

**HEBELOMINA MICROSPORA HUIJSM.\* AND  
REFLEXIONS ON HEBELOMINA R. MAIRE AS A GENUS**

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(With one Text-figure)

The name *Hebelomina microspora* is validated\*. It is supposed that the genera *Hebeloma* (Fr.) Kumm. and *Hebelomina* R. Maire differ in their essential characters only in that 'layer IV' of the spore wall of *Hebeloma*, as defined by Besson & Bruchet, is rudimentary in *Hebelomina*. For the time being it is proposed that they be considered as two separate genera.

***Hebelomina microspora* Huijism., sp. nov.—Fig. 1**

*Hebelomina microspora* Huijisman, nom. nud., in *Revue Mycol.* 11: 31. 1946. (No Latin diagnosis.)

Pileo 20-40(-50) mm, primo hemispherico-convexo, margine involuto, velo fugaci cum stipite apice conjuncto, orbiculari, mox expanso, saepe obtuse ac late umbonato; aetate margine inflexo, undato-sublobato vel irregulari, raro ab initio margine cum eodem sociorum concreto; interdum primitus veli reliquis minutis sparse obtecto, subfragili, haud hygrophano, centro viscidulo, principio albo, demum pallide alutaceo-ochraceo, saepe plus minusve incarnato immixto, nonnunquam cum scrobiculis dispersis diam. 1-4 mm concoloribus sed magis pilei superficie saturatis ornato. Lamellis mediocriter confertis, attenuato-adnatis vel subemarginatis, denique subdecurrentibus, usque ad 4-4.5 mm latis, albis dein pileo concoloribus; acie integra. Stipite e ramulo *Pinus* orto, 35-45 × 3-12 mm, centrali vel subexcentrico, primo vulgo verticali, postea ascendenti vel decumbenti, subaequali vel deorsum dilatato, cortice satis duro, medulla spongiosa farcto, aetate striato vel subsulcato, apice vix pulverulento, fibrillis veli mox evanescentibus, albido. Carne haud crassa, alba; odore primo iodoformi reminiscenti (sec. Smits), dein subnullo; sapore amarissimo.

Sporis in cumulo pertenui albis, in herbario — multis annis post, sub micr. — stramineis 6.5-7.8 × 4.2-4.6 μm, amygdaliformibus, levibus, crassotunicatis, distincte dextrinoideis. Basidiis ± 29 × 6.5 μm, granulis carminophilis carentibus, 4-sporigeris. Pilis marginum lamellarum 30-40 × 6-9 μm, inferne inflatis, superne leviter dilatatis. Trama lamellarum regulari. Pileipelle indistincter bistrata: suprapelle ± 25 μm crassa, e hyphis confertis repentibus perangustis, membrana gelificata, extracta; subpelle e hyphis crassioribus, haud gelificatis, in hyphis intermixtis carnis gradatim transeuntibus. Stipitipelle ad apicem solo nonnullis hyphis emergentibus praedita. Fibulis frequentibus.

Habitatio et distributio: gregatim ad ramulos dejectos *Pinus silvestris* in silva mixta prope Rijssen, provincia Overijssel, Neerlandia. Loco typico tantum reperta, 24.X.1943; *W. J. Reuvecamp* & *W. F. Smits* (Typus; L).

\* The reader is referred to the note added in proof on p. 489.

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*Hebelomina microspora* would seem to be a very rare species; as far as I know, it has not been gathered beyond the type-locality, which was destroyed shortly after 1945, when a new quarter of Rijssen was built. To make things worse, a few years after the war the originally very rich type material was unearthed in a very poor condition, badly moth-eaten and mouldy. Nevertheless the crucial characters of this curious species could be checked.

