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Olymposciadium caespitosum (*Umbelliferae*): A monotypic endemic species from Turkey

Abstract

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The genus *Olymposciadium* Wolff (*Umbelliferae*) is represented by only one species (*O. caespitosum* (Sm.) Wolff) in the Flora of Turkey. It was collected from Karabük province. In this study, morphological and anatomical features of the plant are described. It is a caespitose-perennial with 30-55 cm height. Leaves mostly basal, oblong, 1-pinnate or pinnatisect. Umbels usually equal, 6-14 rayed. Petals white, yellow-striated in the middle. Fruit glabrous, oblong. Stem is often ribbed. The secretory canals are embedded in paranchyma tissue. Isolated bundles separated from one another by ground tissue. Leaf is bifacial. Mesophyll is differentiated into 2-seriate palisade and 3-5-seriate spongy tissue. The different types of stomata (anisocytic, diacytic and paracytic) are observed. Each mericarp has four vittae on the dorsal surface and two to four on the comissural; numerous inconspicuous vittae also present. Ridges are inconspicuous.

Introduction

The *Umbelliferae* (*Apiaceae*) is one of the best known families of flowering plants because of its characteristic inflorescences and fruits and the distinctive chemistry reflected in the odour, flavour and even toxicity of many of its members. It contains about 300 genera and 2500-3000 species throughout the world (Heywood 1979). It comprises mainly herbaceous and cosmopolitan plants which grow chiefly in North temperate regions. It contains a number of plants of economic importance (Rendle 1937; Hickey & King 1981).

The genus *Olymposciadium* is a monotypic member of this family and is confined only to Turkey. *O. caespitosum* (Sm.) Wolff grows at high altitudes (1700-2000 m) in N. West and S. West Anatolia (Hedge & Lamond 1972).

Previously only a short note on *O. caespitosum* was published (Vural & Adıgüzel 1996). Here, morphological and anatomical features of *O. caespitosum* are described.

Material and Methods

O. caespitosum was collected in September from Karabük province of Turkey. Voucher

specimens are deposited in the Herbarium of the Faculty of Pharmacy of Anadolu University, in Eskisehir, Turkey (ESSE 13166). Morphological features were determined on herbarium materials. Transverse sections and surface preparations of stem, leaves and fruit were made manually for anatomical studies. Wild M5 Stereomicroscope with drawing tube and Leitz SM-LUX binocular microscope with drawing tube were used in morphological and anatomical studies. For SEM study, the specimens were mounted onto SEM stubs using double-sided adhesive tape and coated with gold. Photographs were taken with Cam Scan S4.

Results

Morphological description

Caespitose perennial herbs. Stem terete, yellowish-green, branched, 30-55 cm, glabrous or minutely puberulous. Leaves mostly basal, oblong, 2.5-9 x 1.1-2.3 cm, 1-pinnate or pinnatisect, segments ovate or oblong, 7-16 x 2.5-9 mm, dentate or laciniate, teeth apiculate. Upper leaves sheath-like, sometimes divided segments at the top, 6-25 x 1.5-4 mm. Bracts narrow-triangular to linear-subulate, unequal, spreading or recurved, 1-5 mm. Bracteoles similar to bracts, 0.8-4.5 mm. Umbels usually equal 6-14 rayed, rays 3.5-12 mm in flower, 10-30 mm in fruit. Flowers small in compound umbels (umbels are protandrous). Diameter of compound umbel 1.5-2.5 cm in flower; 2.2-5.5 cm in fruit. Diameter of partial umbel 5-7 mm in flower, 7-13 mm in fruit. Pedicels 8-12 per umbellule, 1.2-2.5 mm in flower, 2-3.5 mm in fruit, usually shorter than fruit. Calyx is very reduced and is often only indicated by inconspicuous teeth on the upper edge of the ovary, sepals green, free, almost 0.1 mm. Corolla consists of five free petals which are white to pale yellow striated in the middle, 0.7-1.3 x 0.5-1 mm, all equal in size. Stamens five, free. Anthers introrse, dorsifixed, 2-celled, dehisces longitudinally, white, 0.8-0.15 mm. Filaments broaden gradually towards the base, white, 1-1.5 mm. They are bent inwards in the bud; but are ultimately spreading. Ovary inferior, of 2-united carpels, 2-locular with 1-pendulous, anatropous ovule in each loculus epigynous disc present, prolonged into 2 short styles. Ovary 0.5 mm at early anthesis, 2.5-3.2 mm at late anthesis. Stylopodium 0.2-0.7 x 0.6-1.3 mm at early anthesis, 0.5-0.8 x 1.5-1.8 mm at late anthesis. Style + stigma 0.2-0.5 mm at early anthesis, (0.6-) 0.8-1.2 mm at late anthesis. Fruit is a dry schizocarp which splits down a septum into two one-seeded mericarps. It yellow or pale brown, glabrous, oblong, mericarps ± terete, smooth, ridges inconspicuous, 3.2-4.8 x 1-1.5 mm (Fig.1-2).

