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Cultural and morphological characteristics of wood-inhabiting *Xylaria* species from Ukraine

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Abstract: The cultural and morphological characteristics of three wood-inhabiting *Xylaria* Hill ex Schrank species (23 strains) from the IBK Mushroom Culture Collection were studied. Data on radial mycelial growth, detailed descriptions and illustrations of colonies on two different agar nutrient media were provided. For *X. polymorpha* (Pers.) Grev., *X. longipes* Nitschke and *X. hypoxylon* (L.) Grev. differences in mycelial colony characteristics (textures, colors, concentric zones, margins, formation of stromata and characteristics of reverse) were observed.

Keywords: *cultural characteristics, morphology, vegetative mycelium, growth rate*

INTRODUCTION

Xylaria Hill ex Schrank species are well known as saprophytes, endophytes, symbionts with insect nests and have been studied by researchers from around the world [Chacko, Rogers, 1981; Rogers, Callan, 1986; Rogers, Samuels, 1986; Rodrigues et al., 1993; Fournier et al., 2012; Stadler et al., 2013]. These fungi are widely known for the diversity of morphology that complicates taxonomizing. The stromata of *Xylaria polymorpha* (Pers.) Grev., the most common species, show a huge variety of morphology: from spade-shaped to fusiform or discoid, cylindrical or flattened, upright, contoured or curved, etc [Rogers, Callan, 1986]. Data on the growth of *Xylaria* in pure culture reveals similar significant variability in the appearance of mycelial colonies depending on the media [Chacko, Rogers, 1981; Rogers, 1983; Callan, Rodgers, 1993; Fenwick, 1994; Ahmed, Jahan, 2018]. Concerning studies of *Xylaria* in Ukraine, mycologists have reported finds of this genus from various regions of the country, but no detailed *in vitro* studies have been conducted. Until the beginning of our survey only two strains of *X. polymorpha* (IBK 2430 and IBK 2382) were deposited in the largest fungal culture collection in Ukraine – The IBK Mushroom Culture Collection of the M.G. Kholodny Institute of Botany, NAS of Ukraine [Bisko et al., 2018; Bisko et al., 2022]. Therefore, adding and describing new *Xylaria* strains to the collection and analyzing their specific characteristics is highly important for studying the diversity based on the morphology.

This study aims to analyze the growth patterns in the culture of three wood-inhabiting *Xylaria* species common to Ukraine and Europe, that have been maintained at the IBK Mushroom Culture Collection, and to describe their cultural and morphological features.

MATERIAL AND METHODS

Cultures were established from stromata collected from natural habitats in Ukraine. Pertinent collection data with strain numbers, date of isolation, and their origins (region and geographical coordinates of the particular collections) are cited in table 1. All cultures are preserved in the IBK Mushroom Culture Collection.

Cultural characteristics and radial growth rate of mycelia were studied on glucose-yeast-peptone agar medium (GYPA): 25 g/L glucose, 3 g/L peptone, 3 g/L yeast extract, 0.25 g/L $MgSO_4$, 1 g/L KH_2PO_4, 1 g/L K_2HPO_4; 21 g/L agar, pH 6.5), and malt extract agar medium (MEA): 35 g/l malt extract (Scharlau Chemie S.A., Spain), 15 g/L agar, at 25±1ºC on 9-cm Petri dishes. The pH of the media was adjusted using 0.1 N KOH, and then the media were sterilized at 121ºC for 20 min. Isolations were established by a stromatal tissue of the entostromata fragment, from which the overlying ectostroma had been excised, onto GYPA added ampicillin. Growing out mycelium was subsequently transferred onto fresh GYPA dishes without antibiotics. For the study of cultures growth and morphology, 5–8-day-old cultures grown on GYPA were used as inoculum. Mycelial discs with a diameter of 8 mm were cut with a sterile steel tube at a distance of 8–10 mm from the edge of the actively growing colony. The discs were aseptically transferred onto GYPA and MEA plates. The cultures were incubated at 25±1°C in the dark for 14–30 days. Cultural characteristics of mycelial colonies, the marginal zone, aerial mycelium, colony color, and changes in the reverse colony color were described.

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Table 1. List of the studied strains of *Xylaria* species used in his study.

