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Pileolaria azerii (Uredinales), a new rust species from Turkey

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Hüseyin E. & Selçuk F. (2016) *Pileolaria azerii* (Uredinales), a new rust species from Turkey. – *Sydowia* 68: 1–6.

A new species of the rust genus *Pileolaria* was found on living leaves of *Rhus coriaria* in the Bursa Province of Turkey. It is described as *Pileolaria azerii*, illustrated and compared with allied species. With its character combination of small urediniospores, rugose teliospores and a rather long pedicel *Pileolaria azerii* differs from any other *Pileolaria* species known on *Rhus*.

Keywords: Rust fungi, Basidiomycota, Pileolariaceae, new taxon, Bursa.

Turkish mycobiota has not been well investigated, whereas the rust fungi on higher plants of Turkey have been well studied. However, most of the rust fungi studies dealt with *Gymnosporangium*, *Melampsora*, *Phragmidium*, *Puccinia* and *Uromyces* (Tamer et al. 1998). Considering the rust genus *Pileolaria*, only *P. terebinthi* (DC.) Castagne has been known in Turkey from living leaves of *Pistacia terebinthus* (Hüseyin & Selçuk 2001, 2004). A rust fungus was found on *Rhus coriaria* L. during a trip to the Gemlik district of the Bursa Province, North-Western Anatolian Peninsula, which is located in the Mediterranean phytogeographic region (Atalay 1994). This fungus, which belongs to the genus *Pileolaria*, is illustrated here and compared with allied species.

Materials and methods

The samples were collected in 2010 during field trips to the macchie vegetation of the Marmara region in the Anatolian Peninsula. For light microscopy (LM) spores were examined in distilled water under an Olympus BX 53 microscope, and microphotographs were taken under an Axio imager 2 equipped with Nomarski differential interference-contrast optics and an Olympus DP 22 digi-CAM (Japan). For scanning electron microscopy (SEM), 4–7 mm square pieces of infected leaves were mounted on SEM stubs with double-sided adhesive tape. They were coated with gold using a Polaron SC 500 Sputter Coater and examined with a Jeol JSM 5600 scanning electron microscope that oper-

ated at 10–20 kV in the Electron Microscopy Unit, Kırıkkale University (Turkey). The host plant was identified using Davis (1967). The authors names and current names of taxa are given according to Kirk et al. (2008), and www.index.fungorum.org. The samples are deposited at the Ahi Evran University, Arts and Sciences Faculty, Department of Biology, in Kırşehir Province.

