

The genera *Paxillus* and *Tapinella* in Central Europe Rody *Paxillus* a *Tapinella* ve střední Evropě

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A brief survey of the genera *Paxillus* Fr. and *Tapinella* Gilb. is given with a key to the determination of Central European species of this group. Differences between the above mentioned genera are summarized into seven points. The species *Agaricus atrotomentosus* Batsch: Fr., often treated as a *Paxillus*, is here transferred to the genus *Tapinella*. The following new combinations are proposed: *Tapinella atrotomentosa* (Batsch: Fr.) comb. nov. and *Tapinella panuoides* (Fr.: Fr.) Gilb. f. *ionipes* (Quél.) comb. nov.

Je podán stručný přehled rodů *Paxillus* Fr. a *Tapinella* Gilb. s klíčem k určení středoevropských druhů této skupiny. Rozdíly mezi výše zmíněnými rody jsou shrnuty do sedmi bodů. Druh *Agaricus atrotomentosus* Batsch: Fr., často považovaný za zástupce rodu *Paxillus*, je zde přemístěn do rodu *Tapinella*. Jsou navrženy následující nové kombinace: *Tapinella atrotomentosa* (Batsch: Fr.) comb. nov. a *Tapinella panuoides* (Fr.: Fr.) Gilb. f. *ionipes* (Quél.) comb. nov.

For some years I have studied the anatomy of Central European species of the family *Paxillaceae* Lotsy. On the basis of this study I arrived at the conclusion that *Tapinella* Gilb. is a good, separate genus, distinguished from the most related genus, *Paxillus* Fr., by many significant diagnostic characters. In this taxonomic question I agree with the authors who accepted *Tapinella* (= *Tapinia* P. Karst.) at the generic level already sooner (e. g. Karsten 1879, Fayod 1889, Murrill 1917, Gilbert 1931, Redhead and Ginns 1985, Kreisel 1987, Breitenbach and Kränzlin 1991, etc.).

Into the genus *Tapinella* it has usually been included only the type species, *Tapinella panuoides* (Fr.: Fr.) Gilb. (= *Agaricus panuoides* Fr.: Fr.). In my opinion, however, into this genus it should be placed also the species *Agaricus atrotomentosus* Batsch: Fr. which is like *T. panuoides* in all important microscopic and anatomical details. The microscopic features show that *A. atrotomentosus* belongs to *Tapinella* rather than to *Paxillus*. With respect to this fact I propose the following new combination: *Tapinella atrotomentosa* (Batsch: Fr.) Šutara comb. nov. [basonymum: *Agaricus atrotomentosus* Batsch, Elench. Fung., p. 89, 1783; Fries, Syst. Mycol. 1, p. 272, 1821].

Differences between the genera *Paxillus* and *Tapinella*

Paxillus:

1. A predominant part of the stipe surface is fertile, composed of a caulohymenium with sporulating caulobasidia. (In other words: The stipe covering is analogous with the hymenium of the hymenophore).
2. Lateral strata (or hymenopodia?) of the hymenophore gelatinize in a certain developmental stage.

Tapinella:

1. The stipe surface is not fertile. The stipe is either absent or is covered with a trichodermium or tomentum. (The stipe covering is analogous with the pileus cuticle).
2. Lateral strata of the hymenophore do not gelatinize.

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| 3. Basidia clavate or clavate-capitate, 6.5-13 μm broad, resembling the ones of boletaceous genera. | 3. Basidia slender, narrowly clavate or almost cylindrical, only 4-6.5 μm broad, smaller and much narrower than those in <i>Paxillus</i> . |
| 4. Spores longer than 6.5 μm , ellipsoid or ellipsoid-fusoid; some of them with a suprahilar applanation or depression in profile, reminiscent of a broad boletoid shape, only partly and weakly dextrinoid and cyanophilic. | 4. Spores shorter than 6.5 μm , broadly ellipsoid, without a distinct suprahilar depression, rather strongly dextrinoid and cyanophilic, reminding of the ones of some <i>Coniophoraceae</i> . |
| 5. Cystidia present both in the hymenophore and on the stipe. | 5. Cystidia absent. |
| 6. Medaillon clamp connections absent (see Lange and Hansen 1954). | 6. Medaillon clamp connections present (see Lange and Hansen 1954). |
| 7. Terricolous fungi, facultatively mycorrhizal. | 7. Lignicolous fungi, causing brown rot (see Davidson and Patton 1961, Nilsson and Ginns 1979). |

Genus *Paxillus* Fr., Fl. Scan.: 339, 1835.

