

## AMANITA SIMULANS, A SPECIES LITTLE KNOWN IN BELGIUM

ANDRE FRAITURE<sup>1</sup> & HUGO DE BEUCKELEER<sup>2</sup>

<sup>1</sup> Botanic Garden Meise, Nieuwelaan 38, 1860 Meise, Belgium

<sup>2</sup> Nieuwe Molenstraat 212 bus 3, 9100 Sint-Niklaas

### Summary

*Amanita simulans* Contu has been collected in Stekene (Belgium). The specimens are briefly described and illustrated. A synthesis of the taxonomy and systematics of the species is presented. *A. simulans* remained unknown because it was confused with other (often ill-defined) taxa, such as *Amanita vaginata*, *Amanita lividopallescens* and "*Amanita malleata*". The most important characteristics of *A. simulans* are presented and its ecology analysed. The presence of the species in Europe and, more precisely, in Belgium is examined. After having been ignored or misidentified up to recently, *A. simulans* has been repeatedly observed in Belgium for a few years.

### Samenvatting

*Amanita simulans* Contu werd verzameld in Stekene (België). De exemplaren worden bondig beschreven en geïllustreerd. Een synthese van de taxonomie en de systematiek van de soort wordt besproken. *A. simulans* bleef onbekend omdat de soort werd verward met andere (vaak slecht gedefinieerde) taxa, zoals *Amanita vaginata*, *Amanita lividopallescens* en "*Amanita malleata*". De voornaamste kenmerken van *A. simulans* worden besproken en de ecologie geanalyseerd. Het voorkomen van de soort in Europa en meer bepaald in België wordt onderzocht. Tot voor kort werd *A. simulans* miskend of foutief gedetermineerd, maar sedert enkele jaren herhaaldelijk waargenomen in België.

Key words: *Amanita simulans*, taxonomy, Belgium, ecology.

### Introduction

The domain of Steengelaag (Stekene) is a former exploitation area of clay, for manufacturing of bricks and tiles. Exploitation activities stopped in 1977 and the place is now a protected site. The soils are clayey and the woody vegetation is marked by the prevalence of alder, willow and old plantations of *Populus*.

One of us (HDB) is keeper of the domain. Last August (2013), he collected an amanitopsis showing original characteristics. He sent it to AF, who identified it as *Amanita simulans* Contu. Although not being very rare, this recently described species (Contu 2001) remains unknown by most European mycologists and is often misidentified as *Amanita malleata*, *A. lividopallescens* or *A. vaginata*.

Below we present the main morphological characteristics of *A. simulans*. We discuss the nomenclatural problems raised by its synonymy, we stress the differences with related species and we detail its ecology. The distribution of the species in Europe and

especially in Belgium, based on literature data and information provided by various Belgian mycologists, is also investigated.

### Identification of the collection

The stipe, not bulbous at the base and devoid of a ring, the cap margin radially sulcate and the inamyloid spores, indicate that the collection belongs to an amanitopsis of the section *Vaginatae* ss. Bas.

The general veil, moderately friable, often leaving fragments on the cap (fig. 4) and containing many sphaerocysts (fig. 11), is typical of the subsection *Inauratae* ss. Bon.

The general veil, which neither becomes blackish nor greyish but rather ochraceous and which often produces a volva of the Ib or sometimes IIa or IIb types, leads to the "*Amanita lividopallescens* complex" (Fraiture 1993). Within this complex, the grey, sometimes "hammered" cap, the somewhat pinkish or greyish cream gills with blackish dashes on the edge (fig. 10), the (sub)globose spores (fig. 11) and the frequent growth under



Fig. 1-2. Growth place and habitus. 1. Site in Stekene (photo H. De Beuckeleer); 2. *Amanita simulans* in Angleur (photo J. Pellicani).

Salicaceae are typical of *A. simulans*.

We also observed in our specimen that the spores (fig. 11) are inamyloid, globose to subglobose, measuring 9.0-10.4-11.5 × 8.5-9.8-11.0 μm, Q = 1.00-1.06-1.12 (-1.16), mixed with a few bigger spores, 12.0-13.5 × 11.5-13.0 μm, probably produced by 2-spored basidia. Basidia 4-spored, clavate, 38-52 × 10.5-13.0 (-14.0) μm. General veil containing a high proportion of globose to ovoid or ellipsoid sphaerocysts (fig. 11), smooth, (20-) 30-45 (-50) μm diam., mixed with filamentous hyphae, (2-) 3-5 (-8) μm diam.