Anatomical description

Stem: Transverse sections taken from the middle part of the stem were observed as follows (Fig. 3). The epidermis is composed of a single layer of almost square compactly arranged cells. Upper surface is covered with a thin cuticle. Covering trichomes consist of non-glandular type (simple, unicellular). The collenchyma tissue which is located under the epidermis consists of variably a single layer and a grouping with 5-10 layers in between the epidermis and the secretory canals. Apart from the collenchyma, the cortex tissue consists of 4-5 layered chlorenchyma tissue (= photosynthesizing tissue) which comprises small and dense parenchyma cells containing chloroplasts and crystals. The cells of inner part of the cortex consist of thin-walled compact tissue with secretory canals embedded in

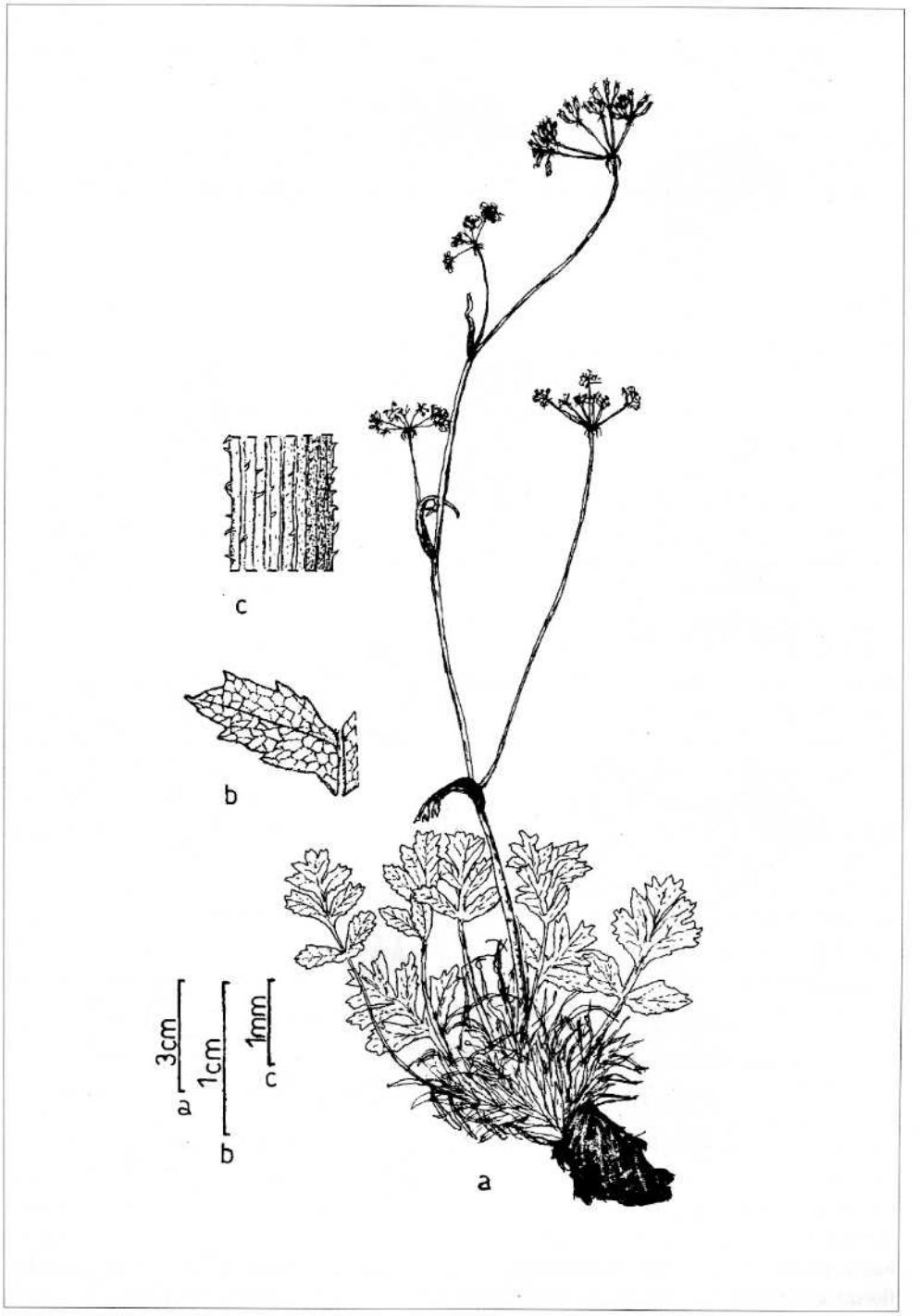

Fig. 1. *Olymposciadium caespitosum* ESŞE 13166: a - habit; b - leaf; c - stem.