Species, strain	Origin, date of isolation
X. polymorpha 2719	Ukraine, Vinnytsia Oblast, 49°16'13.8"N 28°26'40.1"E; 2020
2720	Ukraine, Vinnytsia Oblast, 49°16'13.8"N 28°26'40.1"E; 2020
2721	Ukraine, Vinnytsia Oblast, 49°15'31.3"N 28°26'21.0"E; 2020
2723	Ukraine, Sumy Oblast, Romny Raion, Bratske
2727	Ukraine, Vinnytsia Oblast, 49°15'23.9"N 28°25'56.6"E; 2020
2729	Ukraine, Kharkiv, 50°02'38.4"N 36°15'50.4"E; 2020
2736	Ukraine, Mykolaiv Oblast, Voznesensk Raion, "Trykraty forest" reserve tract; 2020
2737	Ukraine, Mykolaiv Oblast, Voznesensk Raion, "Trykraty forest" reserve tract; 2020
2382	Ukraine, Ivano-Frankivsk Oblast, Gorgany nature reserve; 2014
2430	Ukraine, Donetsk Oblast, Dronovka, 2013
X. longipes 2715	Ukraine, Ivano-Frankivsk Oblast , Hutsulshchyna National Park; 2020
2716	Ukraine, Kyiv; 2020
2717	Ukraine, Ivano-Frankivsk Oblast, "Dibrova" arboretum; 48°46'28.3"N 24°30'39.6"E; 2020
2718	Ukraine, Kyiv Oblast; Borivka; 2020
2722	Ukraine, Kyiv, Lysa Hora; 2020
2726	Ukraine, Vinnytsia Oblast, 49°15'08.3"N 28°24'34.1"E; 2020
2730	Ukraine, Kyiv, Holosiivskyi National Nature Park; 50°23'27.1"N 30°31'11.9"E; 2020
2733	Ukraine, Lviv Oblast, Zolochiv Raion, Bilyi kamin, 49˚52'40.9"N 24˚53'02.9"E; 2020
2739	Ukraine, Kyiv Oblast, Borodianka Raion, Babyntsi; 2020
X. hypoxylon 2725	Ukraine, Ivano-Frankivsk Oblast, "Dibrova" arboretum; 48°46'31.9"N 24°30'48.2"E; 2020
2732	Ukraine, Ivano-Frankivsk Oblast, 48˚36'00.1"N 24˚33'10.6"E; 2020
2734	Ukraine, Ternopil Oblast, 49˚26'8.05"N 24˚52'41.03"E; 2020
2735	Ukraine, Ivano-Frankivsk Oblast , Hutsulshchyna National Park; 2020

The terminology used to describe the texture of mycelia followed J.A. Stalpers [1978]. Color designations used throughout the taxonomic descriptions were taken from R. Ridgway [1912], and were indicated by "R" and the appropriate plate number.

The mycelial growth rate was calculated considering that the colonies grew in a circular regular manner. Fungal growth was determined by daily measuring the colony radius in four mutually perpendicular directions. When the increase of colony radius (R2-R1) with time (t2-t1) was linear, the radial growth rate (GR, mm/day) of the colony was obtained from the formula:

$$GR = (R2-R1) / (t2-t1),$$

where GR – growth rate, R2 – radius of the colony at the end of the exponential growth phase, R1 – radius of the colony at the beginning of the exponential growth phase (mm), t2-t1 – duration of the exponential growth phase (days) [Bisko et al., 2012].

Statistical analysis was performed using Microsoft Excel (Microsoft Corp., Redmond, WA, USA). Experimental data were expressed as mean ± standard deviations (SD) from measurements. The Student's t-test was applied to express the significance; values at $p < 0.05$ were considered significant.

RESULTS AND DISCUSSION

Cultural and morphological characteristics of mycelia. The greatest morphological diversity was observed for *X. polymorpha* strains. Based on the morphological traits of the colonies, studied *X. polymorpha* strains can be divided into two groups (Tab. 2). Such characters as colonies' texture, color, margin, and reverse varied both for different strains growing on the same medium and the same strain on different media. The main features common to all strains of *X. polymorpha* were the darkening of the colony from the center outwards from white to various shades of grey with time, changing of media color into a greenish grey, developing cylindrical grey stromata after a week of cultivation (Fig. 3, 4). B.E. Callan and J.D. Rogers [1993] described that *X. polymorpha* colonies are initially white, concentrically zonate, becoming grey or black with time, appressed, and floccose with clear droplets of exudate. For *X. hypoxylon*, almost same features were noted by B.E. Callan and J.D. Rogers [1993] except the colony showing pink or grey shade initially.

In our studies, mycelial colonies of *X. longipes* were characterized by the darkening of the initially white colonies from the center and forming grey rings around the inoculation point (Fig. 1-3C). In addition, no changes of reverse to greenish-grey color as was

Table 2. Cultural and morphological characteristics of the mycelial colonies of the studied strains of *Xylaria* species on agar nutrient media of different composition.