#### Collection habitat

The specimen (De Beuckeleer STG13H20-cn650) has been collected on a clayey soil, along a path bordered by a row of old *Populus x canadensis*, behind which is a marshy woodland with *Alnus glutinosa*, *Betula pendula*, *Salix* sp., etc. On the other side of the path, various tree species are growing, a.o. *Populus tremula* (fig. 1).

#### Nomenclature and systematics of the species

***Amanita simulans*** Contu, *Bol. Accad. Gioenia Sci. nat.* **32** (n° 356): 11 («1999», publ. 2001).

= *Amanita griseofuscescens* Neville & Poumarat (nom. nud.), *Fungi non delineati* **LI / LII**: 113 (2009).

= *Amanita roseoxeros* Courtec. ad int.

?= *Amanita subfuliginosa* Neville, Poumarat & Bottoni, *Fungi non delineati* **LI / LII**: 73-77 et 186-187 (2009).

Misidentified: *Amanita malleata* sensu Contu (1986b), Ballero & Contu (1988), Bon (1982), etc. [taxon with (sub)globose spores].

Excluded: *Amanita malleata* (Piane ex Bon, emend. Tulloss) Contu (1986) [see comments below], *Amanita lividopallescens* var. *malleata* Piane ex Romagn. (1982) and *Amanita lividopallescens* var. *tigrina* Romagn. ex Bon (1986) [all these taxa have ellipsoid spores].

White form: *Amanita simulans* f. *alba* Contu, *Bol. Accad. Gioenia Sci. nat.* **32** (n° 356): 12 («1999», publ. 2001).

Neville and Poumarat (2007: 82, 2009: 113) gave the species the provisional name of *Amanita griseofuscescens*, before realizing that it was *A. simulans*. This name, which has never been validly published (nom. nud.), has been cited by some authors, e.g. Lecomte & Pellicani (2010).

*Amanita roseoxeros* is another name which has been

sporadically applied to *A. simulans* in the literature (see a.o. Beauvillain 1998), without having been validly published. The epithet comes from the fact that the gills often turn pinkish when dried. However, this characteristic can also be observed in some other European amanitopsis.

*Amanita subfuliginosa* Neville, Poumarat & Bottoni (in Neville & Poumarat 2009), darker and growing under *Pinus pinea*, is most probably another synonym (Morini & Consiglio 2012: 254).

Other amanitopsis species show some similarities with *A. simulans*:

*Amanita vaginata* (Bull.: Fr.) Lamarck sensu stricto is the classical grey amanitopsis, with (sub)globose spores. However, the sporophores of this species are often more slender, with a more membranous general veil, producing a well developed vaginate volva (type III, Fraiture 1993: 16-17) and the species is not particularly bound with Salicaceae.

*Amanita beckeri* Huijsman is also very close to *A. simulans*. However, its cap is not grey but more brownish, coffee with milk or hazel. Its habit and the white veil remnants on the cap often remind *Amanita pantherina* (DC.) Krombh.

The name *Amanita malleata* is a real nomenclatural and systematical nightmare (Migliozi & Lavorato 1987, Tulloss 1994, Contu 2001). Today, many authors are considering it as a « nomen confusum », which should be abandoned. The taxon has been invalidly described (Piane 1972, no type designated) as an amanita with ellipsoid spores. It has been validated a first time by Romagnesi (1982), under the name *Amanita lividopallescens* var. *malleata* Piane ex Romagnesi, the spores of the type-specimen being ellipsoid. In the same publication, Romagnesi stipulates that his *A. lividopallescens* var. *tigrina*, invalidly published about twenty years earlier (Romagnesi 1961: pl. 169, no type indicated), is a synonym of this var. *malleata*. Less than a year later, Bon (1983) validates again Piane's taxon, under the name *Amanitopsis malleata* Piane ex Bon, by designating another type. Unfortunately, in this last publication, Bon describes a taxon with globose spores. However, Tulloss (1994) showed that the type-specimen designated by Bon is a mixed collection containing both a piece of



Fig. 3-4. *Amanita simulans*. 3. Rigenée (photo P. Derboven); 4. Stekene (photo H. De Beuckeleer).