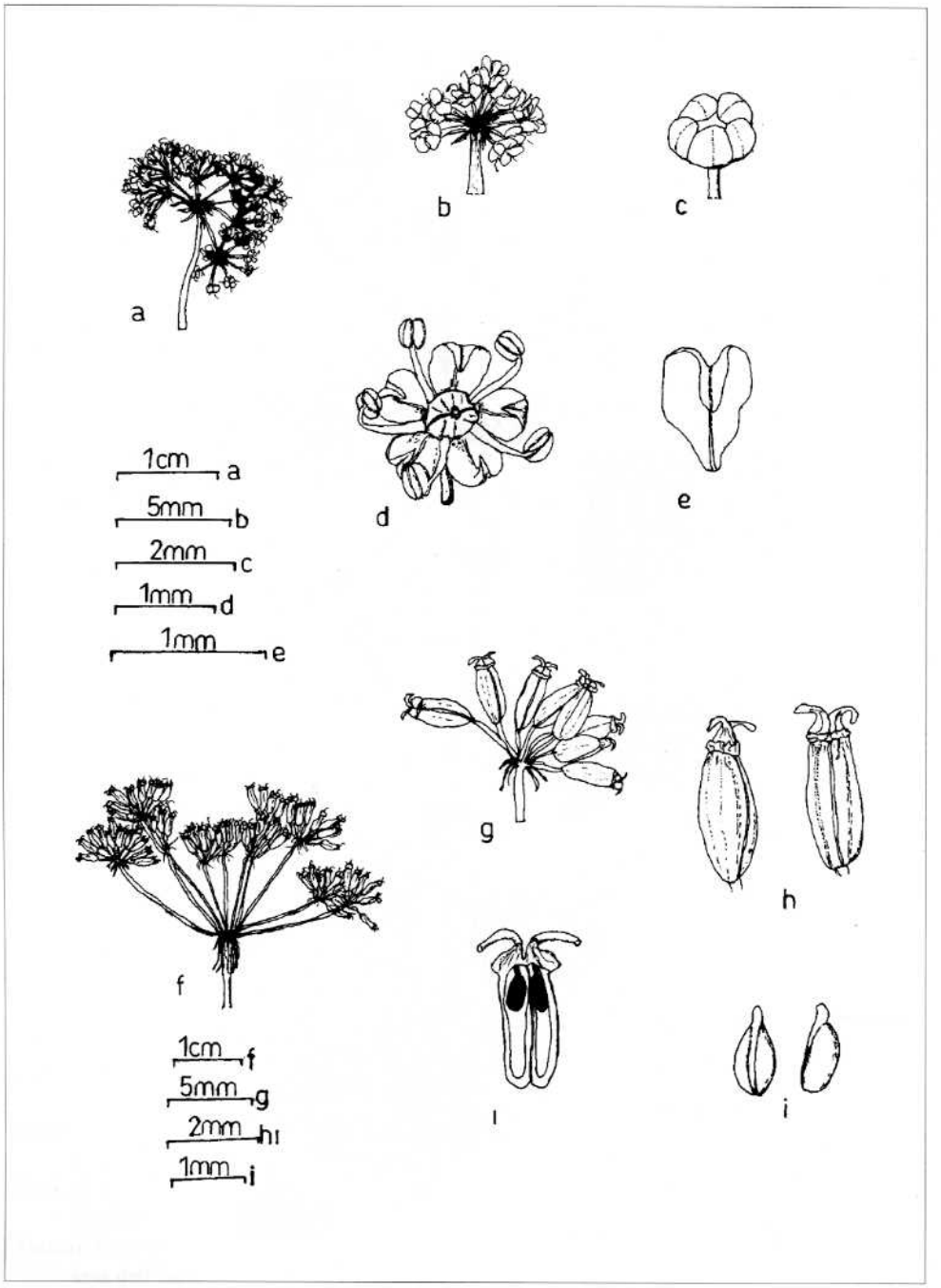

Fig. 2. *Olymposciadium caespitosum* ESSE 13166: a - compound umbel-flower; b - partial umbel-flower; c - flower-bud; d - flower; e - petal; f - compound umbel-fruit; g - partial umbel-fruit; h - fruit; ı - fruit cut vertically; i - seed.

