



Original Contribution

NEW DATA ON DIAPORTHALES FROM SOUTHWEST BULGARIA

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ABSTRACT

Studies on saprotrophic foliicolous ascomycetous fungi found in Southwest Bulgaria were done. Microscopic examinations of these materials were carried out. Results from nineteen species (eighteen species of the Gnomoniaceae and one of the Valsaceae) of diaporthalean foliicolous fungi are hereby presented. Ten of the species represent the genus *Gnomonia*. *Geum montanum* is new to Bulgaria substratum of *Gnomonia gei-montani*, while *Prunus cerasifera* is a new substratum of *Apiognomonium erythrostoma* in the country. *Apiognomonium errabunda*, *Gnomonia setacea* and *Hypospilina pustula* were found on dead leaves of *Castanea sativa*. *Tilia cordata* is a new substratum of *A. errabunda* in Bulgaria. Nine species of the Diaporthales from the region of Slavyanka Mt have been observed for the first time. In addition, this was the first time when these studies have been conducted in Southwest Bulgaria comprising Vitosha region, West Frontier Mts, Strouma valley, Belasitsa Mt, Slavyanka Mt, Pirin Mt and Western Sredna Gora Mts.

Key words: ascomycetes, Bulgarian mycota, new data, saprotrophs, substrata

INTRODUCTION

The results presented are from a study on foliicolous ascomycetous fungi found in Southwest Bulgaria. They provide information on the diversity of those saprotrophic fungi (both xylophyllous and foliicolous) developing on dead branches, stems and leaves of various plants in that part of Bulgaria. Therefore they must be considered as specialized saprobes, which participate actively in the first stages of destruction of the leaf litter in Nature.

Significant contributions to the diaporthalean fungi from different regions of Bulgaria have already been made in some recent scientific works on the following families - Diaporthaceae, Gnomoniaceae and Valsaceae (1-7).

Two species of the family Gnomoniaceae (*Apiognomonium erythrostoma* and *A. veneta* – highly specialized on substrata of *Prunus* and *Platanus*) are presented in the text with brief descriptions and original metric data, because of a lack of

comprehensive information in the previous publications in Bulgaria.

MATERIALS AND METHODS

All specimens cited here were collected by the authors unless otherwise stated. They are preserved in the Mycological Collection of the Institute of Botany, Bulgarian Academy of Sciences (SOMF). Their accession numbers are given in brackets at the end of each record. The investigations were carried out on dried specimens, rehydrated in water. Microscopic features were observed and measured in lactophenol with cotton blue (8). The measurements of ascospores in the text are given in the form: min-max (mean \pm standard deviation). Number of studied ascospores (*n*) is designated in brackets (see Table 1). New to Bulgaria substrata of diaporthalean fungi are marked in the text with an asterisk. Drawings were made with a camera lucida on an Amplival Carl-Zeiss microscope. Taxonomic studies, regional monographs and contributions on the diaporthalean fungi have been used for the determination of the taxa (9-12).

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RESULTS

As a result of studies carried out in different parts of Southwest Bulgaria the following saprotrophic fungi from the Diaporthales were established:

***Apiognomonium acerina* (Starbäck) M. Monod**

On dead leaves of *Acer platanoides* L., Vitosha region: Mt Vitosha; between the villages of Simeonovo and Dragalevtsi, 15 May 1993, Violeta Fakirova (21152).

***Apiognomonium errabunda* (Roberge) Höhn.**

On dead leaves of: *Castanea sativa* Mill. West Frontier Mts: Mt Osogovska Planina, along the road from Kjustendil to Bogoslov village, 7 September 2002 (25917); **Tilia cordata* Mill.: Vitosha region: Vitosha Mt, Zheleznitsa village, 1 May 1999 (25024).

***Apiognomonium erythrostroma* (Pers. : Fr.) Höhn. (Figure 1).**

Perithecia 400-550 μm in diam, reddish brown, immersed, non-stromatic, globose. Beak 180-210 \times 70-100 μm , reddish brown, central, straight. Asci (50-) 57-70 (-80) \times 7.5-10 (-11) μm , clavate to subcylindrical, 8-spored, apical ring 3 μm long. Ascospores 13.2-17.1 \times 4-6.1 μm ($15.38 \pm 1.1 \times 4.7 \pm 0.5$) ($n = 50$), hyaline, straight, fusiform-ellipsoidal, two-celled, with septum at 1/3 of the spore length, overlapping biseriate in the ascus. The small cell narrower. The bigger cell oriented in the ascus towards the apical annulus, with two large globules.