Fig. 5-7. *Amanita simulans*. 5. Vedrin (photo Ph. Dufour); 6. Waterloo (photo C. Mertens); 7. Detail (photo C. Mertens).

sporophore with globose spores and another big piece, with ellipsoid spores. To remain in accordance with Piane's original description, Tulloss designated this last fragment as the lectotype of *Amanitopsis malleata*. Finally, Contu (1986) combined this last name in the genus *Amanita*. Given there is no nomenclatural competition between ranks, Romagnesi's publication (1982) can be neglected if one remains at the rank of species. If we want to be accurate and complete in the authors' citation, we should then write *Amanita malleata* (Piane ex Bon, emend. Tulloss) Contu. A lighter version should be *Amanita malleata* (Bon) Contu. When he revised the type-specimens of these different taxa, Tulloss (1994: 342) indicated that *A. malleata*, *Amanita lividopallescens* var. *malleata* Piane ex Romagn. and *Amanita lividopallescens* var. *tigrina* Romagn. ex Bon were probably synonyms. We must also add to this synonymy the different new names which have been published to replace the three aforementioned names: *Amanita pianeii* "ad interim" Migl. & Lavorato (1987), *Amanita fraudulenta* Contu (2001) and *Amanita subfraudulenta* Contu (2005). *Amanita malleata* and these numerous synonyms do not correspond with *A. simulans*, which has ellipsoid spores.

Only some misinterpretations of *A. malleata*, showing (sub)globose spores (Contu 1986b, Ballero & Contu 1988, Bon 1982, etc...), correspond with *A. simulans*.

*Amanita cistetorum* Contu & Pacioni, syn.: *Amanita vaginata* var. *cistetorum* (Contu & Pacioni) Vila & Llimona, is a Mediterranean species, with a grey cap, described from the garrigues of Sardinia (Contu & Pacioni 1998). However, it grows under *Cistus salviifolius* and *C. monspeliensis* – with which it could perhaps form mycorrhizae – and its globose to broadly ellipsoid spores are a bit more elongate than those of *A. simulans* (Q = 1.00-1.40). According to Contu (in e-litt. 2013), molecular analyses confirmed it is a separate species.

*Amanita pini* Neville & Poumarat (2007) is another taxon close to *A. simulans*, but the Q-ratio of its spores is quite variable (Q= 1.04-1.40), its cap is more beige and it should grow in connection with pines (*Pinus*).

*Amanita griseoargentata* (Contu) Contu also looks like *A. simulans*, a.o. because of its globose to subglobose spores. However, its cap is of a metallic silvery grey, with very fine radial fibrils (especially visible with a magnifying glass) and its volva tends to turn grey (Morini & Consiglio

2012), what would rather place it in the stirps *Submembranacea*. Moreover, it has been described as a variety of *A. submembranacea* by Contu (1986a). It grows under *Picea abies* and *Castanea sativa*.

Finally, *Amanita populiphila* Tulloss & E. Moses (1995) is an American *Amanita* growing under *Populus* and having subglobose spores. However, its stem is white and its cap whitish, then cream to leather-coloured. It is unlikely it could be conspecific with *A. simulans*.

#### Descriptions

? Bon (1982, sub *Amanitopsis malleata*), Contu (1986b, sub *A. malleata*), Ballero & Contu (1988, sub *A. malleata*), Beauvillain (1998, sub *A. lividopallescens*), Contu (2001, original description of the species), ? Ortega & Contu (2003, unusual aspect: stem white and bulbous, sporal Q = 1.10-1.16-1,23), Neville & Poumarat (2009), Lecomte & Pellicani (2010), Morini & Consiglio (2012).

#### Illustrations

Ballero & Contu (1988, sub *A. malleata*), ? Ortega & Contu (2003, unusual aspect), ? Saar (2003, sub *A. argentea*), Kibby & Burnham (2009), Neville & Poumarat (2009: 192-193), Lecomte & Pellicani (2010), Courtecuisse & Duhem (2011: pl. 825), Morini & Consiglio (2012).