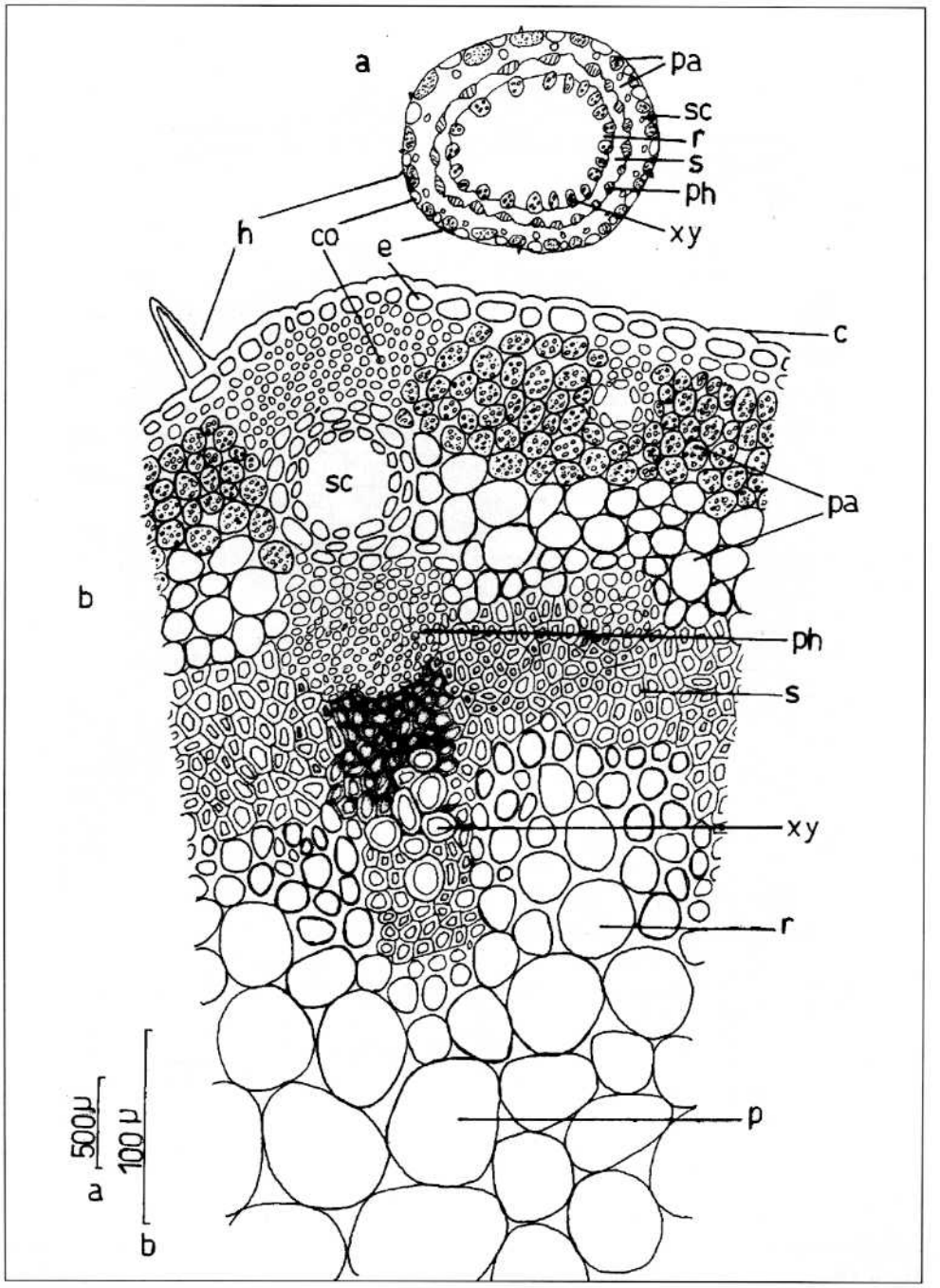

Fig. 3. *Olymposciadium caespitosum* ESSE 13166, Stem cross-section: a - schematic; b - anatomic; c - cuticle co - collenchyma; e - epidermis; h - hair; p - pith; pa - parenchyma; ph - phloem; r - rays; s - sclerenchyma; sc - secretory, canal; xy - xylem.