Prof. R. Kühner and prof. R. Singer (1962: 581; 1975: 580) kindly examined fragments of the type and both of them declared that the Dutch fungus belonged to a genus of which until then they had never seen a representative. They agreed that the species be placed in the monotypic genus *Hebelomina* R. Maire (1935), found only once in North Africa. Though the type of the type species of the genus seems to have been lost, the generic and especially the very detailed and impeccable specific diagnosis of Maire (the two in Latin) give an excellent picture of *Hebelomina domardiana* R. Maire.

In the accompanying French text, Maire characterized *H. domardiana* as follows: '...un champignon très remarquable, ayant l'aspect extérieur d'un *Tricholoma*, mais qui est, en réalité, un *Hebeloma* à spores incolores.' And a little farther '...*Hebelomina* est aux *Hebeloma* ce que le genre *Cortinellus* est aux *Cortinarius*.'

With the remark in the species-diagnosis: 'Sporae in cumulo tenui albae; in cumulo crassae non visae', Maire evidently envisaged the possibility that, like in so many 'Leucosporae', the spores in a thick spore-print might prove to be not quite white. The same could apply to *H. microspora*, of which I suspect that the spores in a layer of sufficient thickness might prove to be not entirely without colour.

Before comparing *H. microspora* with possibly allied taxa, the following should be pointed out. In the plate of my former paper on *Hebelomina* (1946) I designated as III two fusiform 'pleurocystidia' scarcely surmounting the top-level of the basidia. A re-examination many years ago showed that this level on the face of the lamellae is not topped by any formation except sterigmata and spores. Thus the formations indicated and described as pleurocystidia must have been incidental.

*Hebelomina microspora* is similar to species of *Hebeloma* in having an ixocutis, a corresponding pattern of colours of the cap, the same structure of the lamellae — further provided with only marginal hairs, morphologically falling within the range of variability of those of *Hebeloma* —, the bitter taste of the flesh and the amygdaliform shape of the spores of so many representatives of *Hebeloma*, the thick spore walls, etc.

It differs from *Hebeloma* in the white or very pale spores, which are smooth (observed with a light-microscope), in the cyanophilous and dextrinoid wall and, curiously, in its lignicolous habitat. Mr. W. F. Smits stressed that the type-locality was strewn with branches of different kinds of trees, but that only branches of *Pinus* were affected. So *H. microspora* seems to be pinicolous or, perhaps, bound to wood of conifers only.

*Hebelomina microspora* has in common with *H. domardiana* that both of them can be defined as 'un *Hebeloma* à spores incolores' (Maire). It differs essentially from *H.*

*domardiana* in that only young spores of the African species have a dextrinoid wall, in the dimensions of the spores (*H. microspora*:  $6.5-7.8 \times 4.2-4.6 \mu\text{m}$ ; *H. domardiana*:  $11-15 \times 8 \mu\text{m}$ ), consequently also in those of the basidia, and again in the habitat (*H. domardiana*: 'in quercetis suberis').

*Hebelomina domardiana* and *H. microspora* have so many characters in common with the species of *Hebeloma* that a close relationship with that genus cannot be denied.

To enrich insight in the architecture of the spore wall within the genus *Hebeloma*, Besson & Bruchet (1973: 264-275) investigated exhaustively, with the most advanced techniques at present available, the constituting layers of this wall.

In broad outlines, they found five different layers which they indicated from inside outwards by the Roman figures I-V. The concentric layers I-III are perfectly smooth. The important layer IV, enveloping layer III, produces the spore ornamentation and bears the spore pigments. It is covered by the thin layer V, distinguishable with an ordinary microscope in such species of *Hebeloma* as have a relatively high spore ornamentation.

Mature and sound spores of *Hebeloma* are acyanophilous and not dextrinoid. This alters as soon as a spore is broken or damaged. Then an intermediate zone of the wall — indicated by Besson & Bruchet as layer III (+an outer zone of II) — proves to be coloured after treatment with a solution of cotton blue in lactic acid and, at the same time, proves to be dextrinoid. Evidently in intact and mature spores there is a barrier, preventing cotton blue and iodine from entering into III. In broken spores however these substances can enter through the plane of breakage and probably, still more easily, via I (and the inner layers of II). As layer V seems to be of little importance here, the barrier must be formed by the thick and pigmented layer IV. For a better understanding it might be useful to refer to plate III (figs. 1 and 3) of the article of the French authors mentioned.