#### Main characteristics of the species

##### MACROSCOPY

**Cap** (3-) 5-10 (-15) cm diam., striated at the margin, rarely whitish (f. *alba*), very often grey: ash grey, leaden grey or silver grey (fig. 2, 3, 4 and 6), sometimes mixed with bistre, brownish or ochraceous; surface often decorated with fairly thick remnants of veil, polygonal or with the shape of a truncated pyramid, whitish and more or less tinged with ochre or pinkish ochraceous, sometimes a bit greyish. The surface of the cap is rather often marked with depressions (« hammered ») (fig. 3). As previously suggested (Fraiture 1993: 54), this phenomenon could be due to the fact that the fragments of the thick veil would protect the underlying portions of cuticle from shrinking due to drought. **Lamellae** white, sometimes greyish beige or slightly pinkish, often turning pale salmon pink when dried (fig. 9); the edge often marked with dark dashes of the same colour as that of the stipe (partial veil): grey, yellowish brown or blackish (fig. 10). **Stipe** 5-12 (-20) × (0.5-) 1-2 cm, without ring, not bulbous, gradually widened from top to bottom, also widened just under the gills; whitish or covered with partial veil remnants forming grey or bistre annular zigzags (fig. 5) or a continuous

layer, the top of the foot often remaining paler ; when the partial veil is thick, it is often longitudinally striated by the print of the gills (fig. 7 and 8). **Volva** usually buried in the ground, membranous but often fragile, belonging to types Ib, IIa or IIb (Fraiture 1993: 16-17), whitish (fig. 4 and 6), often tinged in places with ochraceous, fulvous or even bright fulvous orange (fig. 2, 6 and 8) ; greyish or greyish beige on the inner face. **Context** white, without particular taste or smell.

#### MICROSCOPY

**Spores** hyaline, smooth, inamyloid, globose to sub-globose, (8-) 9-12 (-14) × 8-11 μm, Q = 1.00-1.18. **Basidia** 4-spored, clavate, (35-) 40-55 (-65) × (7-) 10-15 (-20) μm. **General veil** containing numerous globose or pear shaped sphaerocysts, (10-) 20-60 (-80) μm diam., as well as filamentous hyphae (2-) 4-8 (-10) μm diam. **Clamp connections** not observed.

#### Ecology and phenology

*Amanita simulans* is a rare species, which is often rather abundant in its growth places (Contu 1986b, sub *A. malleata*). In our regions, it fruits from August to October but, in southern Europe, sporophores can be found during a longer portion of the year: (May-) September-October (-November). It has been observed from 30 to 1700 m above sea level (Morini & Consiglio 2012).

The species mostly appears among grass at the edge of woods of broad-leaved trees, usually on more or less clayey and calcareous soils. It is probably bound to Salicaceae, especially to poplars (*Populus xcanadensis*, *P. nigra* var. *italica*, *P. tremula*, *P. alba*, *P. xcanescens*), sometimes also to willows (*Salix*). Some publications, however, mention it under various species of oaks (*Quercus suber*, *Q. pubescens*, *Q. cerris*), under beech (*Fagus sylvatica*), under chestnut trees (*Castanea sativa*), or even under conifers (*Pinus pinea*, *P. nigra* and *Picea abies*) (Morini & Consiglio 2012). The GB checklist of fungi reports observations under *Helianthemum nummularium* and under *Corylus avellana*.

#### Distribution in Europe

*Amanita simulans* is a rather southern species, which has repeatedly been observed in Italy (Contu 1986b, sub *A. malleata* ; Neville & Poumarat 2009 ; Morini & Consiglio 2012) since its description, from Sardinia (Contu 2001). It has also been found in Spain (fide Neville & Poumarat 2009), in the centre and the south of England (Kibby &

Burnham 2009 and GB checklist of fungi), in Luxemburg (fide Courtecuisse & Duhem 2011), in Switzerland (sub *A. malleata*, see also Neville & Poumarat 2009: 105), in Austria (Austrian Fungi Database) and in Germany (fide Neville & Poumarat 2009: 112, who provide other bibliographic references). On the other hand, it does not seem to have been found in the Netherlands.

