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HYDROPUS PARADOXUS VAR. XEROPHYTICUS AND A KEY TO THE TAXA KNOWN FROM EUROPE

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Hydropus paradoxus var. *xerophyticus*, characterized by its long cystidia, broad spores and habitat in xerophytic basic pastures with communities of *Thymus-Lavandula* spp. is described as a new taxon from Spain. In addition, a key to 22 taxa known from Europe is given.

The genus *Hydropus* (Kühner) Singer ex Singer has been the subject of very few monographical studies, both at European and at world-wide level. The only monograph of this genus is Singer's (1982) which deals only with tropical species. In Europe, one of the first authors who studied this genus was Kühner (1938), who recognised four species though he included them in *Mycena* (Pers.) Roussel. Later, Moser (1983) recognised the genus *Hydropus* as a taxon on its own, and provided the first European key comprising a total of seven species. We also stress the importance of contributions published by Robich (1986, 1990, 1992), Contu & Robich (1998) in Italy, Hausknecht et al. (1997) in Austria and Bas (1999) in the Netherlands.

The present paper describes a new variety of *Hydropus paradoxus* from Spain. The colour codes given in this paper are according to Munsell (1988).

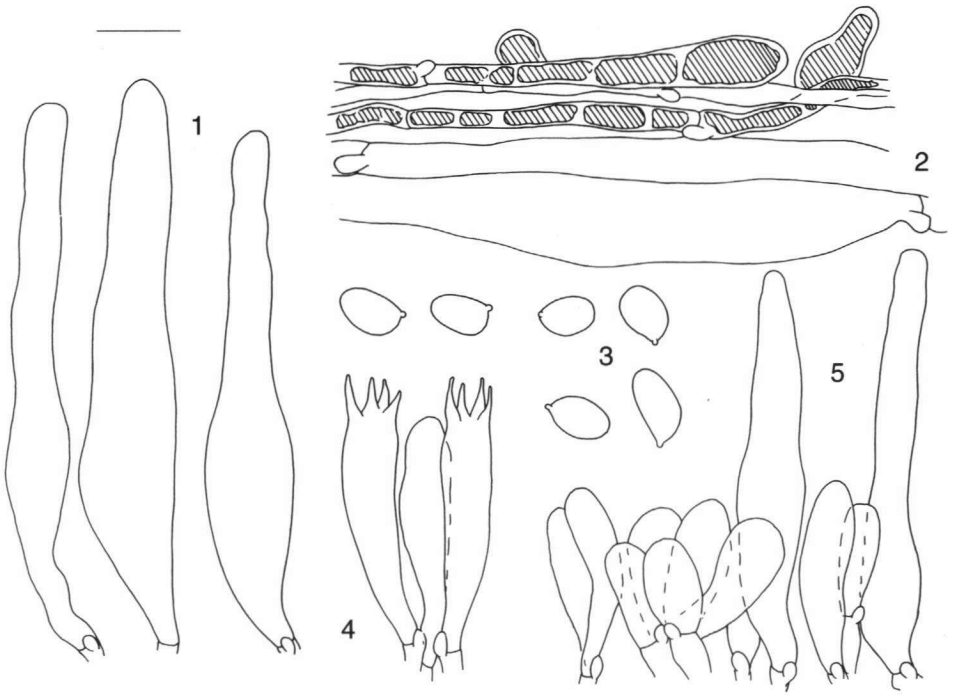
Hydropus paradoxus var. **xerophyticus** Esteve-Rav., Villarreal & Heykoop, *var. nov.* — Figs. 1–5

A typo differt sporis latioribus, cystidiis longioribus et habitatione aridiore.

Holotypus: SPAIN, Segovia, Parque Natural de las hoces del Río Duratón, 10 Nov. 1993, leg. F. Esteve-Raventós, M. Heykoop, S.G. Busutil & P.G. Escolar (AH 18987).