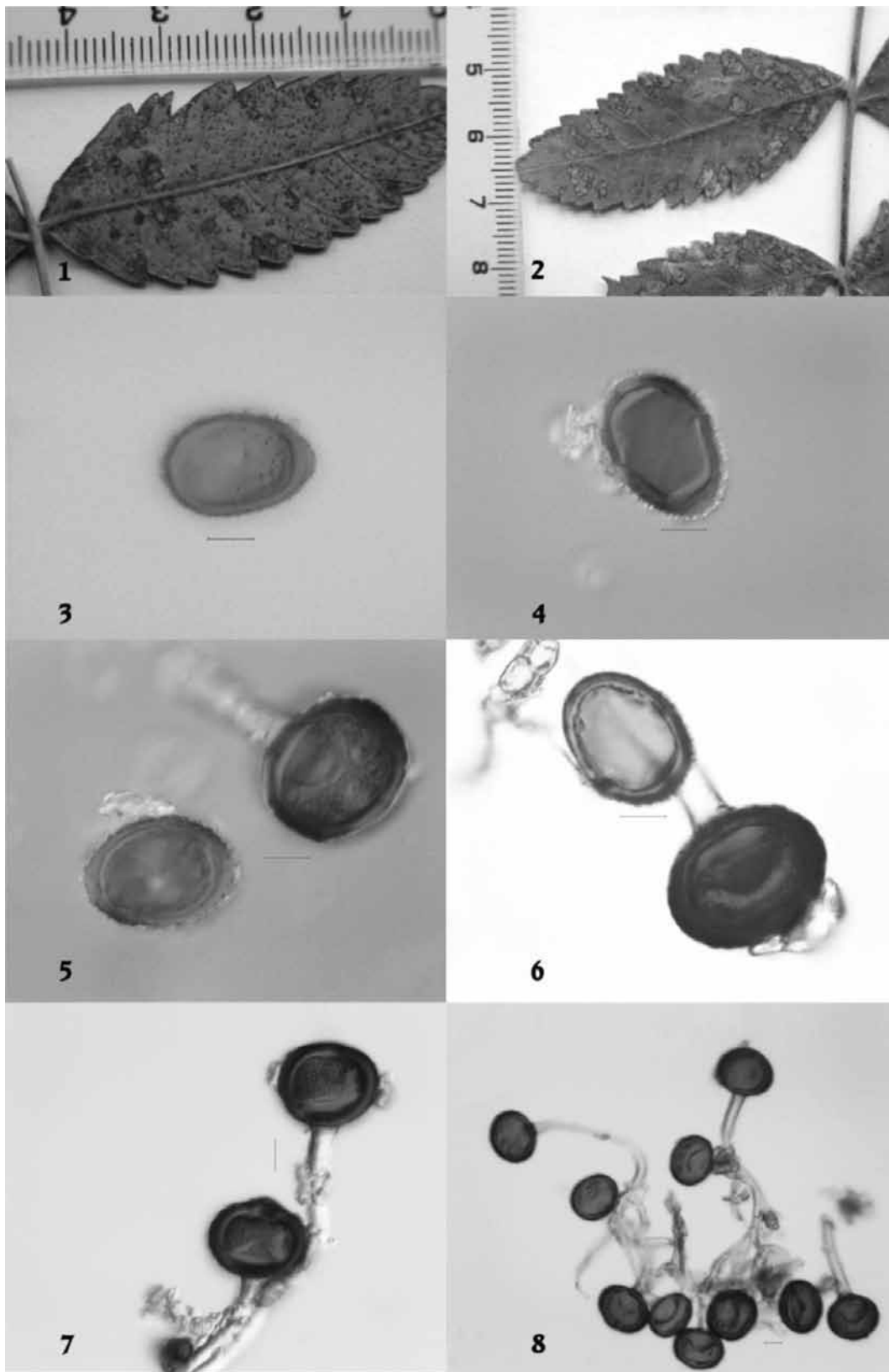
Taxonomy

Pileolaria azerii E. Hüseyin & F. Selçuk, **sp. nov.** – Figs. 1–14.

Mycobank no.: MB 815046

Holotypus. – TURKEY, Bursa Province, Gemlik District, on living leaves of *Rhus coriaria* L., 40° 27' 200" N, 29° 10' 091" E, 600 m a.s.l., 17 November 2010, *leg. & det.* E. Hüseyin (EH G-7, deposited in Ahi Evran University Mycology Laboratory: FS.1002).

Description. – **Disease symptoms:** spots on both sides of the leaves, mainly marginal, irregular, angular, oblong, limited by veins, 2–10 × 1–3 mm, clay coloured, with a dark-grey, almost black narrow margin on the upper surface, but a diffuse, dark-grey margin on the lower surface. – **Spermogonia and aecia unknown.** – **Uredinia** mainly hypophyllous, scattered, irregular or rounded, frequently on the veins and petioles, reddish brown, confluent, 1–2 mm in diam., at first covered by the epidermis, and later ruptured. – **Urediniospores** oblong, ellipsoid, or oval, 20–28 × 17–20 µm; wall 3.7–5 µm thick at sides, sometimes 7–9 µm thick at the apex, scattered short-echinulate, clay-coloured, germ pores 4, equatorial.

