

First report of *Didymium flexuosum* (Myxomycetes) in Mexico

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Primer registro de *Didymium flexuosum* (Myxomycetes) para México

Resumen. Se describe macro y microscópicamente a *Didymium flexuosum* por primer vez para México. Las características distintivas de esta especie foliícola son sus fructificaciones plasmodiocárpicas comprimidas lateralmente y su columela calcárea que recorre longitudinalmente el interior de la fructificación a manera de muro.

Palabras clave: Didymiaceae, taxonomía, corología, foliícola, Chihuahua.

Abstract. *Didymium flexuosum* is described at the macro- and microscopic levels for the first time for Mexico. The distinguishing characteristics of this foliicolous species are its plasmodiocarpic fructifications, laterally compressed, and its calcareous columella running longitudinally along the interior of the fructification like a wall.

Keywords: Didymiaceae, taxonomy, chorology, foliicolous, Chihuahua.

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Introduction

The genus *Didymium* Schrad. has sessile and stipitate sporocarps, and plasmodiocarps whose main taxonomic character is a peridium covered with star-shaped crystals of calcium carbonate; columella present or absent, capillitium formed by non-calcareous dark threads and black spores in mass (Martin and Alexopoulos, 1969). There are some exceptions in some of the species of this genus, such as the presence of “vesicles” similar to the spores but larger, as in *D. flexuosum* Yamash. and *D. serpula* Fr. Other species have “trabeculae”, calcareous columns that start at the base of the sporocarp and extend toward the peridium, v.g., in *D. sturgisii* Hagelst.; the absence of capillitium in *D. atrichum* Henney & Alexop. (Henney *et al.*, 1980), *D. eremophilum* M. Blackw. &

Gilb. (Blackwell and Gilbertson, 1980) and *D. subreticulosporum* Oltra, G. Moreno & Illana (Oltra *et al.*, 1997; Lizárraga *et al.*, 1998; Mosquera *et al.*, 2000), all of which has raised some doubts about the inclusion of some species in this genus (Henney *et al.*, 1980).

Worldwide, 83 species are accepted for this genus (Lado, 2005 - 2013), of which 32 are known for Mexico (Lado and Wrigley de Basanta, 2008; Tapia *et al.*, 2008; Estrada Torres *et al.*, 2009) and 13 for the State of Chihuahua (Moreno *et al.*, 2007; Esqueda *et al.*, 2010). *Didymium flexuosum* was described for the first time in Japan in 1936 (Kalyanasundaram, 1978) and currently, records are scarce, collected from India, Japan and Taiwan (Liu and Chen, 1998), Austria, France, Thailand and Russia (Discover Life, 2013). In the Americas, it has been recorded for Brazil (Lado and Wrigley de Basanta, 2008) and the United States of America (Kansas and Puerto Rico) (Discover Life, 2013).

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Materials and methods

The material studied was collected in the field on the leaf litter of *Quercus* sp. Microscopic observations and measurements were made using permanent preparations of material mounted on Hoyer's medium using a Zeiss ICS KF2 light microscope (LM). The microscope image was taken with an Olympus BX51 photomicroscope. We followed the methodology of the equipment manuals for the EMITECH K-850 and Denton Vacuum Desk NEM TAPE (Nissain EM. CO., LTD) for critical point drying and metallization of the sample, respectively.

For the scanning electron microscope (SEM) photographs we used the JEOL JSM-7000 F. The collections have been deposited in the Herbarium of the Instituto de Ciencias Biomédicas, Universidad Autónoma de Ciudad Juárez (UACJ), and in the fungus collection of the Universidad Estatal de Sonora (UES).

Results and discussion

The study species

Didymium flexuosum Yamash., J. Sci. Hiroshima Univ., Ser. B, Div.2, Bot. 3:31 (1936)