Basidiomata gregarious. Pileus 10–30 mm in diam., hemispherical, convex to planoconvex, sometimes with abrupt central papilla, hygrophanous, translucent-striate only when wet, apparently smooth, fairly pruinose under the lens, very dark brown (Mu. 10 YR 2/2) to dark brown (10 YR 3/3), fading to greyish brown (10 YR 4/2), with yellowish brown (10 YR 5/6), crenulate margin. Lamellae ascending, broadly ventricose, deeply emarginate with decurrent tooth, white to dirty greyish when dry, with entire, concolorous edge. Stipe 15–50 × 2–4 µm, cylindrical to tapering upwards, very pale brown (10 YR 7/4), gradually darkening towards the base to greyish brown or dark brown (10 YR 4/2–3), always somewhat paler than the pileus, entirely pruinose-floccose, at the base densely covered with brownish fibrils. Context somewhat cartilaginous, whitish to pale brown under the cortex at the base of the stipe. Smell none.

Spores 7.7–*9.8*–11.9 × 5.4–*6.35*–7.3 µm; Q = (1.32–)1.45–*1.55*–1.65(–1.95); (n = 21), ellipsoid, broadly ellipsoid, or subglobose, smooth, thin-walled, hyaline, with vacuolar inclusions, inamyloid, acyanophilic. Basidia 32–42 × 8.5–10 µm, 4-spored (rarely 2-spored),



Figs. 1–5. *Hydropus paradoxus* var. *xerophyticus* (holotype). 1. Hymenial cystidia; 2. pileipellis; 3. spores 4. basidia; 5. Caulocystidia. Bar = 15 µm.

sterigmata 4.5–9 µm long, hyaline or with vacuolar contents, clamped. Lamella edge heterogeneous. Cheilocystidia and pleurocystidia abundant, (50–)70–110(–137) × 12–17(–23) µm, normally sublageniform with long neck, but also subutriform to clavate, mostly thick-walled (–1.5 µm). Hymenophoral trama regular to subregular, not embedded in gelatinous matter, not dextrinoid, consisting of long and cylindrical hyphae (–27 µm wide), constricted at the septa. Pileipellis consisting of hyphae 2–5 µm wide, with numerous prostrate cylindrical, cylindrico-flexuose to subclavate dermatocystidioid elements up to 80 × 7–12 µm, cylindrical to clavate, filled with brownish vacuolar contents, not forming a well-developed palisade, and locally forming denses clusters. Subpellis made of wider and shorter elements (15–32 µm wide), forming a pseudoparenchymatic layer with parietal yellowish pigment. Stipitipellis a cutis of cylindrical, parallel 2–5 µm wide hyphae with parietal yellowish pigment, with caulocystidioid terminal elements at the stipe apex, very variable, cylindrical, clavate to sublageniform, 30–85 × 5–10 µm, thin-walled, forming clusters. Context not dextrinoid, not cyanophilic nor oleiferous elements observed. Sarcodimitic tissues present at the cortical layer of the stipe. Clamps present, but sometimes inconstant.

Habitat — In xerophytic grassland, under *Lavandula stoechas* L. and *Thymus* sp.

Material studied. SPAIN: Segovia, Parque Natural de las hoces del Río Duratón, 5 Nov. 1993, leg. F. Esteve-Raventós, M. Heykoop, S.G. Busutil & P.G. Escolar, AH 18986; *ibidem*, 10 Nov. 1993, AH 18987 (Holotype).

Hydropus paradoxus is an extremely rare taxon; according to our knowledge, it is known only from the type locality in Switzerland (Moser, 1969). The Spanish collections, which grow in very xerophytic shrubland areas with poor, basic soils, seem to be restricted to this vegetation where the presence of *Thymus* and *Lavandula* species seems to be constant. The basidiomata grow directly on soil or more commonly on and around debris under the canopy of these two characteristic Mediterranean plants. Apart from this typical habitat, the broader spores and longer cystidia and basidia, seem to be different from those described in the type collection. Macroscopically both taxa are very similar, and the cartilaginous context and the ventricose, annexed greyish white gills, which characterise this species, are present in both taxa.