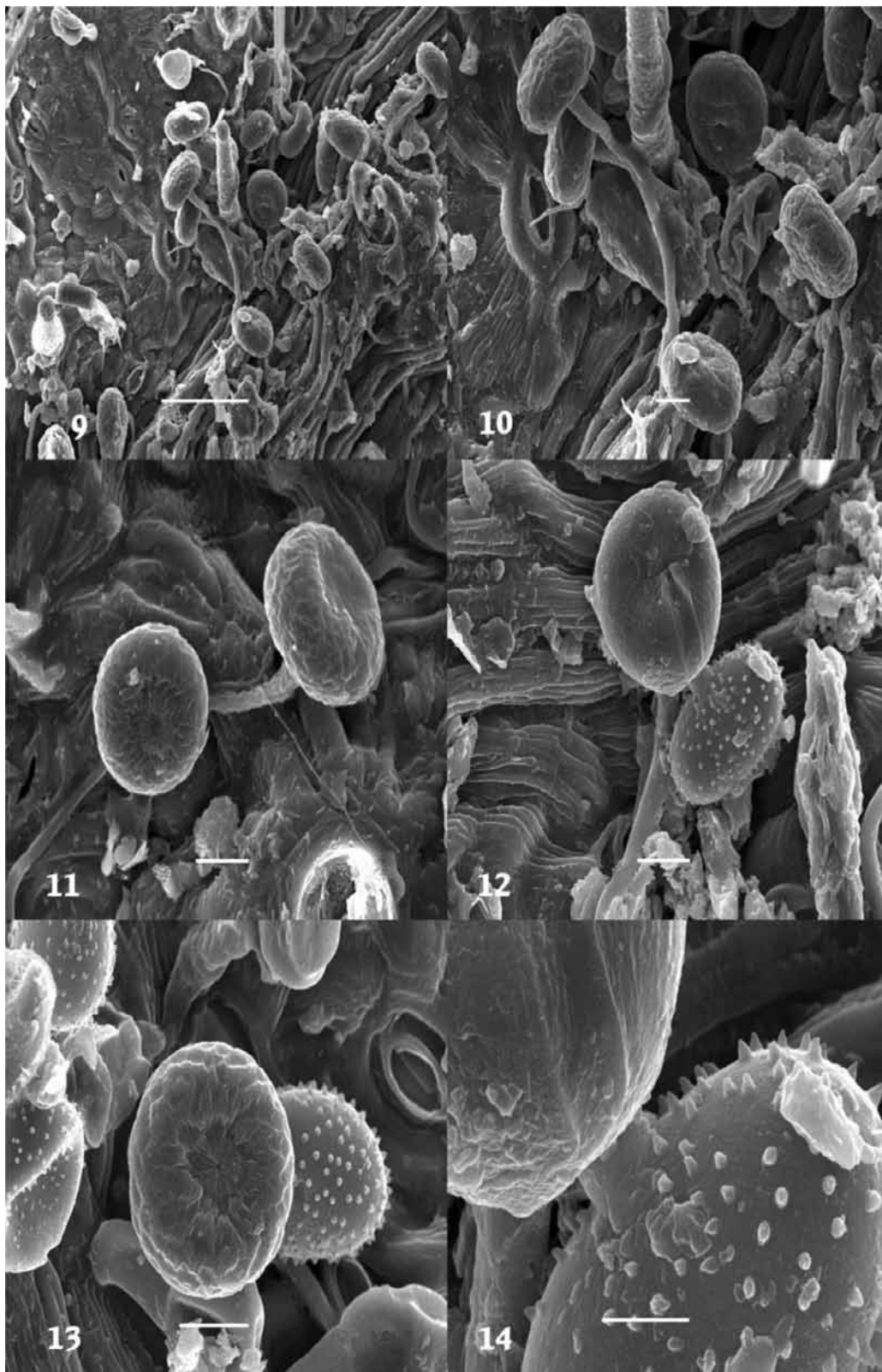


Figs. 1–8. *Pileolaria azerii*: 1–2. Symptoms. 3–4. Urediniospores. 5–6. Uredinio- and Teliospores. 7–8. Teliospores. Bars = 10 μ m.