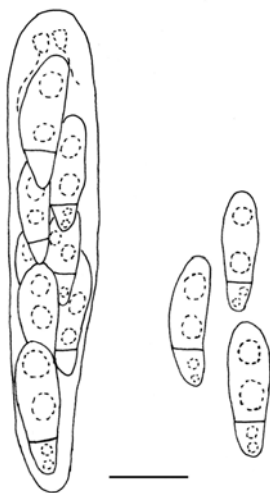


Figure 1. *Apiognomonium erythrostroma*: ascus and ascospores

On dead leaves of **Prunus cerasifera* Ehrh. Western Sredna Gora Mts: Mt Lozenska Planina, above Pancharevo dam lake, 21 May 2005 (25456).

Note. Dobrev (13) reported *Gnomonia erythrostroma* (Pers. : Fr.) Auersw. on leaves of *Prunus armeniaca* L. (= *Armeniaca vulgaris* Lam.) from Northeast Bulgaria, but the corresponding specimen was not conserved in SOMF. The measurements of perithecia (diameter 300-390 μm), asci (70-85 \times 11-12 μm) and ascospores (17-20 \times 5-6 μm) differ from those of our finding on *Prunus cerasifera*.

***Apiognomonium veneta* (Sacc. & Speg.) Höhn. (Figure 2).**

Perithecia (230-) 265-300 μm in diam, black, immersed, non-stromatic, globose or slightly flattened at the base. Beak (70-) 90-130 \times (65-) 80-110 μm , black, central, straight. Asci (35-) 40-55 (-65) \times (7-) 8-12 (-14) μm , clavate to subcylindrical, 8-spored, apical ring 3 μm long. Ascospores 11-16.5 \times 3-4.5 μm ($13.6 \pm 1.4 \times 3.9 \pm 0.5$) ($n = 50$), hyaline, straight or slightly curved, fusiform-ellipsoidal, two-celled, with septum at 1/6 of the spore length, without appendages, overlapping biseriate in the ascus. The bigger cell oriented in the ascus towards the apical annulus, with 2 large or many small globules.



Figure 2. *Apiognomonium veneta*: ascus and ascospores.
Scale bar = 10 μm .

On dead leaves of *Platanus orientalis* L. Valley of River Strouma: between the villages of Belasitsa and Kolarovo, N 41°37'98'' E 23°11'89'', 10 April 2003 (25407).

Note. Rosnev (14) reported *Gnomonia*

veneta (Sacc. & Speg.) Kleb., but the corresponding specimen was not conserved. The measurements of perithecia and beaks given in the paper differ significantly from these of *Apiognomonia veneta*.

***Gnomonia betulina* Vleugel**

On dead leaves of *Betula pendula* Roth. West Frontier Mts: Mt Osogovska Planina, below Choveka peak, 24 August 2002 (25905).

***Gnomonia comari* P. Karst.**

On dead stems, petioles and leaves of *Agrimonia eupatoria* L. Slavyanka Mt: Reserve Ali Botush, Parilski Dol locality, 19 June 2004 (25419). In the vicinity of Nova Lovcha village, 20 June 2004 (25420); along the road to Lalevo locality, 20 June 2004 (25901). On dead stems of *Potentilla recta* L. group. Pirin Mt: Yavorov hut, 17 June 2002, V. Fakirova (25918).

***Gnomonia gei-montani* Ranoj.**

On dead leaves and petioles of **Geum montanum* L. Vitosha region: Mt Vitosha, between Reznjovete and Skoparnika localities, 24 July 2004 (25425, 25426); West Frontier Mts: Mt Osogovska Planina: near the track from Osogovo hut to Choveka peak, 24 August 2002 (25436).

***Gnomonia geranii* Hollós**

On dead stems and petioles of *Geranium sanguineum* L. Slavyanka Mt: Ali Botush reserve, along the track from Hambar Dere locality to Paril village, 19 June 2004 (25913); Pirin Mt: along the road to Orelek peak, 19 June 2004 (25904).

***Gnomonia geranii-macrorrhizi* Fakirova**

On dead stems and petioles of *Geranium macrorrhizum* L. Belasitsa Mt: Samouilovo village, 10 May 1994 (21414); Slavyanka Mt: Reserve Ali Botush, Hambar Dere locality, 19 June 2004 (25896); Pirin Mt: Vihren hut, 17 June 2002, V. Fakirova (25914).