Species	Nutrient media	
	GYPA	MEA
X. polymorpha Group 1 (strains 2382, 2430, 2719, 2720, 2721, 2727, 2736)	Colonies initially white, dense, cottony, darkening to grey from the center outwards as mature, becoming zonate with concentric rings of different hues of grey, velvety, margin undulate (Fig. 1A-B; Fig. 3A). Reverse with concentric black or brown rings, becoming olivaceous-grey due to the release of a pigment to the media or getting reddish-brown (Fig. 3B).	Colonies initially white, dense, cottony, darkening to olive-grey, and blackish-grey from the center outwards as mature, becoming zonate with concentric rings of different hues of grey, velvety, margin undulate (Fig. 2A-B, Fig. 3C). Reverse becoming olivaceous-grey due to the release of a pigment to the media, central zone darkening with time, concentric rings are distinctive all over the colonies of some strains (Fig. 3D).
X. polymorpha Group 2 (strains 2729, 2737)	Colonies initially white, dense, cottony, becoming blackish-grey and crustose as mature (Fig. 1C-D; Fig. 4A). Reverse becoming olivaceous-grey due to the release of a pigment to the media or brown with black concentric patterns (Fig. 4B).	Colonies initially white, dense, cottony, darkening to olive-grey, blackish-grey from the center outwards as mature, becoming zonate with concentric rings of different hues of grey, velvety (Fig. 4C). Reverse becoming olivaceous-grey due to the release of a pigment to the media or brown with black concentric rings (Fig. 4D).
X. longipes (strains 2715, 2716, 2717, 2718, 2722, 2726, 2730, 2733, 2739)	Colonies initially white, velvety, forming a dark grey ring around the center (Fig. 1E; Fig. 5A) or remaining white, margin filiform (Fig. 1F). Central zone on reverse darkening with time, concentric rings are distinctive (Fig. 5-6B).	Colonies initially white, velvety, forming a dark grey ring around the center, margin filiform (Fig. 2C-D). Central zone on reverse darkening with time (Fig. 5-6D).
X. hypoxylon (strains 2725, 2732, 2734, 2735)	Colonies initially white, felty becoming, olivaceous-grey, with yellowish patches, zonate (Fig. 7A) or remaining white (Fig. 1G-H), undulate, margin curled. Reverse becoming olivaceous-grey due to the release of a pigment to the media, central zone darkening with time (Fig. 7B)	Colonies initially white, becoming grey, zonate, felty, undulate, margin curled (Fig. 2C-F; Fig. 7C). Reverse becoming olivaceous-grey due to the release of a pigment to the media, central zone darkening with time (Fig. 7D).

common for *X. polymorpha* and *X. hypoxylon* strains were observed for *X. longipes* cultures. The formation of undulate felty mycelial colonies was distinctive for *X. hypoxylon* strains (Fig. 1E), in contrast to cottony colonies of *X. polymorpha* and velvety of *X. longipes.*

In general, for *X. longipes* and *X. hypoxylon* strain-specific differences were not as pronounced as for *X. polymorpha*, although individual strains had their own specific pattern in the pigmentation of the mycelium and reverse, as shown in figures 5-7. Unlike *X. polymorpha,* stromata of *X. longipes* and *X. hypoxylon* formed on prolonged incubation (30 days) after exposure to daylight.

Detailed descriptions and illustrations of the studied strains are provided.

Xylaria polymorpha (Pers.) Grev.