Tab. 1. Morphology of *Pileolaria* species on *Rhus* spp.

Species	Urediniospores (µm)	Wall	Teliospores (µm)	Wall	Pedicle (µm)
<i>P. azerii</i>	20–28 × 17–20	3.7–5(9) µm thick, clay coloured, short-echinulate	19–30 × 25–35	4–6 µm thick, dark brown, rugose	50–125 × 5–6(7)
<i>P. barbeyana</i> ¹	32–48 × 18–24	3–5 µm thick, hyaline, light yellowish, densely verrucose-aculeate	30–42 × 17–25	4 µm thick, reddish brown, granular verrucose	26–36 × 5–8
<i>P. brevipes</i> ²	28–55 × 20–34	3.5 µm thick, brown, verruculose	17–22 × 22–25	3–4 µm thick, chestnut brown, rugose	Up to 40 long
<i>P. dieteliana</i> ³	32–45 × 20–30	pale brown, prominently linear	20–30 × 25–35	brown, verruculose	Up to 80 long
<i>P. indica</i> ⁴	34–43 × 21–24	1–1.5 µm thick, yellowish brown, prominently spiral linear	28–34 diam.	3.5–5.5 µm thick, dark brown, densely verruculose	35–75 × 5–6
<i>P. klugkistiana</i> ¹	–	pale brown, verruculose	25 × 32–36	brown, verruculose	80–90 long
<i>P. patzcuarensis</i> ⁵	30–40 × 23–29	5–8 µm thick, golden-brown, torulose	12–15 × 30–38	5–6 µm thick, chocolate brown, indistinctly verruculose	50–75 × 5
<i>P. shiraiana</i> ²	35–48 × 21–30	2–3 µm thick, chestnut brown, verruculose	18–36 × 25–37	3.5–6 µm thick blackish brown, coarse-verruculose	30–35 long
<i>P. terebinthi</i> ⁶	25.5–40 × 17.5–27	4–5(6) µm thick, yellowish brown, verruculose	20–30 × 27.5–35	3–4 µm thick, dark brown, sparsely verruculose	About 275 long
<i>P. toxicodendri</i> ⁵	32–45 × 21–27	4–5–7 µm thick, golden brown, spiral densely verruculose	21–27 × 26–32	4–5 µm thick, chocolate brown, closely verruculose	50–75 × 5

¹ Dietel (1921), ² Azbukina (2005), ³ Sydow (1923), ⁴ Sydow (1938), ⁵ Arthur (1907), ⁶ Kuprevich & Uliyanishchev (1975)



Figs. 9–14. SEM micrographs of *Pileolaria azerii*: 9. Teliospore mass, bar = 50 μm . 10–11. Teliospores, bar = 10 μm . 12–13. Telio- and urediniospores, bar = 10 μm . 14. Urediniospore wall, bar = 5 μm .

– Telia mostly hypophyllous, scattered, rounded or irregular, confluent, pulverulent, 0.5–1 mm in diam., dark brown. – Teliospores solitary, unicellular, globoid, depressed-globoid, 19–30 × 25–35 µm; wall 4–6 µm thick, dark-brown, rugose, germ pore 1, apical; pedicel hyaline, 50–125 µm long, on the top 5–6(7) µm, in lower part 3–3.5 µm thick, attached to the substrate, weak and easily eliminated with the spore.

Stages II and III of the life cycle occur on one host.

Etymology. – Azer, in honour of the son of the first author.

Habitat and host plant. – Macchie vegetation, on living leaves of *Rhus coriaria* L. (Anacardiaceae).

Distribution. – Turkey.