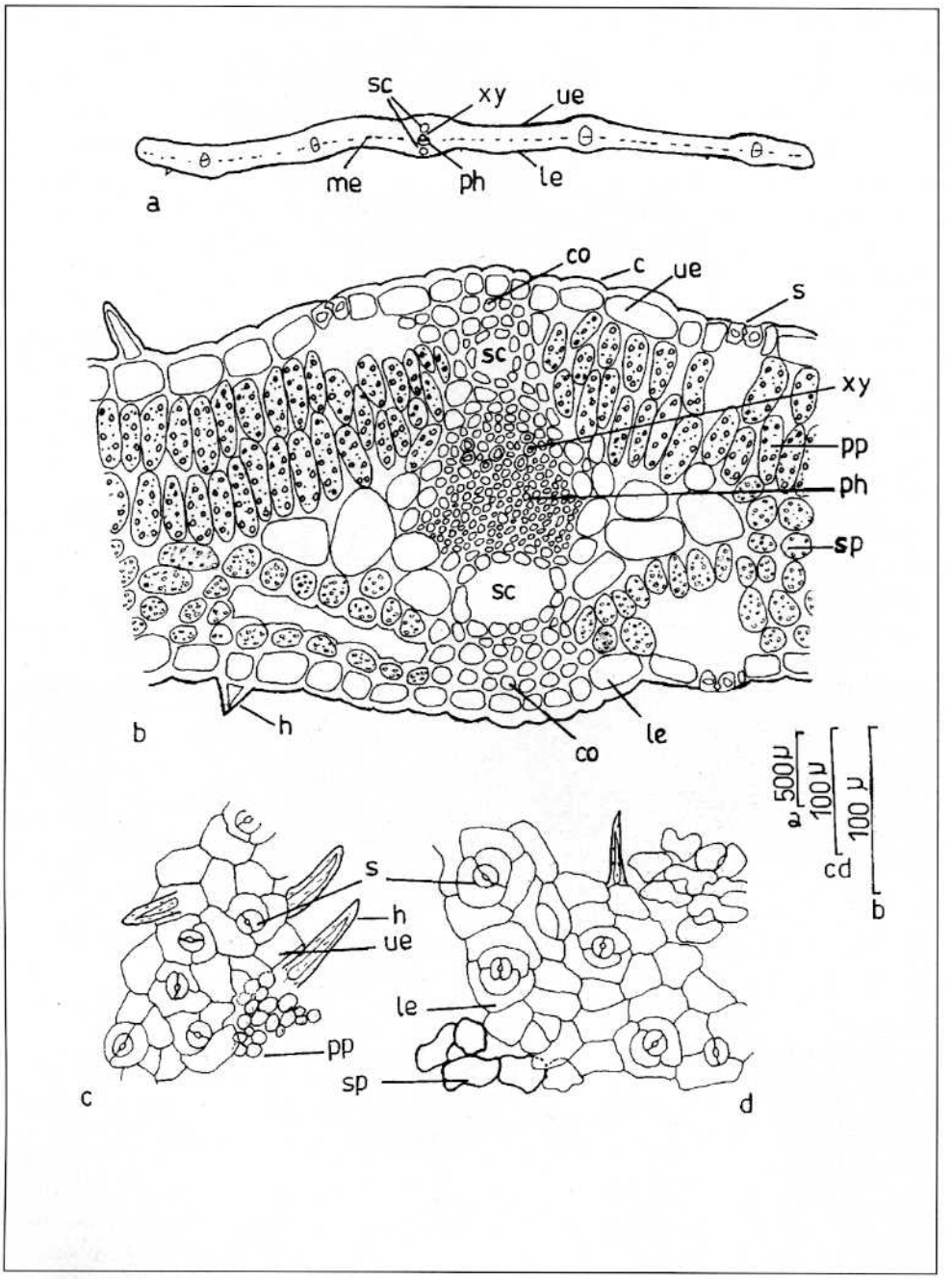

Fig. 4. *Olymposciadium caespitosum* ESSE 13166: Leaf cross-section; a - schematic; b - anatomic; c - surface preparations of upper epidermis; d - surface preparations of lower epidermis; c - cuticle; co - collenchyma; h - hair; le - lower epidermis; me - mezophyll; pp - palisade parenchyma; ph - phloem; s - stomata; sc - secretory canal; sp - spongy parencyhma (arm-palisade); ue - upper epidermis; xy - xylem.

it. 5-7 layered sclerenchyma tissue is located between the phloem and the xylem. Vascular bundles numerous arranged in a ring. Isolated bundles separated from one another by ground tissue. Rays are all multiseriate, usually up to 8 cells wide. Pith consists of large orbicular or polyhedral parenchymatous cells often with abundant intercellular spaces.

Leaf: Transverse sections of the lamina and the midrib and surface preparations of both epidermi revealed the following elements (Fig. 4-5). In transverse sections, upper and lower epidermi comprise uniseriate square and rectangular cells. Upper walls are thicker than lower and lateral walls. Both epidermi are covered with a thin cuticle. Covering trichomes consists of non-glandular type (simple, unicellular). The different types of stomata (anisocytic, diacytic and paracytic) are observed on the same preparations. They occur on the surfaces of both epidermi and they are almost located on the same level with epidermal cells. Leaf is bifacial. Mesophyll is differentiated into 2-seriate palisade and 3-5-seriate spongy tissue. Vascular bundles occur in a narrow area. Central vessel is less developed. Secretory canals are located on upper and lower sides of vascular bundles. The collenchymatous cells are found between the epidermis and secretory canals.

Fruit: Transverse sections taken from the middle part of the fruit were observed as follows (Fig. 6-8). Each mericarp has four vittae on the dorsal surface and two to four on the comissural; numerous inconspicuous vittae also present. Ridges are inconspicuous. Exocarp (the outer epidermis) is composed of a single layer of ovoid, square and rectangularly arranged cells and bears stomata. Upper surface is covered with on thin cuticle