The species is also present in France, where it has been observed, a.o. in the Val de Sensée (Pas de Calais, see Beauvillain 1998), in Guesnes (Poitou-Charente, Jean-Pierre Legros, pers. comm.) and in Piriac-sur-Mer (Bretagne, Daniel Ghyselinck, pers. comm.). Many other French localities are cited by Neville & Poumarat (2009: 105-112).

#### Distribution in Belgium

*Amanita simulans* is obviously very little known in Belgium. At the beginning of September 2013, there was no data under that name in the large mycological databases of the country: FUNBEL (KVMV, manager: Emile Vandeven), MYCOBEL (Cercle de Mycologie de Bruxelles, manager: Daniel Ghyselinck), Herbarium of the Botanic Garden Meise (BR, curator: Ann Bogaerts). The name *A. simulans* neither appears in the checklist of Flanders (Walley & Verbeke 2000) – which is normal, since the publication of the species was still in press – nor in the checklist of the fungi of Flemish Brabant and the Brussels-Capital Region (Steeman *et al.* 2011).

Lecomte & Pellicani (2010) published the first official observation in Belgium, at the water treatment plant of Angleur, on 15.ix.2009, (Fig. 2) and placed a fragment of sporocarp in the humid herbarium of the AMFB. This publication remains practically the sole Belgian mention of the species, which, nevertheless, is not extremely rare in our country. Several Belgian mycologists know it already, but not under the name *Amanita simulans*. To find traces of this species, we have to search among the unidentified amanitopsis or in the collections sorted under *A. lividopallescens* and *A. vaginata*.

The “big grey *Amanita vaginata* growing under poplars”, about which Paul Heinemann and other members of the Cercle de Mycologie de Bruxelles spoke, around thirty years ago already, fits very probably in *A. simulans*. On the other hand, in an e-mail sent to the Forum Mycologia Europaea (06.viii.2004), Ruben Walley spoke about an amanitopsis « non rare ici sous *Populus x canadensis*, et que nous appelons (sans doute à tort) *Amanita vaginata* ».

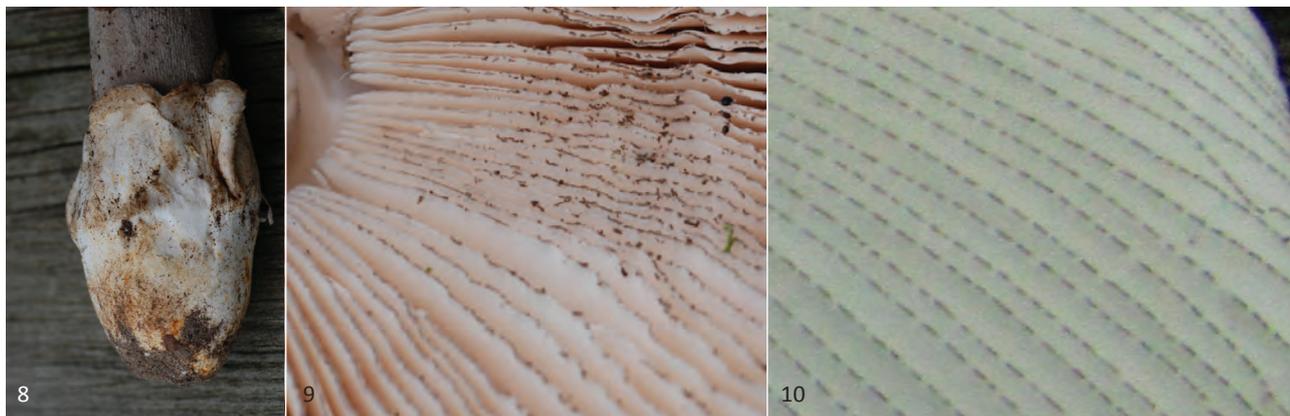


Fig. 8-10. *Amanita simulans*. 8. Volva (photo C. Mertens); 9. Gills (photo C. Mertens); 10. Gills (photo H. De Beuckeleer).

