

# **Sedum pакистanicum Sarwar : a new species of Crassulaceae from Pakistan and Kashmir**

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# Sedum *pakisticum* Sarwar, a new species of Crassulaceae from Pakistan and Kashmir

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## RÉSUMÉ

SARWAR, G. R., S. OMER & M. QAISER (1995). *Sedum pakisticum* Sarwar, nouvelle espèce de Crassulacées du Pakistan et du Kashmir. *Candollea* 50: 267-274. En anglais, résumés français et anglais.

Une nouvelle Crassulacée du Pakistan, *Sedum pakisticum* Sarwar, est décrite. La nouvelle espèce présente d'étroites affinités avec *S. ewersii* Ledeb. Les deux espèces ont un port identique et des morphologies générale et florale similaires. Mais *S. pakisticum* se caractérise par l'absence de glandes sur le calice et les feuilles.

## ABSTRACT

SARWAR, G. R., S. OMER & M. QAISER (1995). *Sedum pakisticum* Sarwar, a new species of Crassulaceae from Pakistan and Kashmir. *Candollea* 50: 267-274. In English, French and English abstracts.

A new species in the genus *Sedum*, i.e. *Sedum pakisticum* Sarwar, is recognized from Pakistan. The new species has close affinities with *Sedum ewersii* Ledeb. and is similar in habit and general and floral morphology. *Sedum pakisticum* Sarwar differs from *Sedum ewersii* Ledeb. by the lack of gland spots from leaf and calyx surface.

**KEY-WOROS:** *Sedum pakisticum* — CRASSULACEAE — Pakistan — Kashmir.

## Introduction

*Sedum ewersii* Ledeb. is widely distributed from Central Asia to the Baltistan and Kashmir region of Pakistan. Phytogeographically, it is a Central Asian or Irano-Turanian element, and its wide distribution range results in pronounced variation.

The genus *Sedum* L. (s.l.) is a polymorphic and variable assemblage, which resulted in the segregation of the genus into a number of splits. Probably, due to these facts, *Sedum ewersii* Ledeb. has been overlooked in finer details. Number of studies exist at the generic level (BERGER, 1930; BORISSOVA, 1969 and OHBA, 1975), indicating simplified version of *Sedum* L. (s.l.). While studying the genus *Sedum* L. (s.l.) and *Sedum ewersii* Ledeb. for the Flora of Pakistan, it occurred that two distinct taxa exist in the region studied.