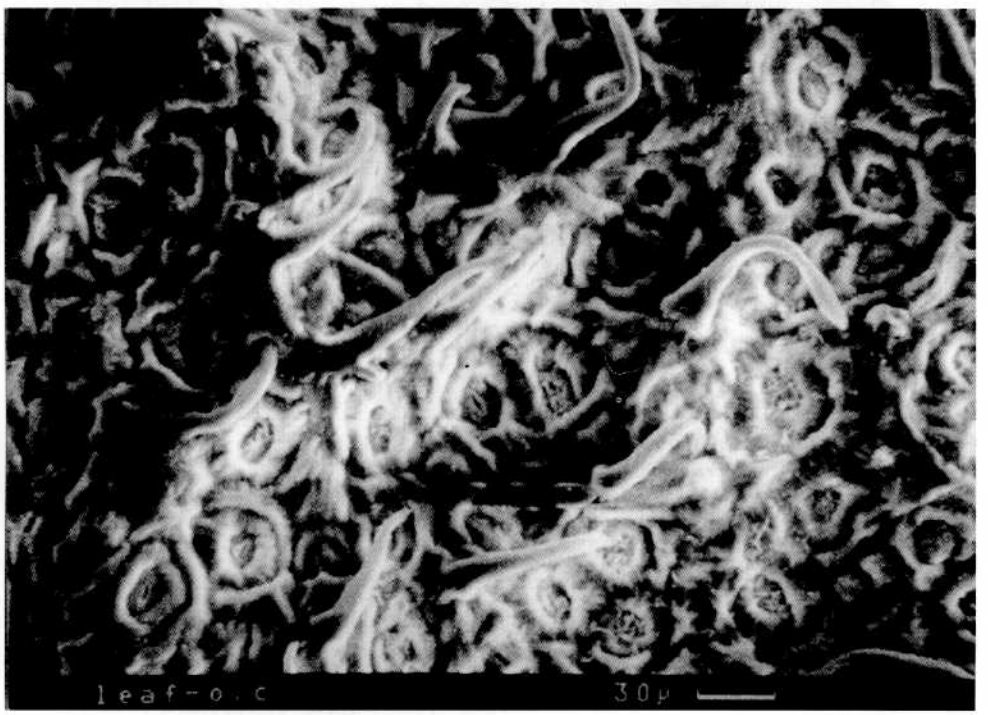

Fig. 5. *Olymposciadium caespitosum* ESSE 13166, SEM of leaf indumentum.

