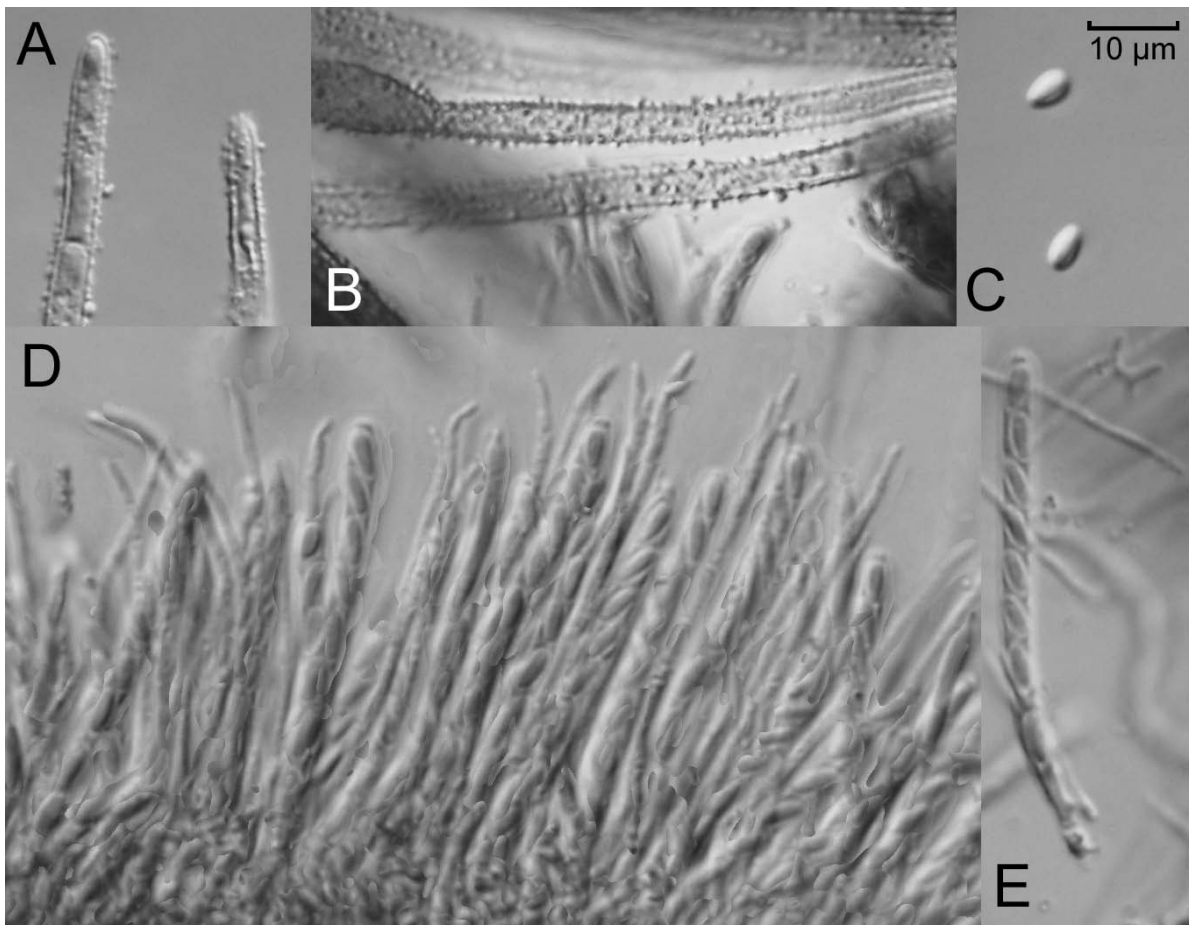

A. Ascomatal hairs, detail of tips. **B**. Ascomatal hairs, showing ornamentation. **C**. Ascospores. **D**. Hymenium, with asci, ascospores and paraphyses. **E**. Ascus with ascospores. [All at same magnification, from **IMI** 233597 (holotype).]

Lachnellula arida (W. Phillips) Dennis, *Persoonia* **2**(2): 183 (1962).