Note. This species is presently reported to belong to the following floristic regions in Bulgaria: Forebalkan, Sofia region, Vitosha Mt, Sredna Gora Mt (western) and Mts Rhodopes (western). According to the distribution of the host species it is expected that future studies will reveal a lot of new localities of *G. geranii-macrorrhizi* in the country.

***Gnomonia gnomon* (Tode : Fr.) J. Schröt.**

On leaves of *Corylus avellana* L. Belasitsa Mt: Belasitsa hut, 30 April 2005 (25902); Slavyanka Mt: Paril village, 19 June 2004 (25900); Pirin Mt: above Bansko town, 21 August 2002 (25906); above Gotse Delchev town, Papaz Chair locality, 18 June 2004 (25417); above Sandanski town, 1 April 1980, V. Fakirova (20322).

***Gnomonia leptostyla* (Fr. : Fr.) Ces. & De Not.**

On leaves of *Juglans regia* L. Strouma valley: Koulata village, 18 May 2006 (25909); Slavyanka Mt: The village of Paril, 19 June 2004 (25916); Nova Lovcha village, 20 June 2004 (25895).

***Gnomonia nervisequa* (Wallr.) Fuckel**

On leaves of *Alnus glutinosa* (L.) Gaertn. Slavyanka Mt: The village of Paril, 19 June 2004 (25412). On leaves of *Juglans regia* L. Slavyanka Mt: Paril village, 19 June 2004 (25432).

***Gnomonia setacea* (Pers. : Fr.) Ces. & De Not.**

On dead leaves of: **Castanea sativa* Mill. Belasitsa Mt: the town of Petrich, 9 May 1994, V. Fakirova (21415); Samouilovo village, 10 May 1994, V. Fakirova (21390); Belasitsa hut, 12 May 2002 (25924); 30 April 2005 (25446); between Belasitsa hut and Vodopada locality, 18 May 2006 (25928); *Quercus cerris* L. Vitosha region: Mt Plana Planina, 29 August 2002 (25907).

***Gnomonia tetraspora* G. Winter**

On dead stems of *Euphorbia* sp. Pirin Mt: between Yavorov hut and Razlog, 17 June 2002, V. Fakirova (25915).

***Hypospilina pustula* (Pers. : Fr.) M. Monod**

On: **Castanea sativa*. Belasitsa Mt: Belasitsa hut locality, 18 May 2006 (25929); Western Sredna Gora Mts: Mt Lozenska Planina, Kokalyane village, 3 June 2005 (25912); *Quercus dalechampii* Ten. Strouma valley: Kresna defile, 30 April 2005 (25447); between Belasitsa village and Kolarovo, 30 April 2005 (25460); Slavyanka Mt: above Paril village, Hambar dere locality, 19 June 2004 (25899); *Quercus pubescens* Willd.

Strouma valley: Marino Pole village, 18 May 2006 (25910); Slavyanka Mt: above Nova Lovcha village, 20 June 2004 (25898).

***Plagiostoma alneum* (Fr. : Fr.) Arx**

On dead leaves of *Alnus glutinosa* (L.) Gaertn. Slavyanka Mt: Paril village, 19 June 2004 (25412).

***Plagiostoma arnstadtense* (Auersw.) M. Monod**

On dead leaves of *Ostrya carpinifolia* Scop. Belasitsa Mt: Belasitsa hut, 30 April 2005 (25445).

***Plagiostoma bavaricum* (Rehm) M. E. Barr**

On dead leaves of *Acer pseudoplatanus* L. Vitosha region: Mt Vitosha, Simeonovo, Ezerata locality, 24 July 2002 (25911); West Frontier Mts: Mt Osogovska Planina, along the track from Choveka peak to the valley of river Bistritsa, 24 August 2002 (25908).

***Plagiostoma inclinatum* (Desm.) M. E. Barr**

On dead leaves of *Acer campestre* L. Slavyanka Mt: between the villages of Teshovo and Gajtaninovo, 20 June 2004 (25897).

***Sydowiella fenestrans* (Duby) Petr.**

On dead stems of *Epilobium angustifolium* L. Belasitsa Mt, 19 May 1975, V. Fakirova (13755).

Six species (viz. *Apiognomonia veneta*, *Gnomonia comari*, *G. geranii*, *G. setacea*, *G. tetraspora* and *Sydowiella fenestrans*) have been recorded in Bulgaria on leaves and on dead stems, so they can be considered both as caulicolous and foliicolous, while the other fourteen species are known only from overwintered leaves and petioles, so they appear to be strict inhabitants of leaves. Among the studied fungi herein *G. geranii-macrorrhizi* is the fungus having the biggest ascospores in length and width, while *Apiognomonia errabunda* is the species with the smallest ascospores (Table 1).