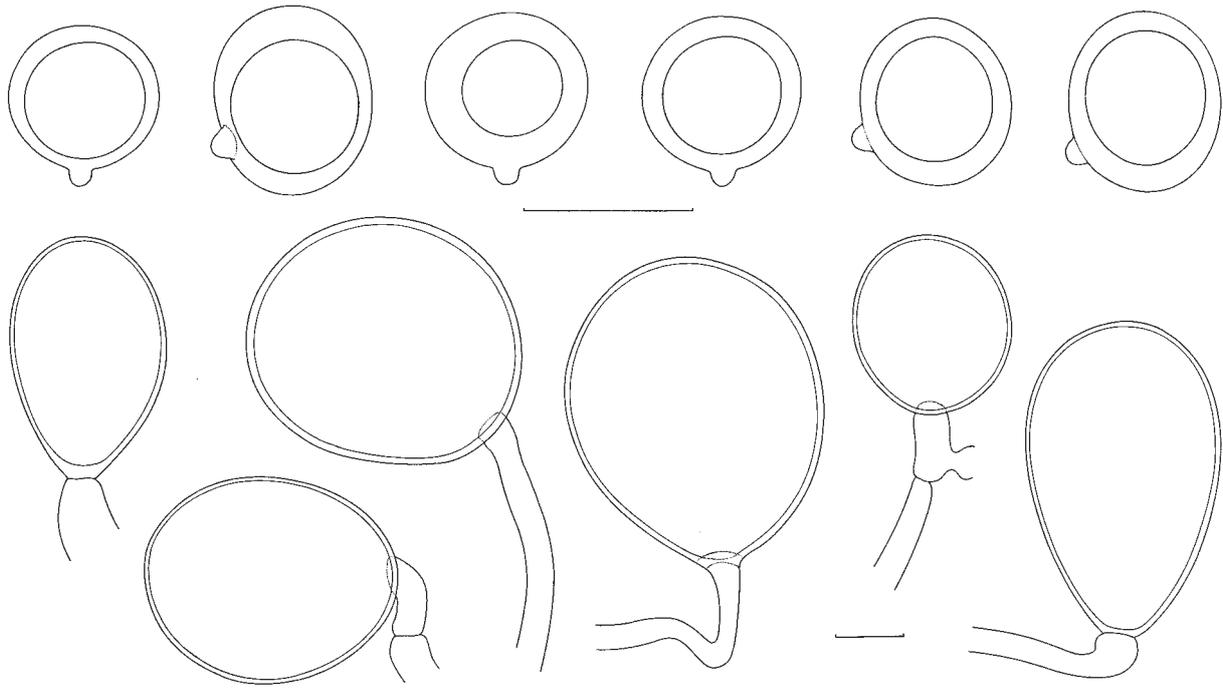


Fig. 11. *Amanita simulans*. Spores (above) and elements of the veil (below); scale bar: 10  $\mu$ m (specimen De Beuckeleer).

The picture he sent with his mail fits well with *A. simulans*.

A quick screening of the mycological herbarium of the Botanic Garden Meise (BR) allowed AF to find two specimens of *A. simulans*, preserved under the name *A. lividopallescens*. Both of them have been collected in Leuven (IFBL E5.13.44), under *Populus*, respectively on 01.xi.2008 (Raf Leysen 2008/073) and 28.vii.2011 (Raf Leysen 2011/586).

Other collections may be cited for Flanders. The specimen described here above has been collected in Stekene, domain "het Steengelaag" (IFBL: C3.28.34), on 20.viii.2013 (Specimen Hugo De Beuckeleer STG13H20\_cn650, private herbarium).

Five sporophores have also been observed by Raf Sienaert, in Bambrugge, on 26.viii.2013, « gemeentelijk[sic] domein, droog, relatief voedselrijk bos » (see Waarnemingen.be).

After examination of the pictures shown, we believe that some of the observations mentioned by the same **Waarnemingen.be** web-site, this time under the name *Amanita lividopallescens*, could also represent *A. simulans*. However, this should be confirmed by checking some microscopic characteristics, such as spore shape.

See particularly the following observations:

- Ruien, Kluisbos central, 2009 (Peter Van de Kerckhove).
- Puurs, Heide, 27.viii.2010 (Luc De Wit) and 2011 (Joost Reyniers).
- Walsbergen, Orsmaal-Melkwezer, Linter, 04.x.2013 (Kurt Boux).