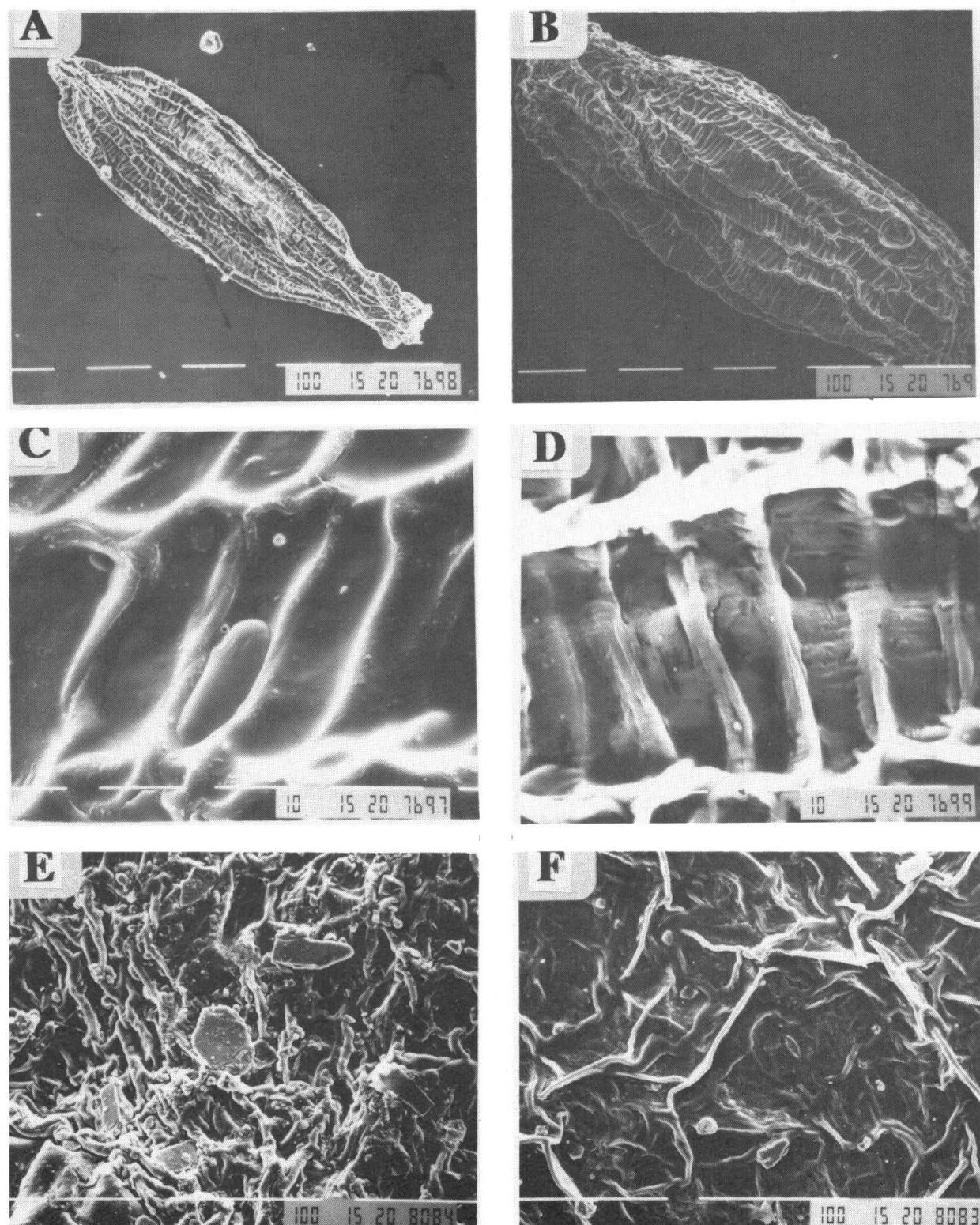


Fig. 1. — **A**, seed of *Sedum pakistanicum*; **B**, seed of *Sedum ewersii*; **C**, seed surface of *Sedum pakistanicum*; **D**, seed surface of *Sedum ewersii*; **E**, leaf surface of *Sedum pakistanicum* without glands; **F**, leaf surface of *Sedum ewersii* with glands.