Peziza arida W. Phillips, *Grevillea* **5**(no. 35): 117, tab. 89, fig. 13 (1877).
Dasyscyphus aridus (W. Phillips) Sacc., *Sylloge Fungorum* **8**: 455 (1889) [as '*Dasyscypha*'].
Lachnella arida (W. Phillips) Seaver, *The North American Cup-fungi (Inoperculates)*: 268 (1951).
Trichoscyphella arida (W. Phillips) E. Müll. & S. Ahmad, *Biologia* Lahore **8**(2): 159 (1962).
Lachnum engelmannii Tracy & Earle, in E.L. GREENE, *Plantae Bakerianae* **1**: 25 (1901).
Trichopeziza engelmannii (Tracy & Earle) Sacc. & D. Sacc., *Sylloge Fungorum* **18**: 80 (1906).

Habit occurring singly or in clusters, breaking out from bark of dead twigs and small branches, often on detached fallen brashing trash or branches broken by wind or snow, usually not buried but rather on upper surfaces. *Conidiomata* often overlooked, light to dark brown, compact, ± globose, later developing into teleomorph initials, producing conidia within labyrinthiform cavities. *Conidiophores* colourless, thin-walled, smooth, verticillately branched. *Conidiogenous cells* colourless, thin-walled, smooth, ± cylindrical,

10–15 × 1·5 µm, producing conidia by non-progressive replacement wall-building apex 'phialide' development. *Conidia* colourless, aseptate, thin-walled, smooth, ellipsoidal or oblong, 2–4 × 1·5 µm. *Ascomata* generally rather conspicuous, apothecial, with olive-green to brown flanks, when young curled up, becoming cup-shaped and, finally, curled up when dry but opening widely in humid conditions to expose yellow or orange-yellow concave saucer-shaped hymenial surface, circular when viewed from above, 4–8 mm diam., short-stalked when viewed from side, with olive-green to brown excipulum covered in conspicuous brown hairs. *In mid-point vertical section* ectal excipulum composed of polygonal cells 6–10 µm diam. with yellowish-brown walls forming *textura globulosa*, medullary excipulum composed of thin-walled hyphae forming *textura intricata*. *Hairs* brown, cylindrical, with finely tuberculated surface (sometimes not so obvious in older material) and obtuse apex, septate, cylindrical, up to 190 × 5–8 µm. *Asci* containing eight ascospores arranged in single row, with only one visible wall layer, thin-walled, clavate to cylindrical, rounded at apex, tapering gradually towards base, 55–72 × 6–8 µm, with apex not turning blue in iodine, opening by small apical pore. *Ascospores* colourless, smooth, aseptate, broadly ellipsoidal, widest slightly above mid point, 6–9 × 3·5–5 µm. *Paraphyses* colourless, smooth, septate, cylindrical, unbranched, slightly wider towards apex, a little longer than asci, 70–77 × 1·5–2 µm, containing yellow to yellowish-orange globules.

DISEASE: SMERLIS (1973) demonstrated that *L. arida* can be pathogenic on *Pinaceae* and, although not explicitly described as pathogenic, ascomata of this species were produced from dead bark of *Larix* following inoculation trials in Japan (OGUCHI, 1981*b*). It is, however, generally regarded as a saprobe, with almost all observations as fruitbodies erumpent from bark of dead twigs and small branches or, exceptionally on *Juniperus*, leaves (HOLM & HOLM, 1977), generally in late spring or summer.

HOSTS: *Abies balsamea*, *A. concolor*, *A. grandis*, *A. lasiocarpa*, *A. magnifica*, *A. magnifica* var. *shastensis*, *A. pindrow*, *A. procera*; *Juniperus communis*; *Larix decidua*, *L. gmelinii*, *L. gmelinii* × *L. leptolepis*, *L. occidentalis*, *L. olgensis* var. *koreana*; *Picea engelmannii*, *P. excelsa*, *P. pungens*, *Picea* sp.; *Pinus albicaulis*, *P. cembra*, *P. concolor*, *P. contorta*, *P. contorta* var. *latifolia*, *P. contorta* var. *murrayana*, *P. flexilis*, *P. lambertiana*, *P. monticola*, *Pinus* sp.; *Pseudotsuga menziesii*, *P. taxifolia*; *Tsuga mertensiana* (*Coniferales*).