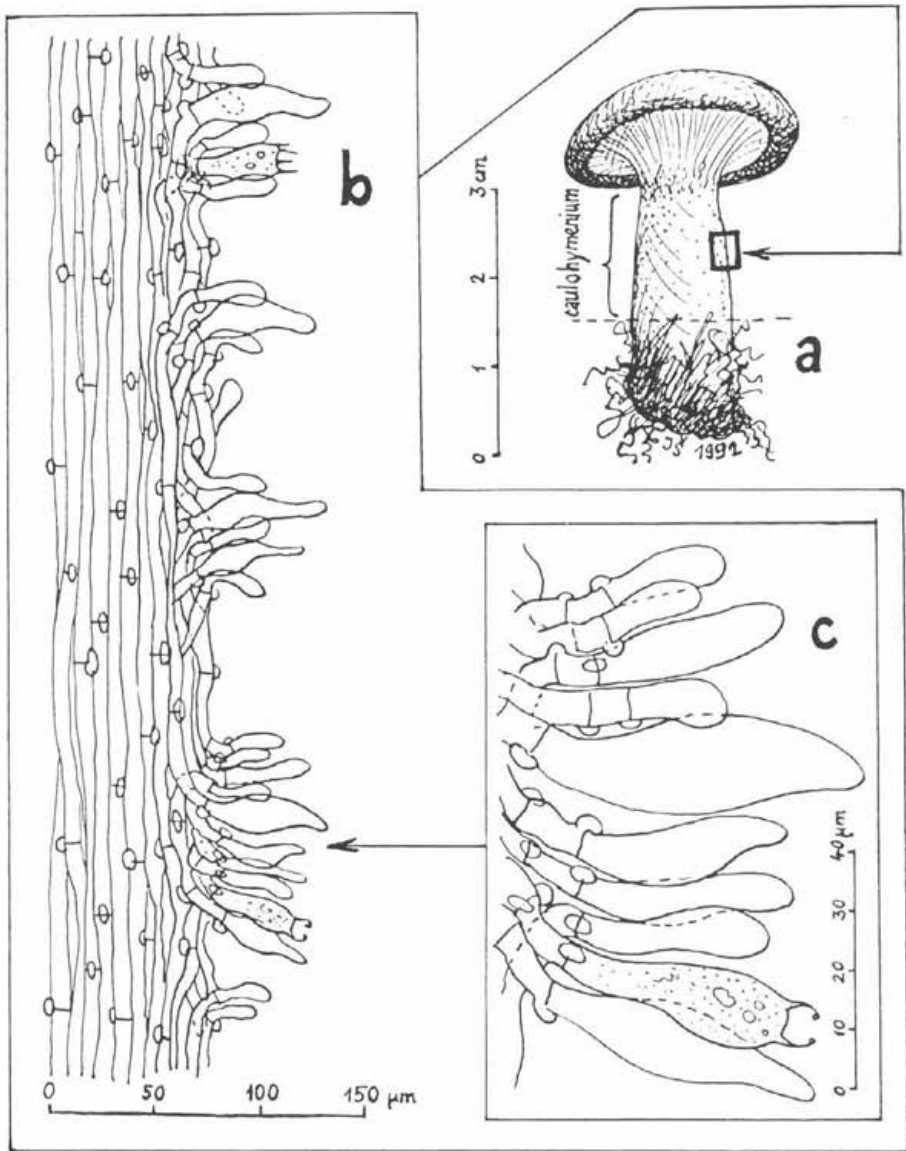
Ruthea Opat., Arch. Naturgesch. 2 (1): 3, 1836.

Rhymoxis ('*Rhymovis*') Pers. ex Rabenh., Deutschl. Kryptogamenfl. 1: 453, 1844.

Tapinia (Fr.) Pat., Hym. Europ.: 130, 1887 (non *Tapina* Mart. 1829, nec *Tapinia* Steud. 1841, nec P. Karst. 1879).

T y p u s : *Agaricus involutus* Batsch: Fr. = *Paxillus involutus* (Batsch: Fr.) Fr.