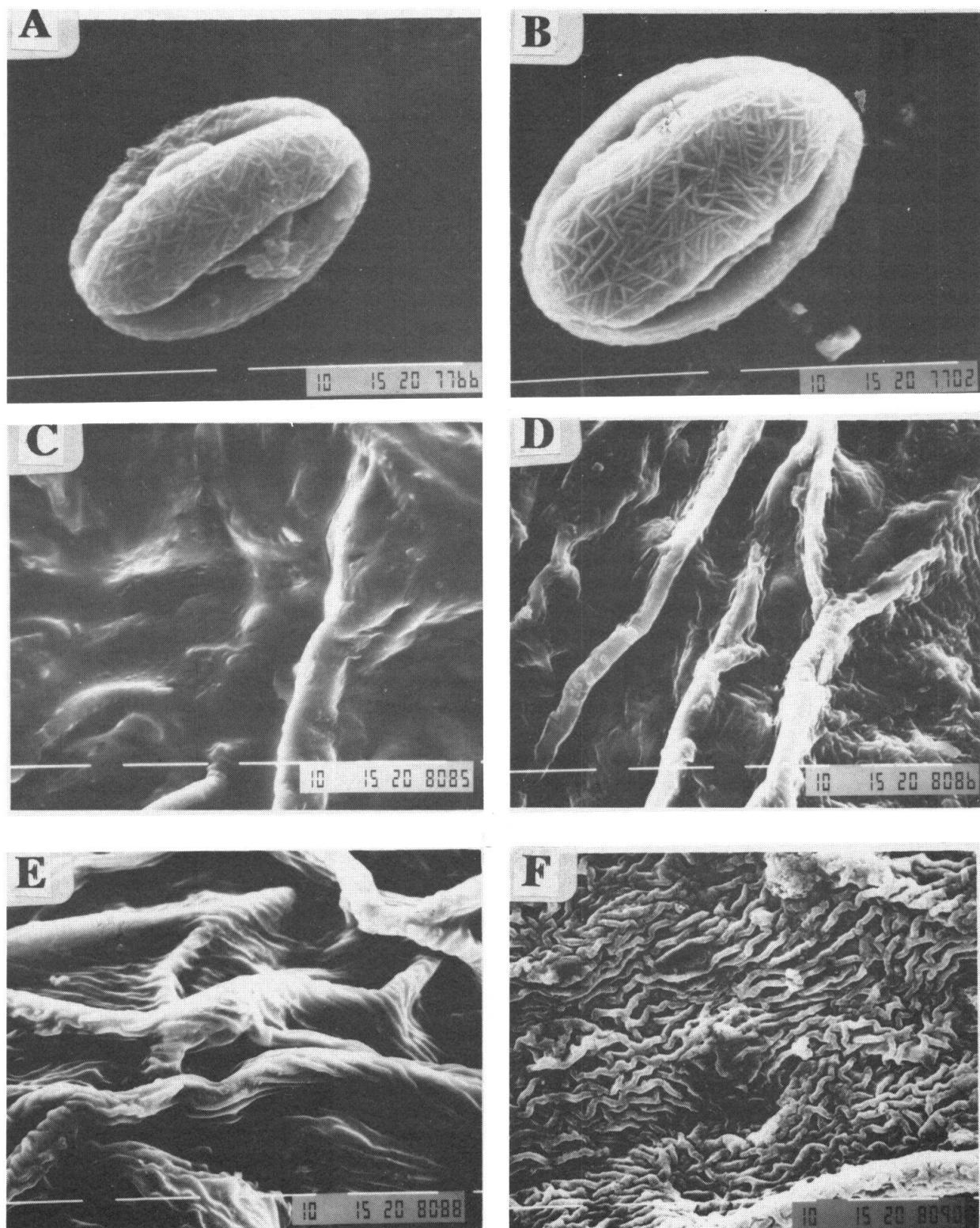


Fig. 2. — A, pollen grains of *Sedum pакистanicum*; B, pollen grains of *Sedum ewersii*; C, sepal surface of *Sedum pакистanicum*; D, sepal surface of *Sedum ewersii*; E, petal surface of *Sedum pакистanicum*; F, petal surface of *Sedum ewersii*.