GEOGRAPHICAL DISTRIBUTION: NORTH AMERICA: Canada (Alberta, British Columbia, Québec), USA (Arizona, California, Colorado, Idaho, Michigan, Montana, Oregon, Utah, Washington, Wyoming). ASIA: Japan, Pakistan. EUROPE: France, Sweden, Switzerland.

PHYSIOLOGICAL SPECIALIZATION: In a study of isolates of this fungus in pure culture, DHARNE (1965) noted that there was some variation in ability to produce the anamorph and teleomorph *in vitro*. DHARNE also studied the range of temperatures at which isolates would grow, noting poor growth above about 21°C, but an ability to continue appreciable growth even at 0°C. He concluded that this demonstrated a probable ability for the species to grow on its natural substratum under snow cover, enabling it to complete its life cycle in early spring. The species has further been investigated for metabolites (FIGUEROA-VILLAR & AYER, 1982, 1983*a*) and is known to produce at least one antibiotic (FIGUEROA-VILLAR & AYER, 1983*b*).

TRANSMISSION: Not known, but presumably by wind-dispersed ascospores. The rôle of the conidia is not known.

NOTES: Macroscopically, all brown-haired species of *Lachnellula* tend to look alike, and a confident identification can only be made by microscopic examination. The combination of brown hairs and ascospores measuring 6–9 × 3·5–5 µm distinguishes this species from other members of the genus occurring on *Coniferales*. The presence of *textura globulosa* in the ectal excipulum, although not unique to this species, may also help identify it. A colour photograph of ascomata of this species can be found in BREITENBACH & KRÄNZLIN (1984, photo 229, p. 197). DHARNE (1965) reported that the fungus can be isolated into pure culture and, on 2% malt extract agar, forms cottony white mycelium, becoming brown to buff with age, some isolates producing the anamorph *in vitro*, and one producing the teleomorph when maintained at 4°C.

Lachnellula arida is known only from some northern hemisphere mountainous or boreal areas, almost universally on *Pinaceae*. In Europe, despite its conspicuous character, it is recorded only from the Alps where it is rare, with one literature report from Scandinavia exceptionally on *Juniperus* (HOLM & HOLM, 1977), and with apparently no records from the Apennines, Balkans, Carpathians, Crimea, Iberian peninsula, Massif Central of France, Pyrenees, Scottish Highlands, Tatras or Urals – all areas with some tradition of mycology. Sporadic searches by the author specifically for this fungus in most of those areas have so far failed to find it. It is not included in lists of fungi from the Atlas Mountains of Africa, and there seem to be no records from mountainous regions of Afghanistan, Bhutan, the Caucasus, China, India, Iran, Iraq, Kazakhstan, Kirgizstan, Korea, Mongolia, Nepal, Russia in Asia, Tadzhikistan, Turkey or Uzbekistan. It has been reported as rare in Canada (Québec) but was recorded in four out of six years between 1995 and 2000 in the Sierra Nevada of California. It has apparently not been recorded on native or introduced pines from Central America, the Caribbean, México, the southern USA or tropical Asia, and has not been recorded as an exotic introduction at all in the southern hemisphere.

Although the conservation status of this species has never been assessed, and there is no evidence of any change in its distribution or frequency of occurrence, given its apparent rarity, a distribution restricted to mountainous or boreal areas and an adaptation to cold demonstrated *in vitro*, it is likely to be vulnerable to climate change.

In addition to cited literature and internet sources, the information in this description sheet is derived from specimens in the **IMI** and **K** fungal reference collections and the author's computerized database of around 800,000 records of fungi and other organisms.

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See also the following internet sites:

www.cegep-sept-iles.qc.ca/raymondboyer/champignons/Asco_Pezize_vive.htm#Lachnellula%20arida [abundance, description, illustration]

www.hfri.bibai.hokkaido.jp/kanko/kenpo/pdf/kenpo19-9.PDF [description, distribution, hosts, illustration]

www.mycomontreal.qc.ca/etude/herb4rap.pdf [distribution]
http://pnwfungi.wsu.edu/programs/aboutDatabase.asp [hosts, distribution]
http://users.skynet.be/deneyer.mycology/champis/lachnellula_arida_(yd)_1.htm [illustration]
www.cegep-sept-iles.qc.ca/raymondboyer/champignons/Images/Lachnellula_arida.jpg [illustration]
www.mycena.sfsu.edu/pages/courses/asco1_list.html [regularity of occurrence]

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