On the other hand, a question sent to the Belgian French speaking mycologists gave the following results.

Pascal Derboven finds the species every year since 2007, on the grounds of Golf of Rigenée (golf course) (IFBL F4.58), where it is present in two places, one under *Salix* and the other one under *Populus alba*. Photos give

evidence of the correct identification of the species.

Camille Mertens found it on the golf course of Waterloo, on 9.viii.2010, under *Populus alba* (confirmed by pictures).

Daniel Deschuyteneer thinks he also found the species in Kampenhout, September 2010. The identification has been confirmed by Serge Poumarat. However, the pictures show rather atypical sporophores, very slender and more beige than usual.

Pascal Derboven also observed the species in Baisy-Thy, under *Populus nigra*. The site is lost because the trees were cut down in 2013.

Jean-Pierre Legros saw the whitish form at the citadel of Namur, under *Populus cf. canescens*, on 10.x.2013 (confirmed by pictures), together with *Russula pelargonica*, *R. melitodes*, *Lactarius controversus* and *L. evosmus*.

Finally, Philippe Dufour collected the species on 7.x.2013 in Vedrin (Namur). The specimens were growing in a pure stand of spruce (*Picea abies*) where the closest other trees were situated at a distance of 20 m or more (young *Fraxinus* and a few *Betula*, *Alnus* and *Corylus*). This is very unusual for the species but the short description and the pictures transmitted by the collector fit very well with *Amanita simulans*.

### Conclusions

From the data and observations cited above, it can be concluded that *Amanita simulans* is a good species and that it is not very rare in Belgium. However, it has been confused, up to now, with *A. vaginata* or erroneously called *A. malleata* or *A. lividopallescens*.

### Acknowledgements

We sincerely thank E. Vandeven and D. Ghyselincq for having checked the presence of *A. simulans* in the

databases they are managing (resp. FUNBEL, KVMV, and MYCOBEL, CMB). We also express our gratitude to mycologists who provided information and photos of personal harvests of this species: P. Derboven, D. Deschuyteneer, Ph. Dufour, D. Ghyselinck, J.-P. Legros, C. Mertens et J. Pellicani. We also thank J.-L. Cheype and P. Duboc, who sent us, via the Forum Mycologia Europaea, information about French collections of the species, as well as Pierre Compère, who accepted to check our conclusions concerning the nomenclature of *Amanita malleata* and its synonyms, O. Van de Kerckhove who drew the fig. 11, and C. Gerstmans who prepared the illustrations for publication.