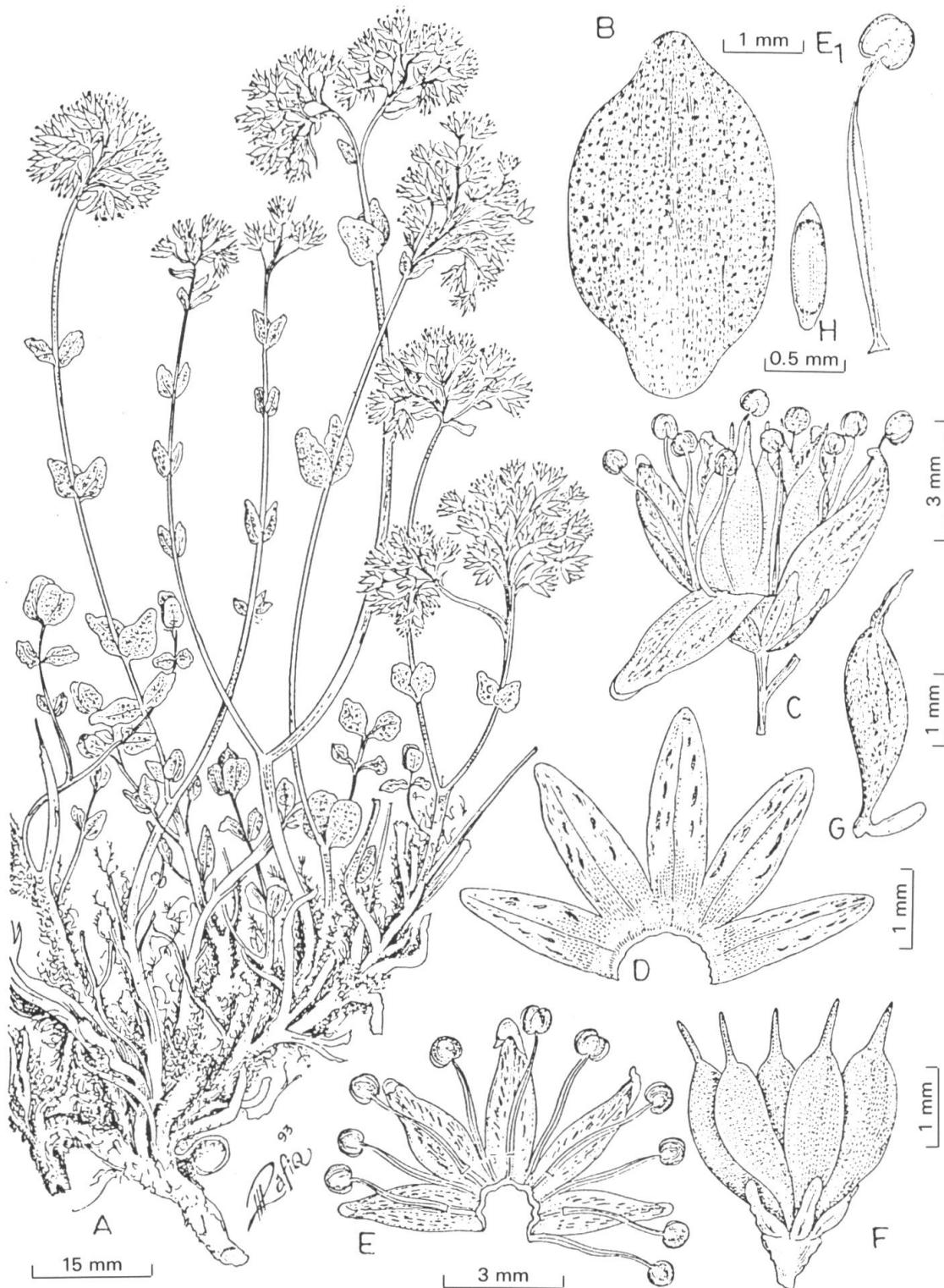


Fig. 3. — *Sedum ewersii* Ledeb.  
**A**, habit; **B**, leaf; **C**, flower; **D**, sepals; **E**, petals with stamens; **E<sub>1</sub>**, stamen; **F**, carpels; **G**, fruit; **H**, seed.