Table 1. Metric data of the ascospores of the Diaporthales in the Southwest Bulgaria

SPECIES	Ascospore measurements (μm)
<i>Apiognomonia acerina</i>	(17.6-) 18.7-20 (-22) \times (4.5-) 5.5-6 (-6.6) (n = 50)
<i>A. errabunda</i>	9.5-13 \times 2.2-2.5 (-3) (n = 20)
<i>A. erythrostoma</i>	13.2-17.1 \times 4-6.1 (n = 50)
<i>A. veneta</i>	11-16.5 \times 3-4.5 (n = 50)
<i>Gnomonia betulina</i>	13.5-21 \times 2.5-4.5 (n = 20)
<i>G. comari</i>	6-13 \times 1.5-2.5 (n = 20)
<i>G. gei-montani</i>	7.5-13 \times 1.7-2.4 (n = 20)
<i>G. geranii</i>	10-16 \times 1.6-2.6 (n = 20)
<i>G. geranii-macrorrhizi</i>	19.5-28 \times (4.5-) 5-6.5 (-7) (n = 50)
<i>G. gnomon</i>	14.5-25 \times 1-1.7 (n = 20)
<i>G. leptostyla</i>	15.4-25.7 \times 2.5-4 (n = 30)
<i>G. nervisequa</i>	12-21 \times 1-1.6 (-2) (n = 20)
<i>G. setacea</i>	(10-) 11-14 (-15) \times 1.5-2.1 (n = 100)
<i>G. tetraspora</i>	12-15 \times 3.5-5 (n = 20)
<i>Hypospilina pustula</i>	20-26 \times 4.3-5 (n = 20)
<i>Plagiostoma alneum</i>	14.3-22.5 \times 2.5-4.4 (n = 20)
<i>P. arnstadtense</i>	(13.8-) 15.6-17.5 (18.5) \times 3-3.5 (-4) (n = 50)
<i>P. bavaricum</i>	(11-) 12.4-16.5 (-17) \times 2.5-4.5 (-5) (n = 50)
<i>P. inclinatum</i>	13.2-19.5 \times 1.5-3 (n = 20)
<i>Sydowiella fenestrans</i>	(12.6-) 16.2-20.5 (-22.7) \times (6.5-) 7-10 (11) (n = 50)

According to our present knowledge on the Diaporthales in Bulgaria it would be interesting to study further distribution of this fungal group. Future field investigations in

these regions of the country, aimed at finding other rare plant-substrata, could reveal more interesting and rare acomycetous fungi.

CONCLUSION

Twenty species of the Diaporthales were established during this study. The highest number of fungal species was recorded in Slavyanka Mt (nine species), followed by Belasitsa Mt (five), Pirin Mt (five), Vitosha region (four), West Frontier Mts (four), etc.

Their distribution is presented on **Table 2**, according to the arrangement of the floristic regions. Four species - new to Bulgaria substrata of diaporthalean fungi are reported (viz. *Castanea sativa*, *Geum montanum*, *Prunus cerasifera* and *Tilia cordata*).

Table 2. New data on the Diaporthales in the Southwest part of Bulgaria

SPECIES	Regions						
	Vitosha region	West Frontier Mts	Strouma Valley	Belasitsa Mt	Slavyanka Mt	Pirin Mt	Western Sredna Gora Mts
<i>A. acerina</i>	+						
<i>A. errabunda</i>	+	+					
<i>A. erythrostoma</i>							+
<i>A. veneta</i>			+				
<i>G. betulina</i>		+					
<i>G. comari</i>					+	+	
<i>G. gei-montani</i>	+	+					
<i>G. geranii</i>					+	+	
<i>G. geranii-macrorrhizi</i>				+	+	+	
<i>G. gnomon</i>				+	+	+	
<i>G. leptostyla</i>			+		+		
<i>G. nervisequa</i>					+		
<i>G. setacea</i>				+			
<i>G. tetraspora</i>						+	
<i>H. pustula</i>			+		+		+
<i>P. alneum</i>					+		
<i>P. arnstadiense</i>				+			
<i>P. bavaricum</i>	+	+					
<i>P. inclinatum</i>					+		
<i>S. fenestrans</i>				+			

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