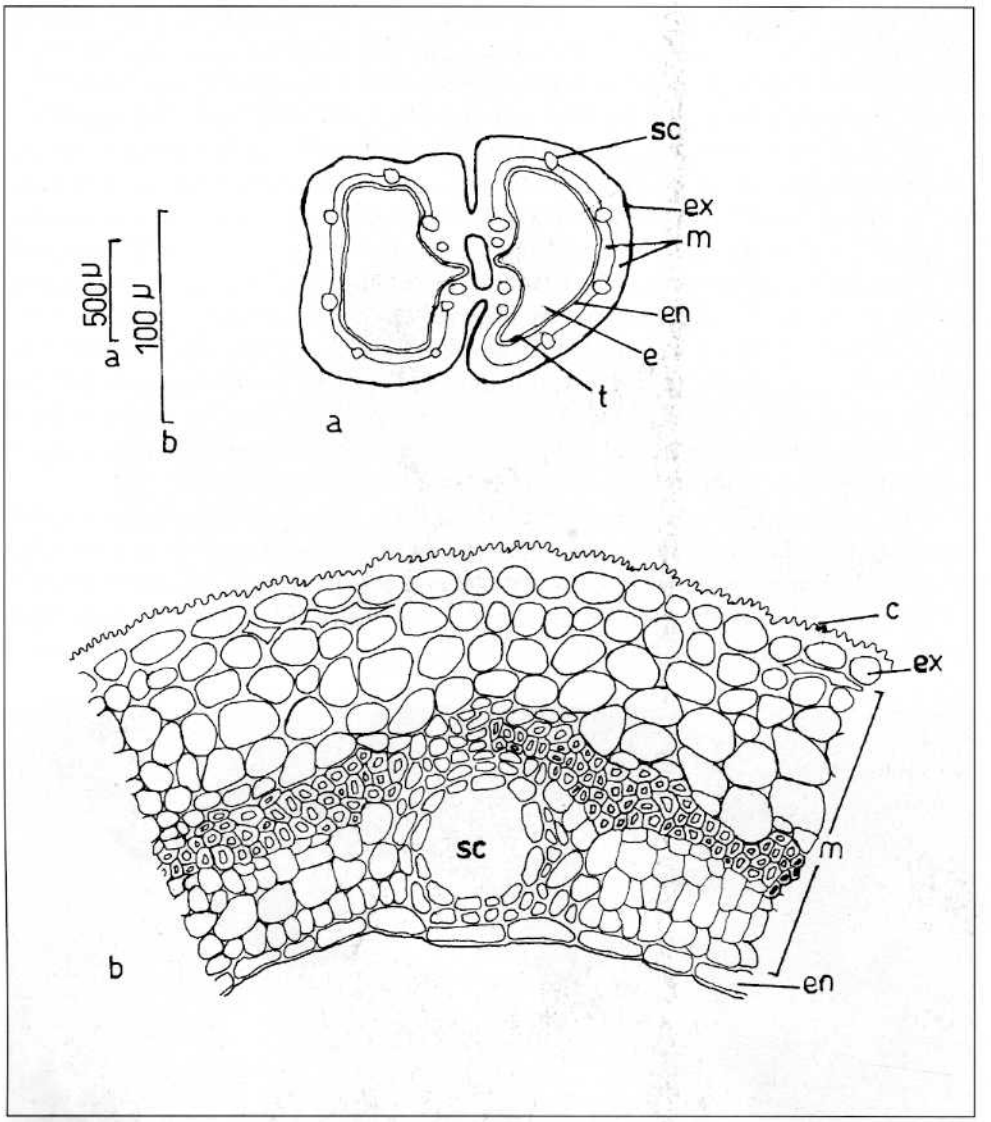

Fig. 5. *Olymposciadium caespitosum* ESSE 13166, SEM of leaf indumentum.

which is small papillae. Mesocarp consists of parenchymatous cells with thin walled. Several layered sclerenchymatous cells are located in the middle of parenchymatous cells. The oil ducts in the mesocarp are surrounded by polyhedral cells. The cells of the innermost layer of the mesocarp are slightly elongated. Endocarp (the inner epidermis) consists of a single layer of narrow cells of which the longitudinal axis is paralel to the transverse axis of the mericarp.

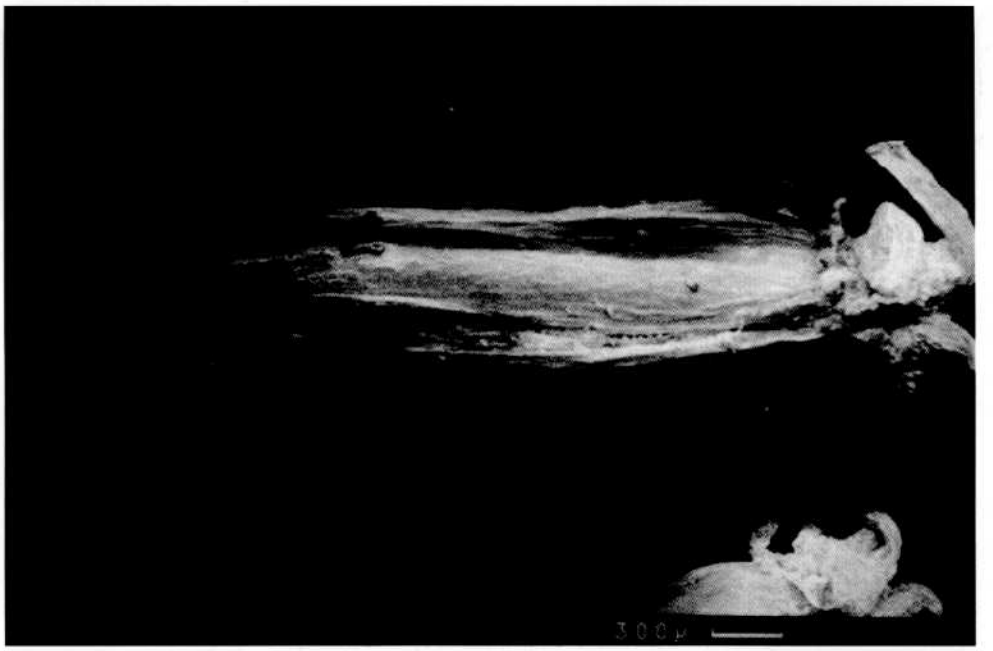

Fig. 6. *Olymposciadium caespitosum* ESSE 13166, Fruit cross-section: a-schematic; b-anatomic; c-cuticle; e-endosperm; en-endocarp; ex-exocarp; m-mezocarp; sc-secretory canal (vittae); t-testa.