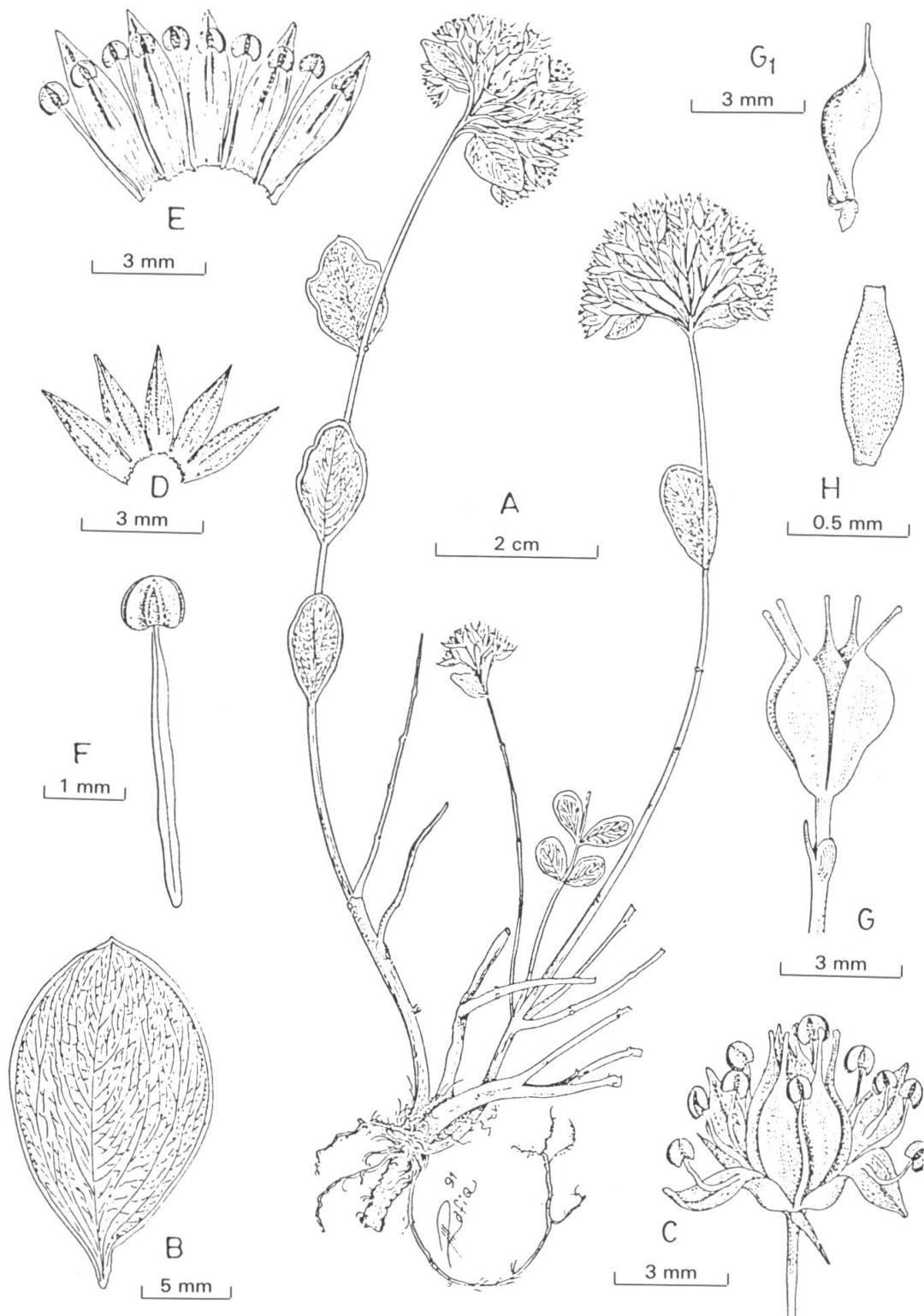


Fig. 4. — *Sedum pakistanicum* Sarwar  
A, habit; B, leaf; C, flower; D, sepals; E, petals with stamens; F, stamen; G, carpels; G<sub>1</sub> fruit; H, seed.

## Materials and methods

### *Palynological studies*

Pollen grains of *Sedum ewersii* Ledeb. and *Sedum pакistanicum* Sarwar were obtained from herbarium sheets. Twenty five pollen grains were studied and measured for each collection. More than one specimen was studied in both species.

#### *Light microscopic studies:*

Pollen slides were prepared by the usual acetolysis method of ERDTMAN (1952). Measurements of polar axis, length and diameter of the grain, mesocolpium, apocolpium, intercolpus distance of the pollen grain, along with the thickness of the exine. PAI (polar area index) was also calculated.