If from a spore of *Hebeloma* we could take away layer IV without causing damage to the other layers, very likely: (i) this spore would be colourless (IV being the layer containing the pigments), (ii) the spore wall would be fully smooth (I ignore the irrelevant possibility that layer V might have become folded), and (iii) layer III would be immediately accessible to cotton blue and to iodine (the 'barrier' having been removed). I think our hypothetical spore would differ little from a spore of *Hebelomina*. That this reasoning is not only illusory may be illustrated by the following.

Examination of the spores of *H. microspora* in chloral-hydrate after a treatment with a watery solution of cresyl blue reveals that the greater part of the thickness of the wall is occupied by a metachromatic zone. Externally this zone is delimited by a dark blue line, internally by a faint blue-coloured line, mostly difficult to observe.

The same picture is obtained with rather young spores of *Hebeloma sinapizans* (or some other allied species) where layer IV is not yet distinctly developed and which have undergone the same treatment. Once more the well-known picture is shown in the 'kernel' of a mature spore which has slipped out of its warty and pigmented shell (=layer IV) after the cover-glass has been forcibly tapped.

Therefore morphologically, in its essential characters, it appears that all the differences between *Hebeloma* and *Hebelomina* (spore colour, wartiness of spores, accessibility to cotton blue and iodium) can be reduced to a single one, namely to a rudimentary 'layer IV' in *Hebelomina*.

In this connection and without much being attached to the fact it is nevertheless curious that the spores of *H. microspora* are just a little smaller than the smallest ones in *Hebeloma*, whose measurements are borrowed from Bruchet (1970).

I trust that the above results, obtained with limited means, will prove to be an approach to the actual facts.

From a phylogenetic standpoint we know nothing at all about the nature of the mutual relations of the two genera. It may be that the existing species of *Hebelomina* are the last representatives of a dying 'tribe', living a languishing life in their last niches. But the possibility that the same mutation took place repeatedly in different species of *Hebeloma*, can better not be excluded.

So, for the present, I deem it wise not to propose a unification of the two closely allied genera.

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#### Note added in proof

Just when the present paper came into print, my attention was drawn to an article by Alessio & Nonis (1977) with a description of an agaric under the validly published name *Hebelomina microspora*. Unfortunately that species seems to be quite different from the *H. microspora* described in this paper.

Macroscopically the Italian species has the habit of some umbonate *Inocybe* rather than that of a *Hebeloma*. The colour of the cap seems to be too dark and, in older specimens, too red (in the original '*H. microspora*' this varies from pure white to about pink-buff as in Séguy 199), and the stem has almost the same colour as the cap (in the original species - as in many *Hebelomata* - remaining practically white).

According to Alessio & Nonis, from a microscopic point of view, the spores are

identified as amyloid (whereas in my species they are pseudoamyloid) and the edge of the gills is set with large cystidia, measuring  $40-80(-100) \times 9-16 \mu\text{m}$ .

Since as a result of the publication of Alessio & Nonis the name *Hebelomina microspora* Huijism., validated in the proceeding text, has become a later homonym. I propose the following name change:

***Hebelomina neerlandica* Huijism., nom. nov.**

Basionym: *Hebelomina microspora* Huijism. (see p. 485) non *H. microspora* Alessio & Nonis, in *Micol. ital.* **6** (3): 15. 1977.

ADDITIONAL REFERENCE

ALESSIO, C. L. & NONIS, U (1977). Una specie quasi sconosciuta: *Hebelomina microspora* Huijsman. In *Micol. ital.* **6** (3): 15-19, pl. 18.