Group 1 (Tab. 2). Mycelial colonies on GYPA at first

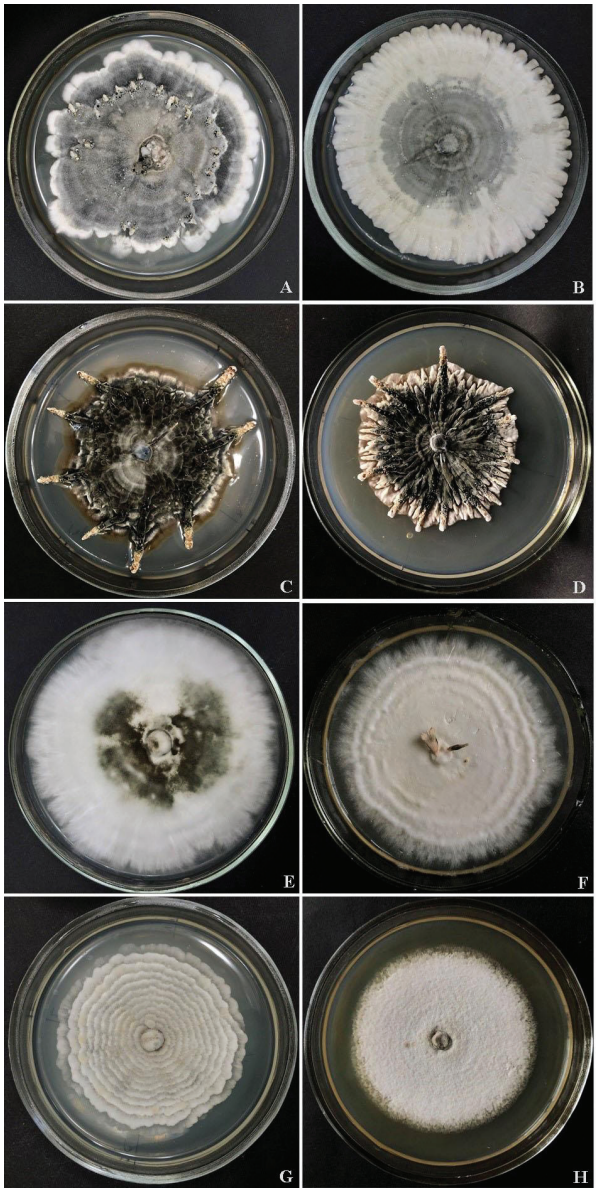

Figure 1. Colonies macrostructure on GYPA:
A – *X. polymorpha* 2430; B – *X. polymorpha* 2720;
C – *X. polymorpha* 2729; D – *X. polymorpha* 2737;
E – *X. longipes* 2722; F – *X. longipes* 2716;
G – *X. hypoxylon* 2725; H – *X. hypoxylon* 2734
(A, C, E, F – 20 days; B, D – 17 days; G, H – 30 days).

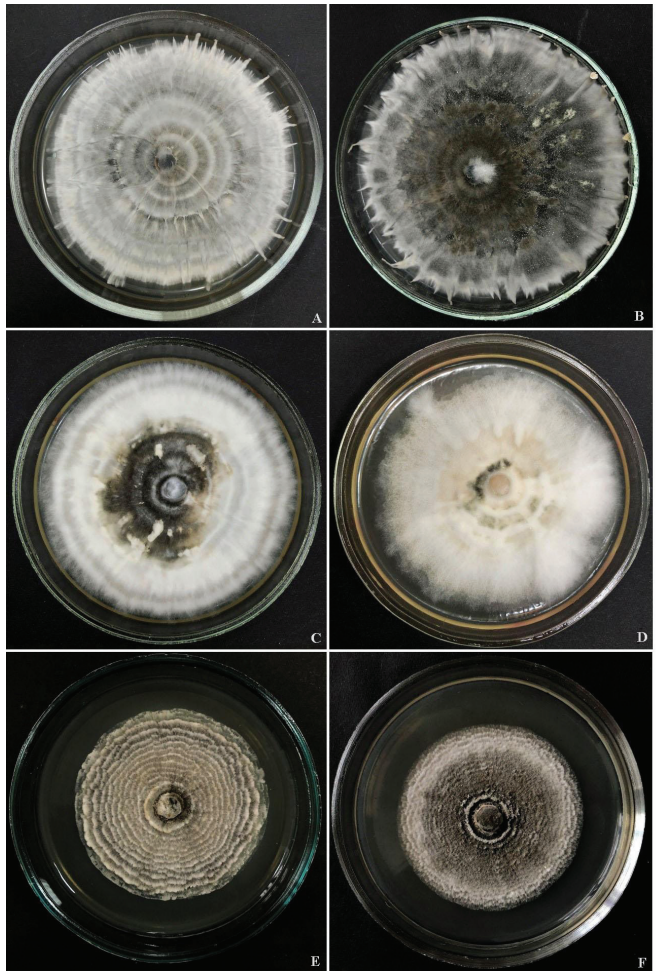

Figure 2. Colonies macrostructure on MEA:
A – *X. polymorpha* 2382; B – *X. polymorpha* 2719;
C – *X. longipes* 2730; D – *X. longipes* 2717;
E – *X. hypoxylon* 2735; F – *X. hypoxylon* 2734
(A, B – 17 days; C, D –20 days; E, F – 30 days).

white, dense, cottony, becoming melanized from the center outwards with time, finally covered by a layer of warty grey (R. L1 23k; L1 23i; L1 23b) mycelium, becoming zonate with concentric circles of different hues of grey, margin undulate (Fig. 3A). Reverse becoming greenish-grey with concentric black circles as colonies mature (Fig. 3B).

Stromatal production beginning after a week of cultivation. Stromata cylindrical, mainly unbranched, 10–25 mm high × 2 mm wide, grey with pinkish apices and colorless droplets at the base (Fig. 3F).

Colonies on MEA showing a similar morphology, but the color of mycelium often gets more greenish-grey shades (R. XLV1 21i; L1 23k; L1 23i; L1 23b), zonation is more defined (Fig. 2B, Fig. 3C). Stromata cylindrical, unbranched, 10–25 mm high × 1–2 mm wide, grey with white apices and droplets forming along the length (Fig. 3-4 G).