#### *Scanning electron microscopy:*

Mostly acetolysed pollen grains were mounted on metallic (brass) stubs, with the help of double adhesive tape. The specimens were coated with gold by the conventional method and were observed under a JSM-T-200 at the Biological Research Center, University of Karachi.

### *Seeds*

Seed samples were collected from the herbarium specimens. Only healthy and mature looking seeds were studied. Seed size, seed shape and seed surface were studied. Seed size was measured by using a Nikon SE model microscope. Seed surface patterns were studied with the help of scanning electron microscopy. The seeds were mounted on metallic stub with the help of double adhesive tape and gold-coated for 6 minutes in a sputtering unit of Jeol and observed in a SEM Jeol JSM-T-200.

## Observations and results

### *Palynology*

The palynological studies have revealed that almost no differences exist between the two taxa. The pollen grains are slightly bigger in length, diameter, colpus length, intercolpus distance (Table 1). On the other hand, the surface structure is identical in the two species.

### *Seed morphology*

The morphological studies have revealed the existence of two groups from Pakistan and Kashmir. One group has smooth and thin surface of striae while the other group has rough and thick surface of striae. The depression between two longitudinal striae is deeper and has smooth surface in *Sedum pакistanicum* Sarwar where as in *Sedum ewersii* Ledeb. depression is lesser and has horizontal striae between two longitudinal striae. The detailed measurement of the two species are indicated in Table 2; Fig. 1A, B, C and D.

### *Taxonomy*

The critical study of specimens previously identified as *Sedum ewersii* Ledeb. (s.l.) have indicated that two taxa can be recognized.

Following key is prepared between the two taxa to identify the *Sedum ewersii* Ledeb. and *Sedum pакistanicum* Sarwar.

### Key to the species

1. Leaves and calyx with distinct reddish brown glands on the surface; epipetalous filaments for lower 1/3 adnate to petals . . . . . ***Sedum ewersii***
2. Leaves and calyx without any glands on the surface; epipetalous filaments for lower 1/2 adnate to petals . . . . . ***Sedum pакистanicum***

#### 1. ***Sedum ewersii*** Ledeb., Fl. Alt. 2: 191. 1830 (Fig. 3).

**Type:** Russia, Altaï: “ad fl. Bolschaja Uba, Buchtorma et Kokoryo et ad lacum aureum (Teletzkoe Osero)” (LE, n.v.).

**Specimens examined.** — **Baltistan:** Kuru valley, Kote, 15.9.1941, *Mohinder Nath* 4419 (RAW); **Abbotabad:** Abbotabad, 11.4.1952, *Coll. ignot.*, s.n. (KUH); Thandiani, 5.9.1985, *Y. Nasir, R. Akhtar & M. Hanif* 12035 (RAW); **Gilgit:** ca. 8 Km from Babusar village on the way to Babusar top, 5.9.1988, *S. Omer & M. Qaiser* 2652 (KUH); ca. 28 Km from Gram Chasma on the way to Shah Saleem, 12.8.1992, *Tahir Ali, S. Z. Husain & Gohar Khan* 2287 (KUH); **Muzaffarabad:** between Reshian and Leepa, 28.8.1986, *M. Qaiser & Rizwan Yusuf* 7855 (KUH); Sharda, *Jan Mohd.* 136, 23.8.1958 (RAW); Leepa Valley, 4.9.1969, *Jan Mohd* s.n. (RAW); **Hazara:** Kalabagh, Nathiagali, 15.10.1955, *Coll. ignot* 620 (KUH); Changla Gali, 16.6.1959, *Jafri & Ali* 3134 (KUH); Naran, Saif-ul-Maluk, 22.8.1987, *Y. Nasir, R. Akhtar & M. Hanif* 13093 (RAW); **Swat:** Gabral, 2.9.1962, *Stewart, Nasir & Siddiq* 1549 (RAW); Jaha Nullah, 3.9.1962, *Dr. Zaman* s.n. (RAW); Kalam, 21.8.1952, *R. R. Stewart* s.n. (RAW); Utroth, 30.10.1985, *Atiq-ur-Rehman* s.n. (KUH); **Kashmir:** Pahlgam, 2.9.1920, *R. R. Stewart* 5882 (RAW); Kum Pather, Masjid Gali, 13.9.1939, *R. R. Stewart & I. D. Stewart* 18459 (RAW); Sapi La, Surn, 8.1912, *R. R. Stewart* s.n. (RAW); Baghicha to Olding, Indus Valley, 23.8.1940, *R. R. Stewart* 21022A (RAW); between Shadra and Kail, 23.9.1987, *Tahir Ali, M. Qaiser & M. Ajmal Khan* 525 (KUH).

