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FIRST RECORD OF THE RUST FUNGUS *MELAMPSORIDIUM HIRATSUKANUM* S. ITO IN UKRAINE

Key words: *Melampsorium hiratsukanum*, *Alnus incana*, *rust fungi*,
Gorgany Nature Reserve, Ukraine

On 26 of August 2010, the uredinal stages of a leaf rust with high disease severity was recorded on grey alder (*Alnus incana* (L.) Moench) near the office of the Gorgany Nature Reserve (N 48°29', E 24°16'). During the next few days more specimens of infected alder leaves were collected at different localities of the Reserve, from 700 to 800 m above sea level. Further microscopic examination revealed the causal organism as *Melampsorium hiratsukanum*, hitherto unknown in Ukraine. The fungus is described and illustrated below.

Melampsorium hiratsukanum S. Ito ex Hirats. f., J. Coll. agric., Hokkaido Imp. Univ. 21: 10 (1927)

Uredinia hypophyllous, scattered or in groups on reddish-yellow spots, circular or elliptical 0,2–0,4 mm in diameter, orange-yellow, covered by a hemispherical, strongly developed peridium (Fig. 1, a, c); peridial cells isodiametric, irregularly polygonal, without ornamentation, ostiolar cells extending into long spines, up to 40 µm long (Fig. 1, a, b, c). Urediniospores broadly ovoid, ellipsoid or elongate 10–20×7–15 µm, orange-yellow, wall colourless, uniformly echinulate, without a smooth area at the apex (Fig. 1, d), germ pores 4–6, bizonate.

Melampsorium hiratsukanum was described in 1927 based on a specimen collected on *Alnus hirsuta* (Spach) Rupr. in the vicinity of Sapporo (Hokkaido, Japan). It differs from other species of the genus *Melampsorium* Kleb. which have been reported to infect alders in having longer ostiolar cells of the uredinia, less elongate urediniospores and in the absence of a smooth area in their apical region. For comparison of *M. hiratsukanum* and the similar *M. betulinum* (Pers.) Kleb. see Fig 2. Molecular phylogenetic analysis has confirmed that *M. hiratsukanum* is a distinct species [2].

Prior to 1996, *M. hiratsukanum* was known in east Asia (Japan, Korea, China, Russian Far East), and in the western Americas (from Canada to Argentina).

In the monograph «British Rust Fungi» [15], this species was reported for Scotland and Ireland, but later investigation [11] showed that spores obtained from birch could infect alder, with the comment that records of rust on alder should be redispersed as *M. betulinum*. This approach was adopted in the addendum to «British Rust Fungi» [3] and in their note to *M. hiratsukanum* the authors stated, «it seems doubtful if this rust is in Europe».

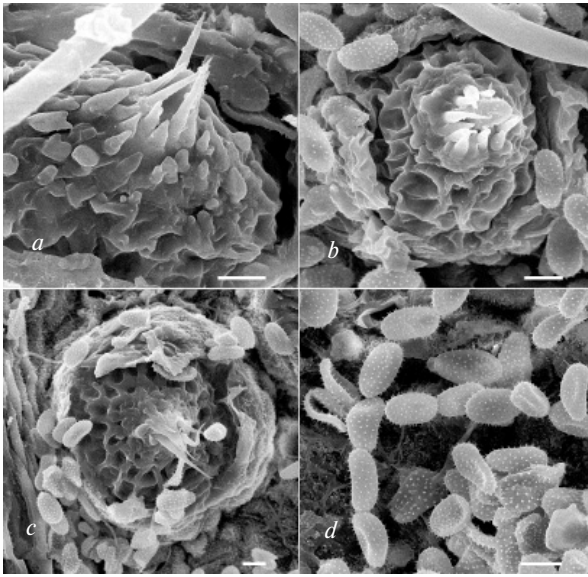


Fig. 1. *Melampsoridium hiratsukanum*: a, b, c — uredinia; d — urediniospores (SEM). Scale bars — 10 μ m