C h a r a c t e r s : Carpophores of lactarioid or clitocyboid habit, fleshy. Velum none. The pileus more or less circular, depressed at the centre and inrolled on the margin. The pileus cuticle a trichodermium, often collapsed and sometimes gelified. Lamellae crowded, decurrent, branching, anastomosing near the stipe. The lamellar trama is bilateral, with lateral strata (or hymenopodia?) which gelatinize in a certain developmental stage. Cystidia present both on the edge and on the surface of the lamellae. Most of the hymenophoral cystidia contain a yellow dispersed pigment. Basidia clavate or clavate-capitate, moderately broad (6.5-13 μm). Spores moderately large (6.5-13 μm long), yellowish or brownish under the light microscope, smooth, ellipsoid or ellipsoid-fusoid, some of them with a suprahilar applanation or shallow depression in profile, partly and weakly dextrinoid and cyanophilic. Spore print ochraceous or pale brown. The stipe central or somewhat eccentric, fleshy, solid. Except the basal part, the stipe is covered with a fertile caulohymenium. The caulohymenial layer is at first entire, later it gradually disrupts into small islands of caulobasidioles, caulocystidia and scattered functioning caulobasidia. No distinct lateral stratum was observed under the caulohymenium. The hyphal system monomitic; the hyphae filamentous or inflated, with walls thin or slightly thickened (to 0.6 μm). Trama of the pileus loosely and irregularly entangled. Trama of the stipe densely and regularly arranged in a longitudinal, parallel way. Clamp connections very abundant. Medaillon clamps were not observed (see Lange and Hansen 1954).



1. *Paxillus involutus*. - a) A young specimen (JŠ 3520). - b) Fragments of the disrupted caulohymenium on the stipe surface. - c) A detail of fig. b showing elements of the caulohymenium.

Paxillus involutus. - a) Mladý exemplář (JŠ 3520). - b) Fragmentsy roztrhaného kaulohymenia na povrchu třeně. - c) Detail kresby b ukazující elementy kaulohymenia.

Terricolous species, forming ectomycorrhiza with frondose as well as coniferous trees (for detailed information on the mycorrhiza of *Paxillus involutus*, see Laiho 1970).

Note: *Paxillus* with its features (the presence of the caulohymenium and caulobasidia, the suprahilar depression on some spores, the not narrowed basidia, the gelified hymenophoral trama, the ability to form mycorrhiza, etc.) is more closely related to the family *Boletaceae* Chev. than is the genus *Tapinella*.

Central European species: (1) *Paxillus involutus* (Batsch: Fr.) Fr., (2) *Paxillus rubicundulus* Orton (= ? *P. filamentosus* Fr.), and (3) *Paxillus albidulus* Šutara.

Key to the identification of Central European species
of *Paxillus*

- 1a) The pileus and stipe of young and maturing specimens are white or whitish, only on pressed or injured places they become brown or rusty coloured. The trichodermal hyphae on the pileus contain no distinct pigment. Also the flesh and the basal tomentum is white *Paxillus albidulus*
- 1b) The pileus and stipe are distinctly coloured (e. g. grey-ochreous, yellow-brown, rusty brown, brown, etc.) from the beginning. The trichodermal hyphae on the pileus contain a brown dispersed pigment. The flesh is at least slightly yellow, cremeous or rusty yellowish. The basal tomentum yellow-grey, olive-grey, grey or rusty brown 2
- 2a) The pileus cuticle become very soon squamulose. The lamellae of immature specimens are vivid yellow or golden yellow. Likewise the flesh is rather vivid yellow. Spores 6.5-8.5 x 4-5 (5.5) μm . On wet sites under *Alnus* *Paxillus rubicundulus*
- 2b) The pileus cuticle is not squamulose in normal conditions. The lamellae cremeous, ochreous as well as yellowish but not so vivid yellow as those of the previous species. Also the flesh is less yellow. Spores (8-) 8.5-12 x (4-) 5-6 (-6.5) μm . Under other trees than alders (*Alnus*), most frequently under *Betula* and *Picea* *Paxillus involutus*