Group 2. Mycelial colonies on GYPA at first white, cottony, becoming denser as mature, blackish-grey (R. L1 23m, L115k, L1 15i), crustose (Fig. 4A). Reverse becoming greenish-grey with concentric black pattern as colonies mature (Fig. 4B). Stromatal production

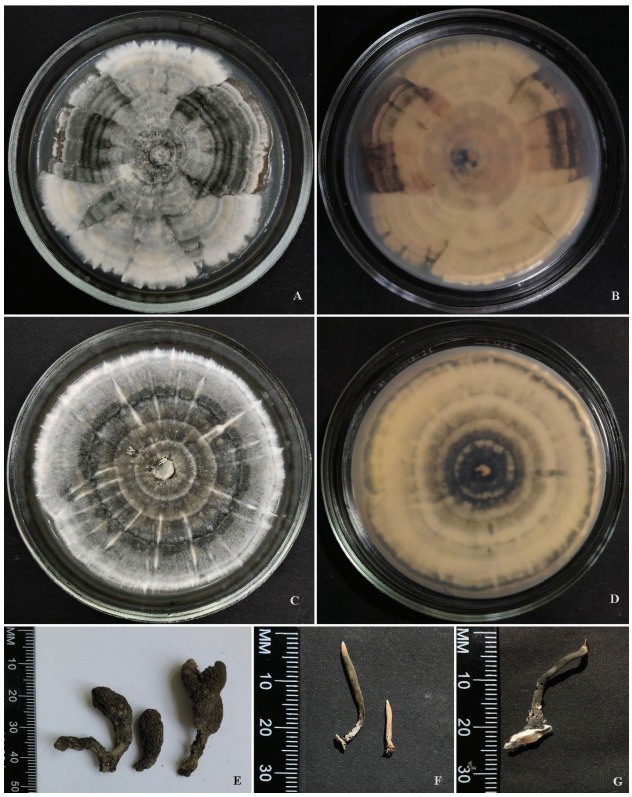

Figure 3. *X. polymorpha* 2727 (17 days): A – mycelial colony on GYPA; B – reverse of the colony on GYPA; C – mycelial colony on MEA; D – reverse of the colony on MEA; E – stromata, from which culture was isolated; F – stromata, formed on GYPA; G – stromata formed on MEA.

Figure 4. *X. polymorpha* 2737 (24 days): A – mycelial colony on GYPA; B – reverse of the colony on GYPA; C – mycelial colony on MEA; D – reverse of the colony on MEA; E – stromata, from which culture was isolated; F – stromata, formed on GYPA; G – stromata formed on MEA.

beginning after a week of cultivation. Stromata cylindrical, branched at the tips, 30–40 mm high × 1–2 mm wide, blackish-grey at the base, getting lighter grey to the pinkish apices with droplets forming along the length (Fig. 4F).

Mycelial colonies on MEA are similar to those of group 1, only reverse getting more black (Fig. 4C-D).

Xylaria longipes Nitschke

Colonies on GYPA at first white, velvety, forming a dark grey (R. L1, 23k) ring around the center as colonies mature, margin filiform. Some strains not forming a dark ring around the center as colonies mature but remaining white or being pigmented with grey patches all over the surface of the colonies (Fig. 6A). Reverse not changing color, concentric rings are distinctive (Fig. 5B). Stromata 10 mm high × 2 mm wide, olive-grey with pinkish cream tips and pinkish droplets forming along the length (Fig. 5F). Strain 2739 formed spade-shaped stromata up to 8 mm wide with cream to pinkish (R. XIII 1 d) surface, developing largely restricted to the center of the colony (Fig. 6F).

Colonies on MEA at first white, velvety, forming a dark grey (R. L1, 23k) ring around the center as colonies mature (Fig. 5C), regularly developing a secondary aerial mycelium, which collapses resulting in the dark central colonies surface being covered with white patches, margin filiform (Fig. 6C.). Reverse of cultures largely not changing color, except for central zone darkening with time (Fig. 5D).

Stromatal production beginning after exposure to daylight in 4-week-old cultures. Stromata cylindrical, mainly unbranched, 10–40 mm high × 2 mm wide (Fig. 5G) or spade-shaped up to 10 mm wide at the tip (Fig. 6G), olive-grey (R. L1, 23 i) with pinkish apices, developing from the center to the periphery of colonies.

Xylaria hypoxylon (L.) Grev.