Discussion

According to www.indexfungorum.org the genus *Pileolaria* Castagne comprises 16 species that are mainly found on living leaves and fruits of Anacardiaceae. *Pileolaria* is characterized by subcuticular spermogonia, subepidermal aecia, verruculose solitary aeciospores, subepidermal uredinia, solitary, pedicellate, densely verruculose or bristled urediniospores, subepidermal telia and by unicellular, sparsely verrucose or smooth teliospores with one apical germ pore and a distinct pedicel (Castagne 1842, Kuprevich & Uljanishchev 1975, Hiratsuka et al. 1992, Azbukina 2005). Nine of the 16 *Pileolaria* species are known on *Rhus* species. In addition to the type species *Pileolaria terebinthi* (DC.) Castagne, these are *P. brevipes* Berk. & Ravenel, *P. patzcuarensis* (Holw.) Arthur, *P. toxicodendri* (Berk. & Ravenel) Arthur, *P. barbeyana* (Henn.) Dietel, *P. klugkistiana* (Dietel) Dietel, *P. shiraiana* (Dietel & P. Syd.) S. Ito, *P. dieteliana* Syd., and *P. indica* Syd. The characteristics of these species are given briefly in Tab. 1.

Considering the morphology of urediniospores, teliospores, and the length of the pedicel *Pileolaria azerii* does not resemble any other *Pileolaria* species known on *Rhus* spp. (compare Tab. 1). *Pileolaria azerii* slightly resembles *P. dieteliana*, *P. terebinthi*, and *P. toxicodendri* with respect to the teliospores. *Pileolaria dieteliana* has 20–30 × 25–35 µm large teliospores with a brown, verrucose wall of unknown thickness and a pedicel of approx. 80 µm length. *Pileolaria terebinthi* has teliospores that are 20–30 × 27.5–35 µm with a 3–4 µm thick, dark brown, sparsely verrucose wall, and a pedicel which

is approx. 275 µm long; and *P. toxicodendri* has teliospores that are 21–27 × 26–32 µm, with 4–5 µm thick, chocolate-brown, densely verrucose wall, and a pedicel that is 50–75 × 5 µm. Thus the fungus collected on *Rhus coriaria* differed from all known *Pileolaria* species on *Rhus* spp. and has been described as a new species. Until now only one *Pileolaria* species, namely *P. terebinthi*, has been recorded in Turkey by Hüseyin & Selçuk (2001, 2004). Thus, *Pileolaria azerii* represents the second *Pileolaria* species known in Turkey.

Key to *Pileolaria* species on *Rhus* spp.

1. Urediniospores with apically thickened wall ...2
 - * Urediniospores with apically not thickened wall4
2. Urediniospores with scattered, small, fine echinulae. Teliospore wall rugose *P. azerii*
 - * Urediniospores with irregularly scattered dense verrucae. Teliospore wall sparsely verrucose *P. terebinthi*
 - ** Urediniospores with verrucae in evident or obscure rows3
3. Urediniospores with verrucae in evident spiral rows. Teliospore wall closely verrucose *P. toxicodendri*
 - * Urediniospores with verrucae in obscure longitudinal rows, crowded. Teliospore wall indistinctly verrucose *P. patzcuarensis*
 - ** Urediniospores with verrucae in evident spiral rows, not crowded. Teliospore wall verrucose ... *P. klugkistiana*
4. Urediniospores with verrucose echinulae arranged irregularly. Teliospore wall granular verrucose *P. barbeyana*
 - * Urediniospores with verrucae in evident or obscure spiral rows5
 - ** Urediniospores with comb-shaped verrucae in evident or obscure longitudinal spiral rows6
5. Urediniospores with verrucae in evident spiral rows. Teliospore wall verrucose *P. dieteliana*
 - * Urediniospores with verrucae in obscure spiral rows. Teliospore wall densely verrucose *P. indica*
6. Urediniospores with verrucae in obscure longitudinal spiral rows. Teliospore wall rugose *P. brevis*
 - * Urediniospores with comb-shaped verrucae in evident longitudinal spiral rows. Teliospore wall coarsely verrucose *P. shiraiana*

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