

# DISTRIBUTION AND CHROMOSOME STUDIES OF COUSINIA SECTION SPHAEROCEPHALAE (ASTERACEAE)

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Section *Sphaerocephalae* is a small section of the genus *Cousinia* (*Asteraceae*), which is distributed in West Asia. Meiosis is described in four taxa. They were regular with 13 bivalents. *Cousinia xiphiolepis* had 13 bivalents and 0-3 B-chromosomes. It seems that the chromosome basic number of the section is  $x=13$ . Chiasmata frequency is determined here for the first time.

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**پراکندگی و مطالعات کروموزومی روی *Cousinia* بخش *Sphaerocephalae***

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بخش *Sphaerocephalae* یکی از بخشهای کوچک جنس *Cousinia* است، که در غرب آسیا پراکندگی دارد. مطالعات کروموزومی روی چهار گونه از این بخش توضیح داده شده است. تمام گونه‌ها دارای تقسیم میوز منظم و شامل ۱۳ جفت کروموزوم بودند. گونه *C. xiphiolepis* علاوه بر ۱۳ جفت کروموزوم دارای صفرالی سه کروموزوم B بود. به نظر می‌رسد که عدد پایه کروموزومی بخش  $X=13$  باشد.

## INTRODUCTION

The section *Sphaerocephalae* Bunge, with eighth species in the world is a small section of the geuns *Cousinia*, which is distributed in the West of Asia. All species of this section belong to the Irano-Turanian region and are found in the areas with more than 2000 m altitude. Six of them (*C. adenosticta* Bornm., *C. chamaepeuce* Boiss., *C. firuzkuhensis* Rech. f., *C. shahvarica* Rech. f., *C. sphaerocephala*, Jaub. & Spach and *C. xiphiolepis* Boiss.) are endemic to Iran and distributed in central part of south Elborz mountain (Rechinger 1972). *C. leptolepis* is endemic to Iran and Iraq, with about 500 km distance from each other (Fig. 1). *C. satdagensis* is an endemic of limited areas in SE. of Turkey (Huber-Morath 1975). At the present time we found no record of chromosome count about this section. In this paper four species have been studied, three of which are endemics in Iran.

Chromosome number and meiotic behavior are presented for the first time.

## MATERIALS AND METHODS

The origins of the studied species are given in table 1. Male inflorescences were fixed in

piennar's solution (ethanol; chloroform; propionic acid; 6: 3: 2 v/v) for 24 hours, transferred to 70% alcohol and stored under refrigeration. Slides were prepared by the squash technique and cells were stained with 2% acetocarmine. Voucher specimens are preserved in the IRAN Herbarium.

## OBSERVATIONS

The results of this study are summerised in table 2, but each species will be dealt with in detail.

***Cousinia chamaepeuce* Boiss.;** n=13; Fig. 2, 3.

The gametic chromosome number for this taxon was n=13. The bivalents at first metaphase were usually in the form of ring with two terminal chiasmata. Mean number of chiasmata was estimated 1.67 for each bivalent at first metaphase. In diakinesis and diplotene stages, one bivalent was associated with nucleolus. Chromosomes segregation in first and second anaphase were (13-13). Occasionally in some cells dicentric chromatid bridges, and fragments were observed.