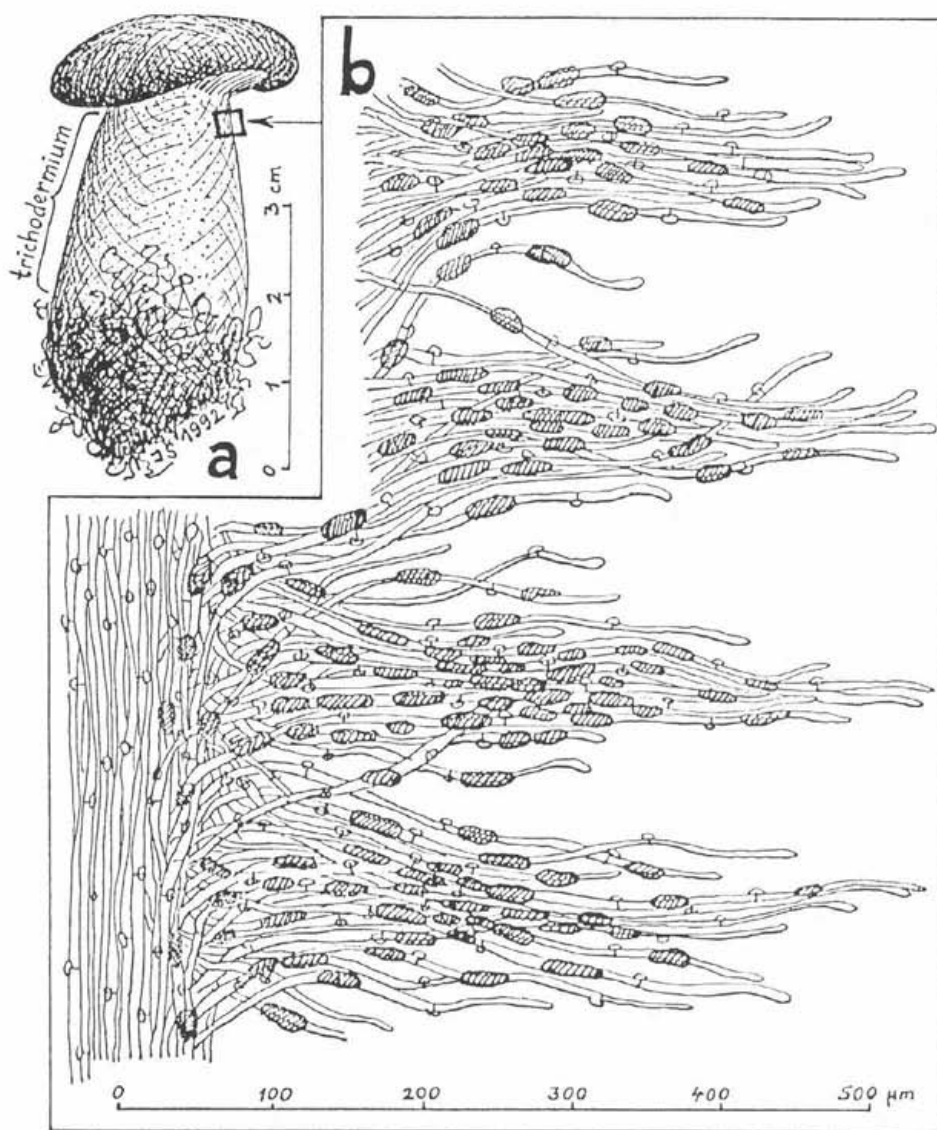
Genus *Tapinella* Gilb., Les Bolets: 67, 1931.

Tapinia P. Karst., Bidr. Känn. Finl. Nat. Folk 32: XXIII, 452, 1879 (non *Tapina* Mart. 1829, nec *Tapinia* Steud. 1841).

Paxillopsis Gilb., Les Bolets: 86, 1931 (nom. inval.).

Type: *Agaricus panuoides* Fr.: Fr. = *Tapinella panuoides* (Fr.: Fr.) Gilb.

Characters: Carpophores of pleurotoid (or crepidotoid) habit, more or less fleshy. Velum none. The pileus conchate, flabellate, auriculate or almost circular, inrolled on the margin. The pileus cuticle a trichodermium, collapsed or erected, usually non-gelified. Lamellae decurrent, branching, anastomosing. The lamellar trama is bilateral, with lateral strata which do not gelatinize. Cystidia absent. Basidia narrowly clavate or nearly cylindric, merely 4-6.5 μm broad. Spores small, shortly ellipsoid, without a distinct suprahilar depression, smooth, yellowish or brownish under the light microscope, rather



2. *Tapinella atrotomentosa*. - a) A young specimen (JŠ 3511). - b) A trichodermium on the stipe surface, composed of erected hyphae which are conspicuously incrustated with the pigment atrotomentin in crystallized form.