Colonies on GYPA at first white, felty, becoming grey with yellowish patches, zonate with alternating rings of

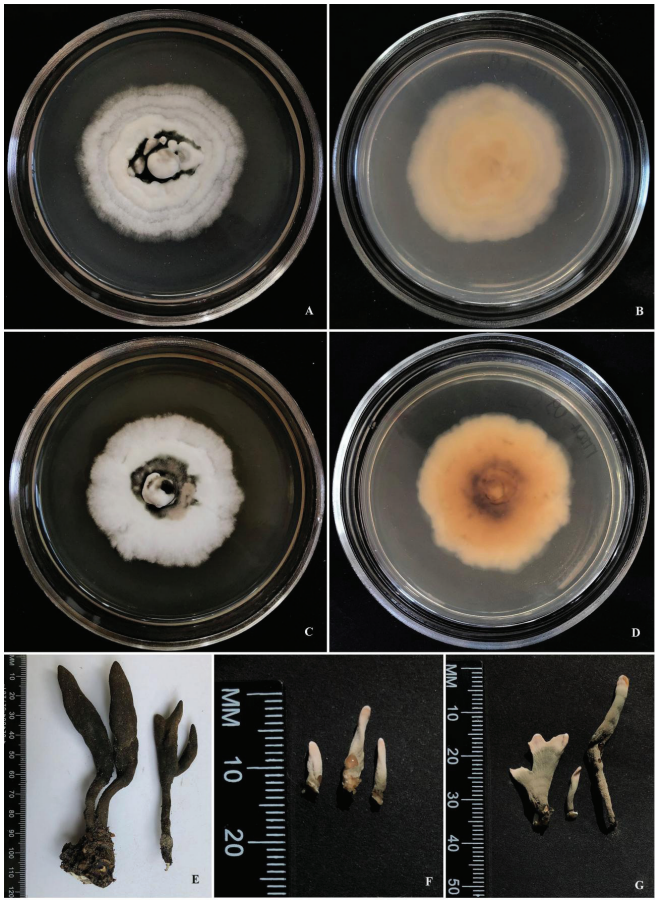

Figure 5. *X. longipes* 2718 (20 days): A – mycelial colony on GYPA; B – reverse of the colony on GYPA; C – mycelial colony on MEA; D – reverse of the colony on MEA; E – stromata, from which culture was isolated; F – stromata, formed on GYPA; G – stromata formed on MEA.

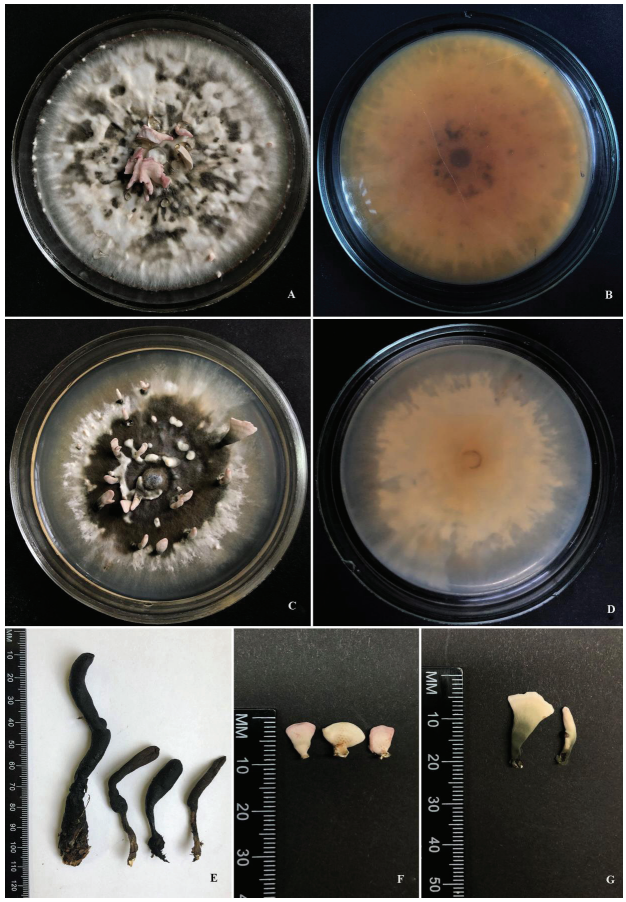

Figure 6. *X. longipes* 2739 (30 days): A – mycelial colony on GYPA; B – reverse of the colony on GYPA; C – mycelial colony on MEA; D – reverse of the colony on MEA; E – stromata, from which culture was isolated; F – stromata, formed on GYPA; G – stromata formed on MEA.

grey and white mycelium (Fig. 7A) or remaining white, undulate, margin curled. Reverse becoming greenish-grey and turning black from the center, forming a black spot around the inoculation point as colonies mature (Fig. 7B).

Stromatal production beginning after exposure to daylight in 4-week-old cultures. Stromata cylindrical, branched at the tips, 10–30 mm high × 2 mm wide, grey with white apices (Fig 7F) or mainly unbranched, black and hairy at the base, 20 mm high × 2 mm wide, if growing in the Erlenmeyer flasks (Fig. 7G).

Colonies on MEA showing a similar morphology, except for not forming yellow patches as colonies mature but being pigmented grey all over the surface of the colonies (Fig. 7C). No stromatal formation were observed on the MEA nutrient medium.