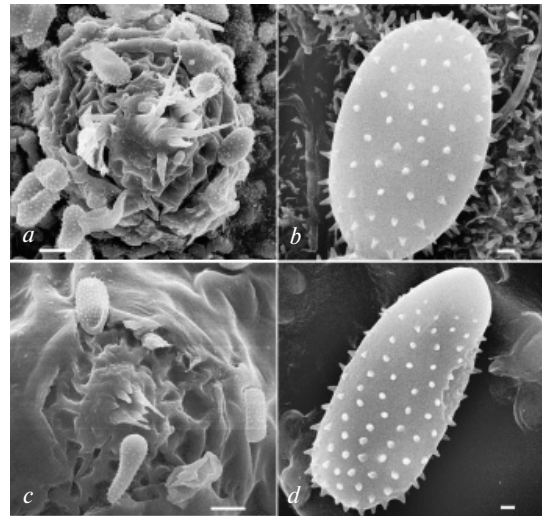


Fig. 2. *Melampsoridium hiratsukanum*: a — uredinium; b — urediniospore. *Melampsoridium betulinum*: c — uredinium; d — urediniospore (SEM). Scale bars: a, c — 10 μ m; b, d — 1 μ m

Taking into account the above history, a rapid spread of *M. hiratsukanum* in Europe during last 15 years was very unexpected. The first European records were found in Estonia and Lithuania in 1996 [9]. It was recorded from Finland [5], Poland [16] and Austria [10] in 1997, from the United Kingdom (Wales) [13] in 2000, from Norway [1] and Hungary [14] in 2001, from Turkey [12] in 1999–2001, from Romania [8] in 2002, from the Czech Republic [7] before 2003, and from Italy [6] in 2008. The species is now clearly established throughout western, northern and central Europe.

Melampsoridium hiratsukanum is a species with a macrocyclic alternating host life cycle, which forms spermogonia and aecia on *Larix* and uredinia and telia on *Alnus* subgenus *Alnus*. Up to now, spermogonial and aecial stages have been noted in nature only from Japan. In Europe these stages have been obtained exclusively through arti-

ficial inoculations on larch species. It is possible that the fungus can reproduce and propagate only through its urediniospores.

The pathway of the original introduction of *M. hiratsukanum* to Europe remains obscure. There is a gap in the Eurasian area of the subgenus *Alnus*. Its species do not occur in Siberia, Central Asia and India. Continuous progress of *M. hiratsukanum* from Eastern Asia to Europe therefore hardly seems possible. Most probably, it has been introduced with contaminated seedlings of alder or larch, but the possibility of spore transmission on plumage of migratory birds should also be considered. Intriguingly, the appearance of *M. hiratsukanum* in Europe coincided in time with a rapid expansion westwards and increase in density of the European population of the common rosefinch (*Carpodacus erythrinus* Pall.) [4], which inhabits the same habitats as alder and undertakes regular seasonal migration between East Asia and Europe.

I am grateful to the staff of the Gorgany Nature Reserve for support during field work, especially to Ya.M. Dzebuchuk who drew my attention to the epiphytic development of this rust of alder. I also thank Z.O. Panina from the staff of the M.G. Kholodny Institute of Botany for her assistance in scanning electronic microscopy of *M. hiratsukanum*.

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Recommended for publication
V.P. Heluta

Submitted 18.10.2010

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**ПЕРША В УКРАЇНІ ЗНАХІДКА ІРЖАСТОГО ГРИБА
MELAMPSORIDIUM HIRATSUKANUM S. ІТО**

Повідомляється про знахідку нового для території України іржастого гриба *Melampsoridium hiratsukanum*, виявленого на листках *Alnus incana* L. у серпні 2010 р. на території природного заповідника «Горгани» (N 48°29', E 24°16'). Він відрізняється від інших відомих у Європі видів роду *Melampsoridium* довгими шипами остіолярних клітин, коротшими урединіоспорами та відсутністю гладенької ділянки на їх апікальному кінці.

Ключові слова: *Melampsoridium hiratsukanum*, *Alnus incana*, іржасті гриби, заповідник «Горгани», Україна.

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**ПЕРВАЯ В УКРАИНЕ НАХОДКА РЖАВЧИННОГО ГРИБА
MELAMPSORIDIUM HIRATSUKANUM S. ІТО**

Сообщается о находке нового для территории Украины ржавчинного гриба *Melampsoridium hiratsukanum*, выявленного на листьях *Alnus incana* L. в августе 2010 г. на территории природного заповедника «Горганы» (N 48°29', E 24°16'). Он отличается от других известных в Европе видов рода *Melampsoridium* более длинными шипами остиолярных клеток, более короткими урединиоспорами и отсутствием гладкого участка на их апикальном конце.

Ключевые слова: *Melampsoridium hiratsukanum*, *Alnus incana*, ржавчинные грибы, заповедник «Горганы», Украина.