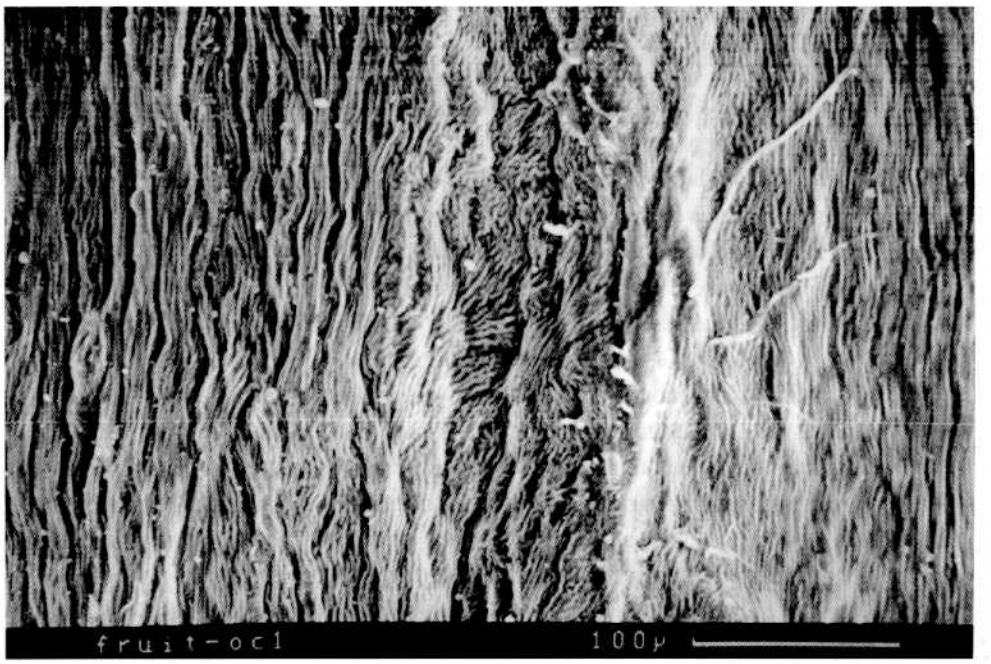

Fig. 7. *Olymposciadium caespitosum* ESSE 13166, SEM of fruit.

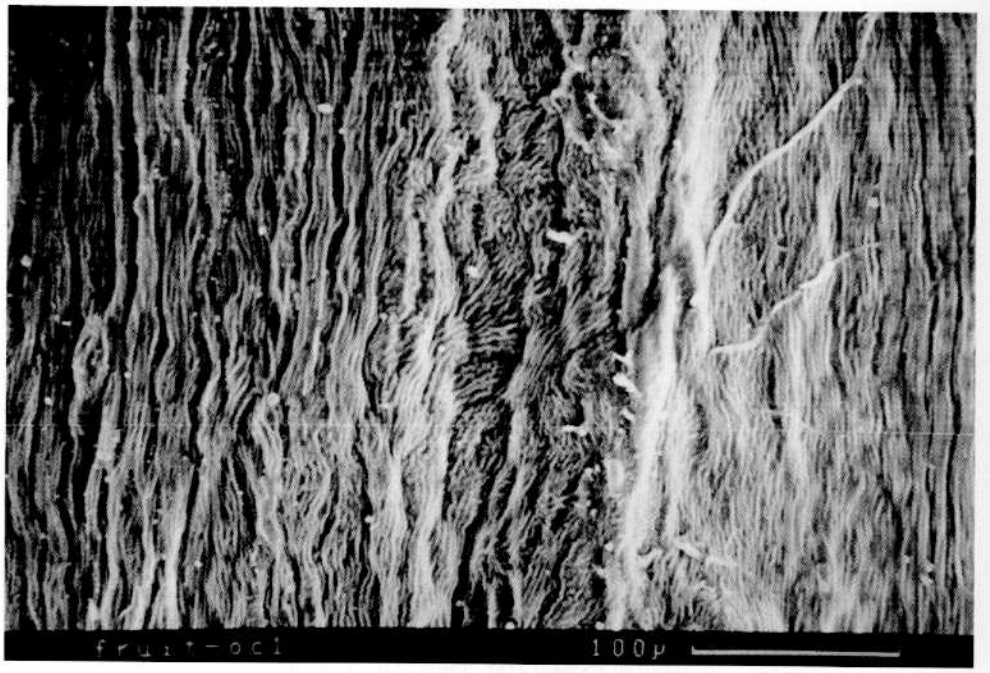

Fig. 8. *Olymposciadium caespitosum* ESSE 13166, SEM of fruit surfaces.

Discussion

O. caespitosum (Sm.) Wolff is a monotypic endemic species. Specimens of this plant collected from Karabük province in grid A4 were investigated. It is distributed in grids A2(A), A4, B3 and C4 (Hedge & Lamond 1972; Vural & Adıgüzel 1996; Yıldırımlı 1997).

Morphological features of the study material were compared with that published in the Flora of Turkey (Hedge & Lamond 1972) and measurements of plant length, ray number, dimensions of leaf-segment and fruit were found higher than those reported. The others features were in accordance with the published data. Umbel and flower properties are reported here in detail for the first time.

Usual features of the Umbelliferae anatomy were observed in anatomical studies, e.g. secretory canals are embedded in paranchyma tissue, there is always a ring of vascular bundles in the stem, isolated bundles are separated from one another by ground tissue, the stomata are accompanied by variously orientated subsidiary cells and the different types of stomata (anisocytic, diacytic and paracytic) are observed on the same preparations (Metcalfe & Chalk 1965). Fruit features almost agree with those reported in the Flora of Turkey (Hedge & Lamond 1972). Each mericarp has four vittae on the dorsal surface and while two on the comissural in flora, two to four on the comissural in our material; numerous inconspicuous vittae also present. Ridges are inconspicuous.

Acknowledgements

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