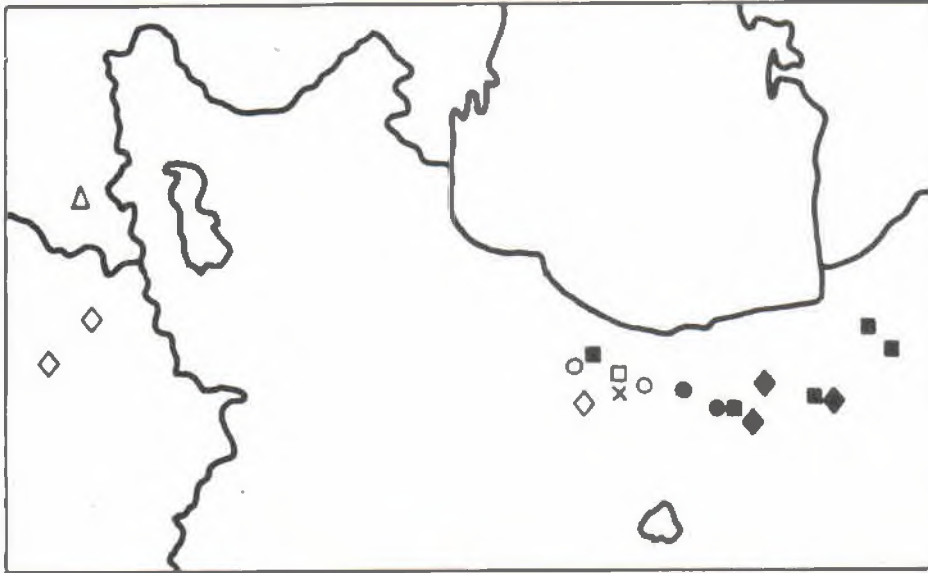


Fig. 1. Geographical distribution of the *Cousinia* species, section *sphaerocephalae*. -x *C. adenosticta*; ○ *C. chamaepeuce*; ◆ *C. firuzkuhensis*; ◇ *C. leptolepis*; ■ *C. shahvarica*; □ *C. sphaerocephala*; ● *C. xiphiolepis*; △ *C. satdagensis*

***Cousinia leptolepis*** (Bornm. & Gauba) Rech. f.; n=13; Fig. 4, 5.

Meiosis in this species showed normally 13 bivalents at first metaphase, but in some cells one or two quadrivalents were observed.

***Cousinia sphaerocephala*** Jaub. & Spach; n=13; Fig. 6, 7.

Meiosis in this species was regular with 13 bivalents at first metaphase. The mean chiasma frequency, determined from eight cells, was 1.67 per bivalent. In diakinesis

Table 1. The origin of materials used in chromosome studies (Dj=Djavadi).

Taxa	Altitude (m)	Origin and Collector
<i>C. chamaepeuce</i>	2600	Tehran: between Shemshak and Dizin, Dj. 8874-IRAN.
<i>C. leptolepis</i>	2340	Karaj: Shahrestanak, Dj. 9076-IRAN.
<i>C. sphaerocephala</i>	2400	Mazandaran: Elika, Dj. 9268-IRAN.
<i>C. xiphiolepis</i>	2090	Tehran: Haraz road, Dj. 9470-IRAN.

stage one bivalent was associated with nucleolus.

**Cousinia xiphiolepis** Boiss.; n=13; Fig. 8, 9.

This species is endemic to Iran and has been found in a limited area in Tehran, Damavand and Firouzkuh. Meiosis was regular with 13 bivalents at first metaphase. Chiasma frequency in eight cells gave a mean of 1.80 per bivalent at first metaphase. Occasionally in some cells 0-3 B Chromosomes were observed.

## DISCUSSION

The section *Sphaerocephalae* Bunge with 8 species is one of the smallest sections of *Cousinia*. Except *C. satdagensis* which is endemic to South East of Turkey, all the other species occur in Iran. *C. leptolepis* more to the restricted distribution in Iran, has also been found in North East of Iraq

(Fig. 1). Considering the floristic regions of Takhtajan (1986), all the species of this section belong to Armeno-Iranian province in the Irano-Turanian region. The conclusion obtained from the chromosome studies on pollen mother cells shows the similarity of chromosome basic number ( $x=13$ ) in all the species. The similarity of chiasmata frequency average for each bivalent (except *C. xiphiolepis*), verify the affinity of the species from the cytological point of view (table 2). Increasing of chiasma frequency in *C. xiphiolepis* is probably due to B-chromosomes effect on chiasma frequency, because in some plants presence of B-chromosomes will cause chiasma increasing in the A-chromosomes (Ghaffari 1998).

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Table 2. Chromosome number and chiasma average in *Cousinia* species.