Tapinella atrotomentosa. - a) Mladý exemplář (JŠ 3511). - b) Trichoderm na povrchu třeně, tvořený vzpřímenými hyfami, které jsou nápadně inkrustovány pigmentem atrotomentinem v krystalické podobě.

strongly dextrinoid and cyanophilic. Spore print ochreous or pale brown. The stipe eccentric, lateral or none, rarely almost central. If present, it is covered with a trichodermium or with a tomentose tangle of hyphae. No lateral stratum was observed under the stipe cuticle. The hyphal system monomitic; the hyphae filamentous or somewhat inflated, with walls thin or slightly thickened (to 0.6 μm). The pileus trama is loosely and irregularly entangled. The stipe trama is densely arranged in a longitudinal, parallel way. Clamp connections very abundant. Medaillon clamps were observed (see Lange and Hansen 1954).

Lignicolous species, living on coniferous wood, causing brown rot (see Davidson and Patton 1961, Nilsson and Ginns 1979, and others).

Note: *Tapinella*, with regard to its characters (the sterile stipe covering, the slender basidia, the absence of the suprahilar depression on spores, the brown rot, etc.), indicates a relationship to some groups of wood-decaying fungi. Some authors (e. g. Nilsson and Ginns 1979) suggested that *Tapinella panuoides* (the type species of *Tapinella*) is closely allied to the family *Coniophoraceae* Ulbr.

Central European species: (1) *Tapinella panuoides* (Fr.: Fr.) Gilb. and (2) *Tapinella atrotomentosa* (Batsch: Fr.) Šutara.

The first cited species occurs in several forms. One of them is *Tapinella panuoides* f. *ionipes* (Quél.) Šutara comb. nov. [basionymum: *Paxillus ionipes* Quél., C. R. Ass. Franc. Av. Sc. 16 (2): 588, ("1887") 1888].

Note on Tapinella atrotomentosa. Macroscopically *Tapinella atrotomentosa* perhaps seems to be somewhat similar to *Paxillus involutus* (the type of *Paxillus*), but microscopically these two species are very different. The microscopic and anatomical features of *T. atrotomentosa* (such as the absence of the caulohymenium and caulobasidia, the non-gelatinous hymenophoral trama, the narrow basidia, the absence of the suprahilar depression on spores, the absence of cystidia, the presence of medaillon clamps, etc.) demonstrate that this species cannot be placed with *P. involutus* together in the same genus. The ability to produce a brown rot, which is a physiological character, is undoubtedly also a significant feature supporting the transference of *T. atrotomentosa* from *Paxillus* to *Tapinella*.

Note on Plicaturella. The question of the generic name *Plicaturella* Murrill, which is sometimes cited as a synonym of *Tapinella*, was clarified by Redhead and Ginns (1985). These authors examined the type of *Cantharellus olivaceus* Schw. (the type of *Plicaturella*) and ascertained that it is most likely a specimen of *Gyrodon merulioides* (Schw.) Sing. = *Boletinellus merulioides* (Schw.) Murrill. On the basis of this fact, they came to the conclusion that *Plicaturella* is not synonymous with *Tapinella* or *Paxillus* but with *Gyrodon* Opat. or *Boletinellus* Murrill.

Key to the identification of Central European species
of *Tapinella*

1a) The stipe well developed, stout, 3-9 cm long, 2-5 cm thick, eccentric or lateral, rarely almost central, covered with a dense, dark brown velvet. The pileus (8-) 10-20 (-25) cm, circular or eccentric, rusty brown, olive-brown or dark brown. The trichodermal hyphae on the stipe and pileus are richly covered with a conspicuous, dark brown incrustation - the pigment atrotomentin in crystallized form (see Kühner 1980). Carpophores grow singly or in tufts on stumps and at the base of coniferous trees *Tapinella atrotomentosa*

1b) The stipe absent or rudimentary, shortly lateral, not longer than 0.5 (-1) cm. The tomentum on the stipe mostly pale yellowish or greyish, occasionally lilac or amethyst violet (in the form *ionipes*), never dark brown. The pileus 2-7 (-10) cm, conchate, flabellate or auriculate, sordid ochreous, olive-yellow, golden ochreous or ochreous brown. A variety with brown-red squamules on the pileus was described as var. *rubrosquamulosus* (see Svrček and Kubička 1964). The superficial hyphae on the pileus and stipe are smooth or sparsely punctate with very minute, almost colourless granular particles. Carpophores grow gregariously or in overlapping tiers on decaying coniferous wood *Tapinella panuoides*

Acknowledgements

The author wishes to express his thanks to Dr. Z. Pouzar, CSc., the Head of the Mycological Department of the National Museum in Prague, for many useful comments on the manuscript.

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