**Distribution.** — Alpine Siberia and Soongaria; temperate and alpine Himalaya from Kumaon to Kashmir, alt. 3000-6000 m.

**Flowers and fruits.** — April-October.

#### 2. ***Sedum pакистanicum*** Sarwar, spec. nov. (Fig. 4).

**Holotype:** Pakistan, Gilgit: Chaprot, 3080 m, West of Chalt, *Y. Nasir* (RAW!).

A *S. ewersii* differt absentia glandularum in foliis calicibusque, filamentis staminum fere 1/2 longitudine adnatis ad petalis.

Perennial: rhizome branched, woody, giving rise to numerous sterile and fruiting shoots; roots slender-cordlike; stem glabrous, basally woody and branched, spreading-ascending and rooting at nodes, 9.5-17.5 cm high; leaves opposite, sessile, broadly ovate or suborbicular, 12-20 mm × 5-13 mm; inflorescence corymbiform compound; flowers small, bisexual; pedicel 1.2-5.0 mm long; sepals 5, lanceolate, acute, 1.6-3.0 mm long; petals 5, elliptic, acute, pink or light purple, 4.0-5.0 mm long; stamens 10, in two whorls, filaments nearly for the lower 1/2 adnate to petals, with blackish anthers; carpels bulging in the middle and tapering upward and downward; nectary scales 0.4-0.7 mm long, oblong; follicles erect, 3.5-5.0 mm long; seeds ellipsoid, 0.8-1.0 mm long, 0.2 mm wide.

**Specimens examined.** — **Gilgit:** W. of Chalt, above Chaprot, 30.8.1988, *Y. Nasir & Ali Gohar* 13544 (RAW); Rama, 13.8.1955, *E. Nasir & G. L. Webster* 6470 (RAW); Hunza, 12.8.1954, *R. R. Stewart* s.n. (RAW); **Baltistan:** Thalle la, 14.8.1940, *R. R. Stewart* 20695 (RAW); Thalle la, 28.8.1930, *J. R. Graham* s.n. (RAW).

*Distribution.* — Pakistan (Gilgit, Hunza, Baltistan).

*Flowers and fruits.* — April-October.

	<i>Sedum ewersii</i>	<i>Sedum pакистanicum</i>
Length $\mu\text{m}$ .....	21.0	20.7
Breadth $\mu\text{m}$ .....	15.2	14.4
P/E $\mu\text{m}$ .....	138.0	143.9
Shape .....	Prolate	Prolate
Colpi length $\mu\text{m}$ .....	18.0	17.6
Colpi breadth $\mu\text{m}$ .....	2.40	2.40
Exine $\mu\text{m}$ .....	2.40	2.40
Mesocolpium $\mu\text{m}$ .....	10.4	10.1
Apocolpium $\mu\text{m}$ .....	7.44	7.39
Intercolpate distance $\mu\text{m}$ .....	6.24	5.47

Table 1. — Measurement of pollen grains of two taxa.

	<i>Length <math>\mu\text{m}</math></i>	<i>Breadth <math>\mu\text{m}</math></i>
<i>Sedum ewersii</i> .....	700.0	210.8
<i>Sedum pакистanicum</i> .....	735.6	227.6

Table 2. — Measurement of seeds of two taxa.

#### ACKNOWLEDGEMENTS

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