Taxa	No. of cells (n)	Chromosome count	Mean chiasma frequency per bivalent
<i>C. chamaepeuce</i>	20	13	1.67
<i>C. leptolepis</i>	9	13	1.59
<i>C. sphaerocephala</i>	8	13	1.67
<i>C. xiphiolepis</i>	8	13+0-3B	1.80

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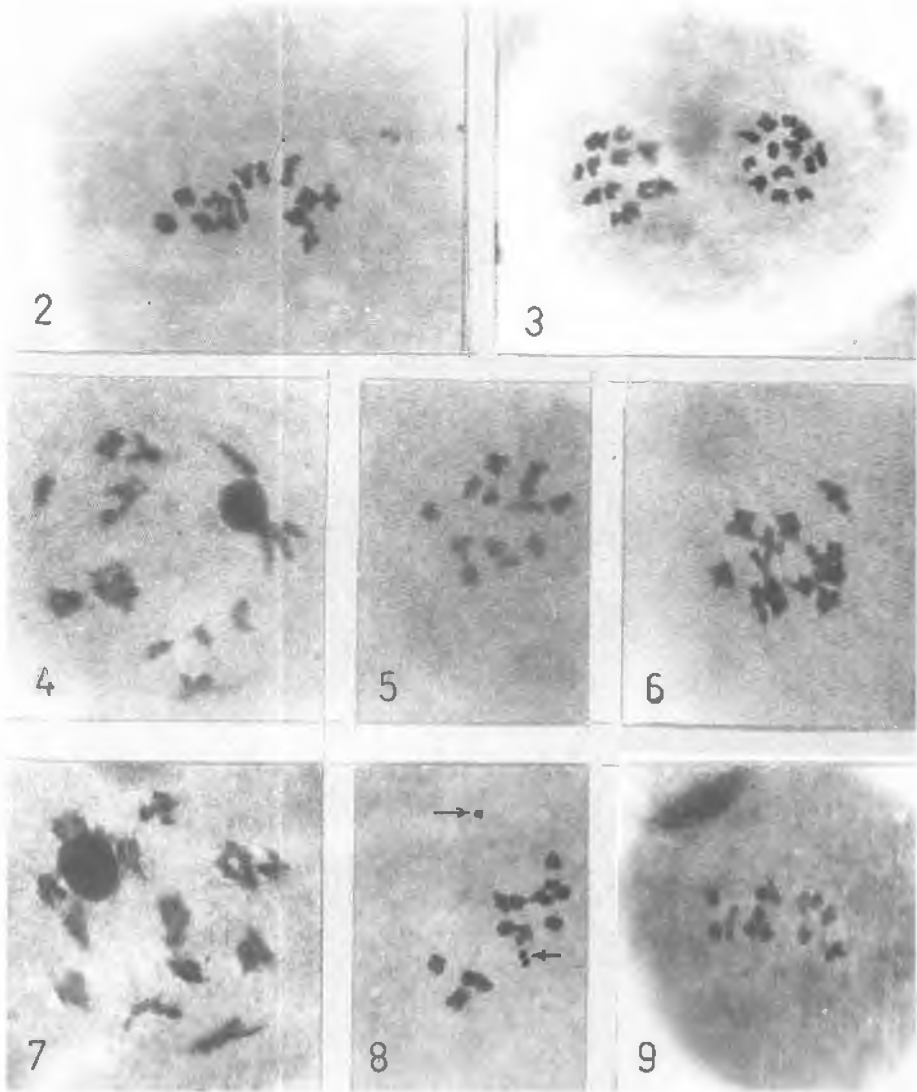


Fig. 2-9. Meiosis in *Cousinia* spp. -2, 3: *C. chamaepeuce*, metaphase I and metaphase II,  $n=13$ . 4, 5: *C. leptolepis*, diakinesis and metaphase I,  $n=13$ . 6, 7: *C. sphaerocephala*, metaphase I and Diakinesis,  $n=13$ . 8, 9: *C. xiphiolepis*. 8: metaphase I showing 13 bivalents and 3 B-chromosomes (arrows). 9: metaphase I showing 13 bivalents without B-chromosomes.