KEY FOR THE EUROPEAN SPECIES OF HYDROPUS

1. Spores amyloid 10
1. Spores inamyloid 2
2. Spores globose 3
3. Smell spermatic, pileus dark brown, on alpine musci .... *Hydropus montis-rosae*
3. Without these characters 4
4. Stipe, context and lamellae with yellowish tinges *Hydropus floccipes* var. *luteipes*
4. Without yellowish tinges ..... *Hydropus floccipes* var. *floccipes*
2. Spores not globose 5
5. Hymenial cystidia absent; alpine distribution ..... *Hydropus dryadicola*
5. Hymenial cystidia present 6
6. Pileocystidia absent ..... *Hydropus conicus*
6. Pileocystidia present 7
7. Gloeocystidia present ..... *Hydropus liciosae*
7. Gloeocystidia absent 8
8. Stipe whitish, spores reniform ..... *Hydropus subalpinus*
8. Stipe brownish, spores ellipsoid to subglobose 9
9. Spore width ≤ 5.5 µm; cystidia up to 60 µm long *Hydropus paradoxus*
9. Spore width > 5.5 µm; cystidia > than 60 µm long *Hydropus paradoxus* var. *xerophyticus*
10. Pileipellis with encrusting pigment 11
11. Spores up to 5 µm wide, pileipellis without intracellular pigment, sarcodimitic tissues absent, lignicolous *Dennisiomyces lanzonii*
11. Without these characters 12
12. Basidia 4-spored, clamp-connections present *Hydropus trichoderma* var. *trichoderma*
12. Basidia 2-spored, clamp-connections absent *Hydropus trichoderma* var. *lobauensis*
10. Pileipellis without encrusting pigment 13
13. Context darkening when cut, spores globose *Hydropus atramentosus*
13. Context not darkening, spores not globose 14

14. Pileocystidia absent 15
15. Caulocystidia fusoid, with thick and frequently mucronate apex ..... *Hydropus nitens*
15. Without these characters 16
16. Spores < 4.5 µm wide, base of stipe safron-yellowish, pileipellis with some diverticulae *Hydropus pseudotenax*
16. Spores > 4.5 µm wide, base of stipe without yellowish tinges 17
17. Basidia 2-spored *Hydropus scabripes* var. *scabripes*
17. Basidia 4-spored *Hydropus scabripes* var. *quadrisporus*
14. Pileocystidia present 18
18. Pleurocystidia present 19
19. Clamp-connections absent, crowded to rather crowded lamellae (L = 20–28, l = 1–5) *Hydropus fraterniger*[1]
19. Clamp-connections present, lamellae distant to subdistant 20
20. Basidia 2-spored, lamellae moderately close to subdistant (with e.g. 18 through-lamellae according to Singer, 1982) *Hydropus fraterniger*[1]
20. Basidia 4-spored, lamellae distant to very distant (L = 12–16, l = 0–1) ..... *Hydropus moserianus*
18. Pleurocystidia absent 21
21. Pileipellis consisting of a dense layer formed by pileocystidia ..... *Hydropus marginellus*
21. Pileipellis not consisting of a dense layer formed by pileocystidia (tropical species growing in European greenhouses) ..... *Hydropus semimarginellus*

1) *Hydropus fraterniger* Singer, *H. fraterniger* s. Hausknecht et al. (1997) and *H. moserianus* Bas are three closely related, though different taxa. *H. fraterniger* s. Hausknecht et al. is characterized by its first dark grey-brown but later brown pileus with paler ochraceous margin, its lamellae with brownish grey edge because of the presence of cheilocystidia with vacuolar pigment, and the absence of clamps. The fruit-bodies on the coloured plate published by Hausknecht et al. (1997) are completely different from *H. moserianus*, especially because of the distant to very distant lamellae in *H. moserianus*. Moreover, the taxon of Hausknecht et al. grows on wood (lying stems of *Abies*). The original *H. fraterniger* Sing. differs from *H. moserianus* by 2-spored basidia (in the latter 4-spored), a (sub)umbonate pileus, white to grey lamellae becoming dark in the region along the edge (in *H. moserianus* grey to dark grey but paler towards the edge), probably less distant lamellae (according to Singer (1982): moderately close to distant, with e.g. 18 through-lamellae), and cystidia without a long narrow neck.

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