Mycelial growth rate (GR). Most of the investigated *Xylaria* strains showed a slow radial growth rate, covering a 9-cm Petri dish in 2–5 weeks. Among all the strains studied, the fastest growth showed *X. polymorpha*, covering a dish in 2–3 weeks. *X. polymorpha* 2727 exhibited the highest statistically significant GR on both media: 4.41±0.33 and 3.49±0.77 mm/day on MEA and GYPA, respectively (Tab. 3).

On the opposite side, the lowest GR was shown by *X. hypoxylon* 2725 and amounted to 0.9±0.04 and 1.17±0.06 mm/day on MEA and GYPA, respectively (Tab. 3).

Among examined strains, *X. hypoxylon* strains showed relatively slower radial growth. These were not reaching the edge of a Petri dish in 4–5 weeks (Tab. 3). This correlates with the data obtained by R.J. Chacko and J.D. Rogers [1981], who observed greyish, lannose

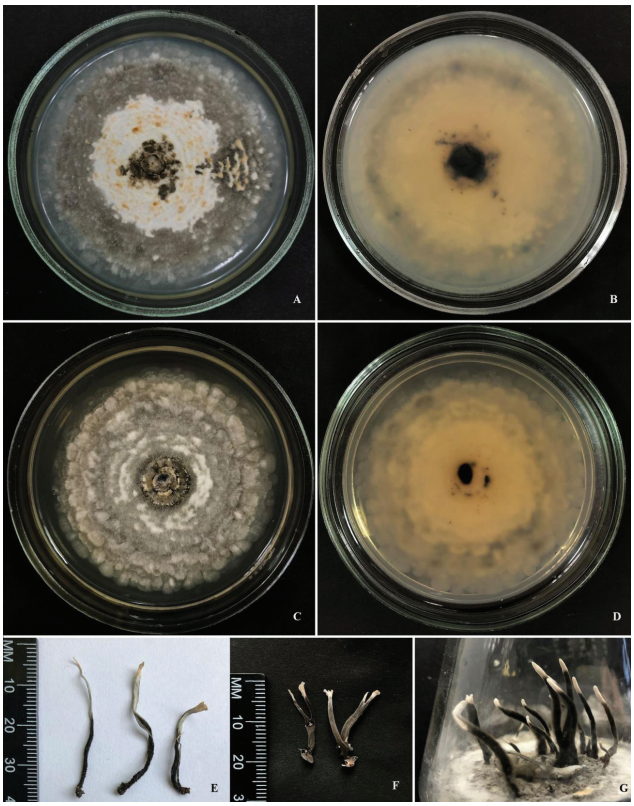

Figure 7. *X. hypoxylon* 2732 (30 days): A – mycelial colony on GYPA; B – reverse of the colony on GYPA; C – mycelial colony on MEA; D – reverse of the colony on MEA; E – stromata, from which culture was isolated; F– stromata, formed on GYPA; G – stromata formed on GYPA in an Erlenmeyer flask.

to felty colonies of *X. hypoxylon*, not growing to the margin of a 9-cm Petri dish after 4 weeks of incubation on laboratory benches under intermittent fluorescent light (about 14 h/d) at 25°C. However, the results obtained by B.E. Callan and J.D. Rogers [1993] showed that during incubation at 20°C and 12 h/d fluorescent light, colonies of *X. hypoxylon* covered a 9-cm Petri dish after 2 weeks, while *X. polymorpha* and *X. longipes* after 3–4 weeks of cultivation.

The results shown in table 3 reveal that a statistically higher GR was observed for most of the studied cultures (12 strains) on MEA. Strains displayed some individual responses to the type of a nutrient medium. In particular, of the 10 strains of *X. polymorpha* studied, 7 grew with a significantly higher GR on MEA. Comparably, most of the *X. longipes* strains (5 of 9) also showed a significantly higher GR on MEA, meanwhile for 3 out of 4 *X. hypoxylon* strains GR was higher on the GYPA. The highest GR among *X. polymorpha* strains was 4.41±0.33

Table 3. Growth Rate Values (mm/day) of *Xylaria* species on agar nutrient media of different composition (t = 25 ± 1 °C).