## Bibliography

- BALLERO M. & CONTU M. (1988) – *Amanita malleata* (Piane ex Bon) Contu. *Mycologist* **2** (2): 66.
- BEAUVILLAIN X. (1998) – Description d'une espèce intéressante du genre *Amanita* (sous-genre *Amanitopsis*). *Bull. semest. Soc. mycol. Nord* **63**: 31-34.
- BON M. («1982», publ. 1983) – Typification de *Amanitopsis malleata* (Piane) comb. nov. *Doc. mycol.* **12** (n°48): 33-36.
- CONTU M. (1986a) – Novitates (2). *Doc. mycol.* **17** (n°65): 62.
- CONTU M. (1986b) – Appunti sul genere *Amanita*, 1 – Note su due amanite del complesso « *Inauratae* » raccolte in Italia. *Boll. Assoc. micol. ecol. Romana* **6/7**: 43-50.
- CONTU M. & PACIONI G. (1998) – *Amanita cistetorum* and *Psathyrella liciosae*, two new Mediterranean species. *Mycotaxon* **69**: 437-446.
- CONTU M. («1999», publ. 2001) – Appunti sul Genere *Amanita*, VII – Nuovi taxa nella sezione *Vaginatae*, del subgen. *Amanita*. *Bol. Accad. Gioenia Sci. nat.* **32** (n° 356): 5-30.
- CONTU M. («2004», publ. 2005) – Appunti sul genere *Amanita*, X – Neotipificazione di *A. separata* e illegittimità della combinazione *Amanita fraudulenta*. *Bol. Gruppo micol. G. Bresadola (Trento)*, NS **47** (1): 27-29.
- COURTECUISSÉ R. & DUHEM B. (2011) – Guide des champignons de France et d'Europe. Delachaux & Niestlé, Paris, 544 p.
- FRAITURE A. (1993) – Les amanitopsis d'Europe. *Opera bot. belg.* **5**: 1-128.
- KIBBY G. & BURNHAM A. (2009) – Some new British records in 2008. *Field Mycol.* **10** (1): 19-23.
- LECOMTE M. & PELLICANI J. (2010) – Une rareté : *Amanita simulans*. *Bull. Assoc. Mycol. francoph. Belgique* **3**: 65-67.
- MIGLIOZZI V. & LAVORATO C. (1987) – Note tassonomiche su *Amanita malleata*. *Micol. Veg. mediterr.* **2** (1): 37-43.
- MORINI S. & CONSIGLIO G. (2012) – Alcune *Amanita* della Serie *Ceciliae*. *Riv. Micol.* **53** (3): 227-257.
- NEVILLE P. & POUMARAT S. (2007) – *Amanita pini* Neville & Poumarat sp. nov. de la sous-section *Vaginatinae* Contu emend. Neville & Poumarat et variabilité morphologique. *Bull. Féd. Assoc. mycol. Médit.*, NS **32**: 65-88.
- NEVILLE P. & POUMARAT S. (2009) – Quelques espèces nouvelles ou mal délimitées d'*Amanita* de la sous-section *Vaginatinae*. 1<sup>er</sup> complément à Amaniteae, Fungi Europaei 9. *Fungi non delineati LI/LII*: 200 p.
- ORTEGA A. & CONTU M. («2003», publ. 2004) – Sobre algunas especies interesantes del género *Amanita* sección *Vaginatae* en Andalucía (España). *Revista Cat. Micol.* **25**: 71-77.
- PIANE V. (1972) – *Amanita (Amanitopsis) malleata*. *Bull. Soc. Naturalistes Oyonnax* **19/21**: 51-58 + 1 pl.
- ROMAGNESI H. (1961) – Nouvel Atlas des Champignons, 3. Bordas. 65 p. + 82 pl. + comment.
- ROMAGNESI H. (1982) – Quelques espèces rares ou nouvelles de macromycètes, 9 – Amanitacées. *Bull. trimest. Soc. mycol. France* **98** (2): 165-173.
- SAAR G. (2003) – Pilzfunde unter Pappeln. *Tintling* **8** (3): 6-19.
- STEEMAN R., ASPERGES M., BUELENS G., DE CEUSTER R., DECLERCQ B., KISZKA A., LEYSEN R., MEUWIS T., MONNENS J., ROBIJNS J., VAN DEN WIJNGAERT M., VAN ROY J., VERAGHTERT W. & VERSTRAETEN P. (2011) – Paddenstoelen in Vlaams-Brabant en het Brussels Hoofdstedelijk Gewest: 1980-2009, Verspreiding en ecologie. Natuurpunt Studie, Mechelen, 728 pp.
- TULLOSS R.E. (1994) – Types studies in *Amanita* sect. *Vaginatae*, 1 – Some taxa described in this century (studies 1-23) with notes on description of spores and refractive hyphae in *Amanita*. *Mycotaxon* **52** (1): 305-396.
- TULLOSS R.E. & MOSES E. (1995) – *A. populiphila* – a new species from the Central United States. *Mycotaxon* **53**: 455-466.
- WALLEYN R. & VERBEKEN A. (2000) – Een gedocumenteerde Rode Lijst van enkele groepen paddestoelen (macrofungi) van Vlaanderen. *Meded. Inst. Natuurbeh.* (Brussel) **7**: 1-84.

## Internet web-sites

- Austrian Fungi Database:  
[http://austrianfungi.mykodata.net/Enter\\_database.html](http://austrianfungi.mykodata.net/Enter_database.html)
- GB checklist of fungi:  
<http://www.fieldmycology.net/FRDBI/FRDBIrecord.asp?intGBNum=15892>
- Waarnemingen.be:  
<http://waarnemingen.be/soort/view/596958>