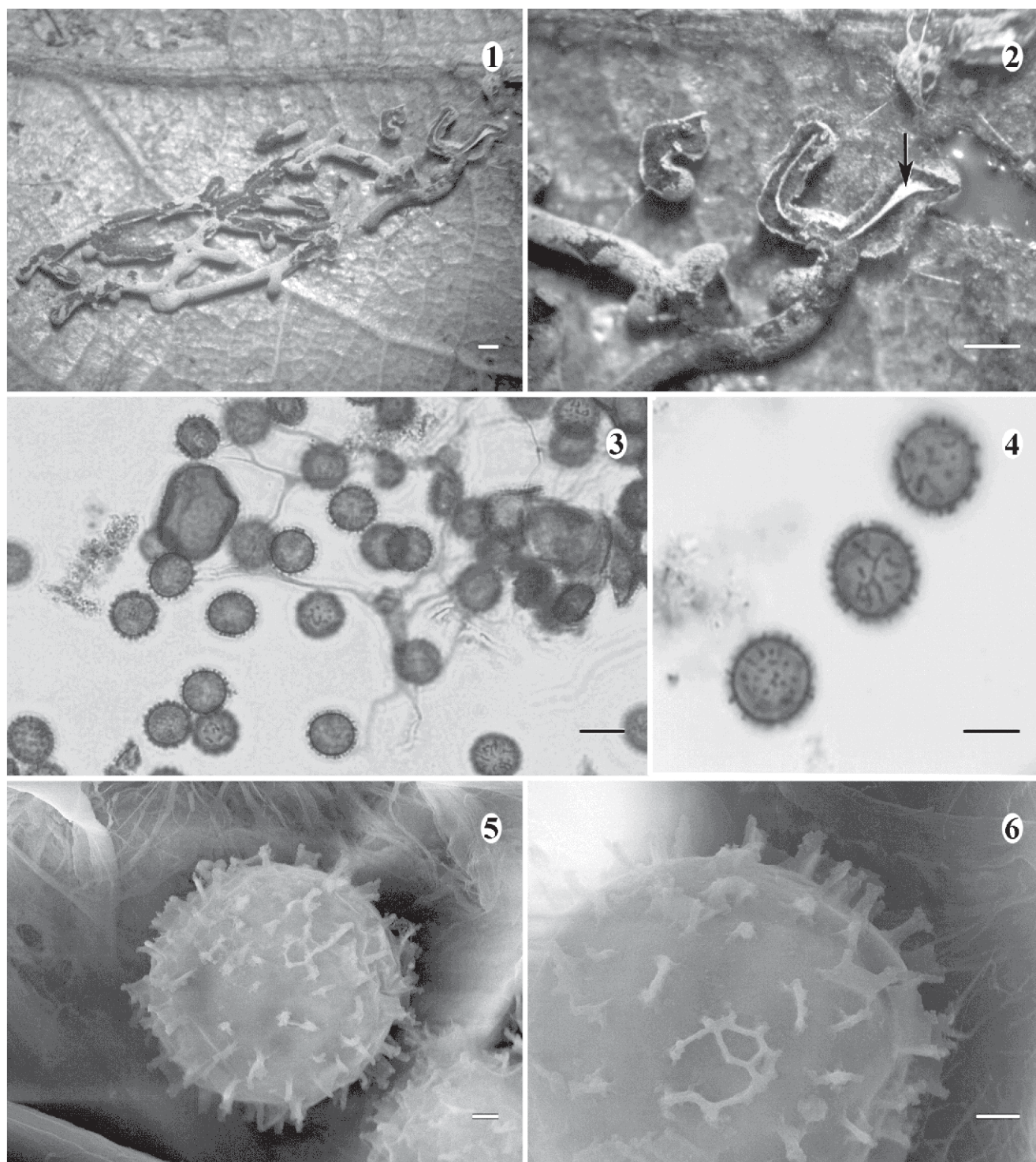
= *D. parietale* G.W. Martin & T.E Brooks, Trans. Amer. Microscop. Soc. 57:320 (1938).

Plasmodiocarps sessile, branched or reticulate, laterally compressed, grayish-white in color, measuring $14\text{--}15 \times 0.2\text{--}0.4 \times 0.3\text{--}0.5$ mm. Hypothallus membranous, inconspicuous, transparent. Peridium single, membranous, grayish with iridescent tones under stereoscopic microscope, superficially with abundant star-shape calcium carbonate crystals of different sizes, white-yellowish under LM, and irregular longitudinal dehiscence. Columella conspicuous,

wall-like attached to the base by broad extensions that run longitudinally along the center of the fruiting body, dividing it into two sections. Capillitium abundant under LM, consisting of pale to dark purple filaments, $1\text{--}2 \mu\text{m}$ diam., bifurcated to dichotomous, occasionally interspersed with nodules, with abundant free endings, and subglobose to amorphous vesicles of $15\text{--}25 \times 16\text{--}40 \mu\text{m}$ diam., of similar color and ornamentation like spores. Spores black in mass, purple under LM, globose to subglobose, $11\text{--}12 \mu\text{m}$ diam., superficially adorned with scattered spines $0.7\text{--}1.0 \mu\text{m}$ long, occasionally fuse to form a subreticulum. Ornamentation is formed by isolated bacula or confluent forming small reticulum under SEM.

Studied material: Mexico, Chihuahua, Rancho La Boquilla, Km 16 on the Highway from Chihuahua to Namiquipa, $29^{\circ}5'19.8''$ N lat. – $106^{\circ}28'11.6''$ W long., on leaves of *Quercus* sp., M. Lizárraga, C. Salazar, M. Vargas and D. López, 01-08-2010, *UACJ 1563*, *UACJ 1564*, *UACJ 1565*, *UES 9006*.

Observations: *Didymium flexuosum* is easy to identify macroscopically because of its plasmodiocarps and the columella which divides the fruiting body longitudinally (Figures 1 and 2), and microscopically by its vesicular bodies and spore ornamentation spiny to subreticulated (Figures 3–6). The presence of vesicular bodies is shared with *D. serpula*, but the latter does not have the longitudinal columella, its vesicles are yellow and its spores smaller and subtly verrucose (Martin and Alexopoulos, 1969). Kalyanasundaram (1978) observed under SEM that the vesicles are part of the capillitium. Similarly, spore ornamentation coincides with that presented for this species in the studies of Neubert *et al.* (1995) and Liu and Chen (1998).



Figures 1-6. *Didymium flexuosum*. 1. *D. flexuosum* UACJ 1563; 2. Detail of the columella; 3. Spores and vesicular bodies; 4. Spores under LM; 5-6. Spore ornamentation under SEM. Scale bars: 1-2: 300 μ m; 3: 10 μ m; 4: 5 μ m; 5-6: 1 μ m.

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