Species, strain	Rate of radial growth, mm/day	
	GYPA	MEA
X. polymorpha 2719	2.86±0.27	3.82±0.29*
2720	3.16±0.49	3.29±0.36
2721	2.50±0.13**	2.05±0.07
2723	2.03±0.31	3.24±0.18*
2727	3.49±0.77	4.41±0.33*
2729	1.65±0.07	3.15±0.36*
2736	3.41±0.19	3.94±0.33*
2737	1.65±0.06	2.34±0.17*
2382	2.65±0.14	2.99±0.07*
2430	2.41±0.19	2.67±0.22
X. longipes 2715	1.00±0.03	1.24±0.08*
2716	2.28±0.09	2.35±0.20
2717	2.98±0.27**	2.09±0.11
2718	1.33±0.07	1.46±0.18*
2722	2.42±0.10	2.50±0.26
2726	1.90±0.09	2.44±0.15*
2730	2.41±0.39	2.71±0.09*
2733	1.50±0.16	2.03±0.18*
2739	2.75±0.18**	2.22±0.05
X. hypoxylon 2725	1.17±0.06**	0.90±0.04
2732	1.46±0.06	1.47±0.03
2734	1.31±0.04**	1.12±0.03
2735	1.26±0.05**	1.11±0.04

Note: *GR on MEA is statistically significantly higher than on GYPA, $p \leq 0.05$

** GR on GYPA is statistically significantly higher than on MEA, $p \leq 0.05$;

mm/day (2727 on MEA) and the lowest was 1.65±0.06 mm/day (2729 on GYPA). The highest and the lowest GR among *X. longipes* strains on GYPA were 2.98±0.27 and 1.33±0.07 mm/day for strains 2717 and 2718, respectively. On the contrary, for *X. hypoxylon* strains, the highest and the lowest GR were observed on MEA and amounted to 1.47±0.03 and 0.9±0.04 mm/day for strains 2732 and 2725, respectively (Tab. 3).

CONCLUSIONS

In total, 21 new strains of 3 wood-inhabiting *Xylaria* species were isolated from fruit bodies inhabiting the natural substrate in Ukraine and deposited to the IBK Mushroom Culture Collection of the M.G. Kholodny

Institute of Botany, NAS of Ukraine. These *Xylaria* strains, together with two *X. polymorpha* strains, which had been maintained at the IBK, were examined for morphological characteristics of mycelial colonies on GYPA and MEA nutrient media.

This study revealed the high variability of isolated *Xylaria* strains' morphological traits in culture. Colonies varied in textures, colors, formation of concentric zones, shape of margin, and characteristics of reverse. *X. polymorpha* strains were divided into two groups based on the cultural characteristics (Tab. 2).

All investigated strains showed slow to moderately rapid growth on both GYPA and MEA nutrient media. Most of the examined cultures (12 strains) had a statistically higher GR on MEA than that on GYPA, opposite to 6 strains with statistically significantly higher GR on GYPA. No significant difference in GR was found for other 5 strains (Tab. 3). The lowest growth rate value from all examined strains – 0.90±0.04 mm/day was observed for *X. hypoxylon* (2725) on MEA, while the highest growth rate value – 4.41±0.33 mm/day was observed for *X. polymorpha* (2727) on the same nutrient medium.

Despite the differences between the strains, major morphological features shared by certain *Xylaria* species were outlined in this study and could be useful as complementary to preliminary taxonomic identification in the culture collection.

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Ukraynadan ağacda məskunlaşan *Xylaria* növlərinin kultural və morfoloji xüsusiyyətləri

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Ağacda məskunlaşan *Xylaria* Hill ex Schrank cinsinin İBK Göbələk Kultura Kolleksiyada saxlanılan üç növünün (23 ştamm) kultural və morfoloji xüsusiyyətləri öyrənilmişdir. İki fərqli qidalı mühitdə koloniyaların radial miselial böyüməsi, koloniyaların təsviri və illustrasiyalar təqdim edilmişdir. *X. polymorpha* (Pers.) Grev., *X. longipes* Nitschke və *X. hypoxylon* (L.) Grev. növləri üçün miselial koloniyaların fərqli xüsusiyyətləri (quruluş, rənglər, konsentrik halqalar, kənarın forması, stromaların əmələ gəlməsi və kulturanın arxa tərəfdən xarakteristikası) müşahidə edilmişdir.

Açar sözlər: *kultural xüsusiyyətlər, morfologiya, vegetativ mitseli, böyümə sürəti*

Культурально-морфологическая характеристика, деревообитающих видов *Xylaria* в Украине

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Изучена культурально-морфологическая характеристика трех деревообитающих видов *Xylaria* Hill ex Schrank (23 штамма) из IBK Коллекции шляпочных грибов, обитающих на деревях. Приведены данные скорости радиального роста колоний, даны описания колоний в процессе роста на двух агаризованных питательных средах разного состава и их фотографии. Наблюдались различия в характеристиках мицелиальных колоний *X. polymorpha* (Pers.) Grev., *X. longipes* Nitschke и *X. hypoxylon* (L.) Grev. (текстура, цвет, концентрические зоны, края, образование стромы и характеристика обратной стороны).

Ключевые слова: *культурные особенности, морфология, вегетативный мицелий, скорость роста*