the flora of Kuwait. – J. Univ. Kuwait **21:** 203-218.

Daoud, H. S. & Al-Rawi, A. 1985: Flora of Kuwait **1.** – London & Kuwait.

Díaz Lifante, Z. & Valdés, B. 1996: Revision del género *Asphodelus* L. *(Asphodelaceae)* en el Mediterráneo occidental. – Boissiera **52.**

Fedorov, A. A. (ed.) 1969: Hromosomnye čisla cvetkovyh rastenij [Chromosome numbers in flowering plants]. – Leningrad.

Goldblatt, P. (ed.) 1981, 1984, 1985, 1988: Index to plant chromosome numbers 1975-1978, 1979-1981, 1982-1983, 1984-1985. – Monogr. Syst. Bot. Missouri Bot. Gard. **5, 8, 13, 23.**

— & Johnson, D. E. (ed.) 1990, 1991, 1994, 1996, 1998, 2000: Index to plant chromosome numbers 1986-1987, 1988-1989, 1990-1991, 1992-1993, 1994-1995, 1996-1997. – Monogr. Syst. Bot. Missouri Bot. Gard. **30, 40, 51, 58, 69, 81.**

Greuter, W. 1997: Save *Asteriscus,* sink *Nauplius (Compositae)*. – Fl. Medit. **7:** 41-48.

Kilian, N., Oberprieler, C. & Vogt, R. 1995: Chromosome numbers of North African phanerogams, V. Some counts in *Launaea (Compositae, Lactuceae)*. – Willdenowia **25:** 272-281.

Ledingham, G. F. & Rever, B. M. 1963: Chromosome numbers of some southwest Asian species of *Astragalus* and *Oxytropis (Leguminosae)*. – Canad. J. Genet. & Cytol. **5:** 18-32.

Malallah, G. A. & Brown, G. 1999: Determination of chromosome number of Kuwaiti flora I. – Cytologia **64:** 181-196.

— , Al-Dosari, M. & Murin, A. 2001: Determination of chromosome numbers in Kuwaiti flora II. – Thaiszia J. Bot. **10:** 137-150.

Moore, R. J. (ed.) 1973, 1974, 1977: Index to plant chromosome numbers 1967-1971, 1972, 1973-1974. – Regnum Veg. **90, 91, 96.**

Ornduff, R. 1967, 1968, 1969: Index to plant chromosome numbers for 1965, 1966, 1967. – Regnum Veg. **50, 55, 59.**

Address of the authors:

Dr Ghanima A. Malallah, Muhammad Masood, Modi Al-Dosari, Department of Biological Sciences, Faculty of Science, Kuwait University, P.O. Box 5969, Safat 13060, Kuwait; e-mail: ghanima@kuc01.kuniv.edu.kw

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use