A New Microsporidian Parasite Record of Phyllotreta undulata (Chrysomelidae, Coleoptera)

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Abstract: A new microsporidian parasite of Phyllotreta undulata was recorded in Turkey. Fresh spores are oval, 3.85 ± 0.69 µm (2.0-4.75) in length and 2.04 ± 0.23 µm (1.90-2.40) in width (n = 50). The spores are uninucleated. As there were insufficient data available on the complete life cycle of the parasite, it could not be identified at species level.

Key Words: microsporidian parasite, Phyllotreta undulata, Chrysomelidae

Introduction
The first microsporidian described from Chrysomelidae was Nosema phyllotretae Weiser, observed in Phyllotreta atra (F.) and Phyllotreta undulata (Kutscher) (Weiser, 1961; Toguebaye et al., 1988), and it is the sole microsporidium reported from P. undulata. In the present paper we report a new microsporidian parasite of P. undulata.

Materials and Methods
Adult P. undulata specimens were collected from the central and east Black Sea regions of Turkey in 2001. Each beetle was dissected and wet smears were examined under a light microscope. Detected spores were measured and photographed and sections of infected beetles were examined with a Philips 208 electron microscope.

For ultrastructural studies in a transmission electron microscope (TEM) different portions of infected beetles were fixed in 2.5% glutaraldehyde in 0.1 M cacodylate buffer (pH 7.4) for 1-2 h, rinsed in cacodylate buffer, postfixed in reduced OsO₄ according to Karnovsky (a fresh 1:1 mixture of 2% OsO₄ and 3% K₄[Fe(CN)₆]) for 1.5 h, rinsed in cacodylate buffer and dehydrated in ethanol prior to embedding in Spurr’s resin (Spurr, 1969). Thin sections were mounted on Pioloform-coated copper grids stained with saturated uranyl acetate and Reynolds’ lead citrate (Reynolds, 1963). They were examined in a Philips 208 TEM.

Results and Discussion
A microsporidian infection was found in the adults of P. undulata collected from Beyyenice (Çarşamba-Samsun). Microscopic examination of parasitized individuals revealed the presence of the parasite in Malpighian tubules. The spores were only observed in this tissue (Figure 1). Spores were in groups. Fresh spores are oval, 3.85 ± 0.69 mm (2.0-4.75) in length and 2.04 ± 0.23 µm (1.90-2.40) in width. The spore is uninucleate. The polar filament of the parasite has 6–7 coils, and the well-developed polaroplast was of the lamellated type with irregularly arranged membranes anteriorly and roughly parallel cisternae posteriorly (Figure 2).
The spore’s ultrastructure elucidated typical characteristics of Microsporidia such as polar filament, an anchoring disc and lack of mitochondria. Microsporidia, known to infect Chrysomelidae are included in 3 genera: Nosema Naegeli, 1857, Unikaryon Canning, Lai and Lie, 1974 and Pleistophora Gurley, 1893 (Toguebaye et al., 1988). However, Brooks et al. (1988) described a new genus, Endoreticulatus, for the microsporidium Pleistophora fidelis (Hostounsky and Weiser, 1975), based on the ultrastructure of a microsporidium in the Colorado potato beetle, Leptinotarsa decemlineata (Say) (Coleoptera: Chrysomelidae). Microsporidians of the genus Nosema are diplokaryotic at all developmental stages and disporous, while the genera Unikaryon and Endoreticulatus/Pleistophora are monokaryotic at all stages (Toguebaye et al., 1988). The spore is the most important life cycle stage for the identification of microsporidia above the species level by ultrastructural studies. The spore is always present and provides abundant characters to evaluate (Larsson, 1999). The ultrastructure of spores of the genus Nosema was given by Canning and Vavra (2000) and Yaman and Radek (2003). The genus Nosema has been used to collect species with diplokaryotic spores (Larsson, 1999). As seen in Figure 2, the present microsporidian is uninucleate. The spore dimension is a good feature for comparison of the microsporidia from chrysomelids. This microsporidian isolate (3.85 x 2.04 µm) differs from Nosema phyllotretae (4.2 to 6 x 2 to 3 µm) in spore size. Furthermore, the present microsporidium infected only Malpighian tubules. Therefore, the parasite characterized here is considered a new microsporidian parasite of Phyllotreta undulata. Further research will be directed to observe other life stages of the parasite and identify it at the species level.

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