

Taxonomic reexamination of *Auricularia* specimens based on updated morphological criteria

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Abstract

Auricularia specimens deposited in the National Museum of Nature and Science, Japan, were observed to reexamine their species identification based on updated taxonomic criteria, and to verify the taxonomy and distribution of *Auricularia* spp. in Japan. Four of the ten specimens previously identified as *A. auricula-judae* were reidentified as *A. americana* (1), *A. cornea* (1), and *A. villosula* (2) based on morphological criteria such as medullae, abhymenial hairs, and basidiospores. The remaining six specimens could not be identified at the species level due to the lack of distinguishing morphological characteristics. Two of the five specimens previously considered *A. minor* were identified as different species due to basidiospore size discrepancy, but the remaining two specimens and the type specimen were in poor condition, and their basidiospores could not be properly observed. Three of the nine specimens previously identified as *A. polytricha* were reidentified as *A. cornea* based on morphological criteria. The remaining six specimens were not identified as *A. polytricha*. The type specimens of *A. polytricha* f. *leucochroma* and *A. polytricha* f. *tenuis* were in poor condition, and their basidiospores could not be properly observed. Reexaminations of existing specimens based on recent taxonomic criteria will contribute to updating the taxonomy and distribution of *Auricularia* spp. in Japan.

Key Words: Auriculariales, herbarium, identification, morphology, taxonomy

Introduction

Species of the genus *Auricularia* (Auriculariales, Agaricomycetes, Basidiomycota) occur as wood-decomposing fungi in forest ecosystems, and the fruiting-bodies of several species are widely used as edible mushrooms in Asia. The classification of *Auricularia* species was formerly based on macroscopic characteristics, such as the color and external shape of basidiocarps¹⁾. Lowy proposed a classification of *Auricularia* spp. based on the internal stratification of hyphae in basidiocarps²⁾, and Kobayasi examined Asian *Auricularia* species based on the same criterion³⁾. Weiß and Oberwinkler also reexamined the genera in Auriculariales based on molecular phylogenetic analyses⁴⁾. In recent years, the species taxonomy of *Auricularia* has been revised based on molecular phylogenetic relationships and morphological characteristics⁵⁻⁹⁾.

As the results of revised taxonomic standards based on phylogenetic relationships, several new *Auricularia* species have been described in Asia, and some specimens have been reidentified as different species. Wu et al. conducted taxonomic reexaminations of the *Auricularia auricula-judae* complex collected from China,

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and *A. heimuera* F. Wu, B.K. Cui & Y.C. Dai, *A. minutissima* Y.C. Dai, F. Wu & Malysheva, and *A. tibetica* Y.C. Dai & F. Wu have been described as new species^{6, 7)}. Based on specimens collected from Thailand, Bandara et al. described *A. thailandica* Bandara & K.D. Hyde and *A. asiatica* Bandara & K.D. Hyde as new species, and reported *A. villosula* Malysheva and *A. cornea* Ehrenb. for the first time from Thailand^{8, 9)}.

In Japan, taxonomic studies based on morphological characteristics of *Auricularia* species have been carried out by Yasuda¹⁰⁻¹²⁾ and Kobayasi^{3, 13, 14)}. Yasuda described *A. papyracea* Yasuda as a new species based on a specimen collected in Japan¹¹⁾. Kobayasi described *A. minor* Kobayasi as a new species based on a specimen collected from Taiwan, and stated that this species is also distributed in Japan³⁾. Shirouzu et al. reexamined the taxonomy of Japanese *Auricularia* species based on molecular phylogeny and morphological observations¹⁵⁾. As a result, 26 specimens and cultures, including specimens previously identified as *A. auricula-judae* (Bull.) Wettst. based on morphological criteria, have been reidentified as *A. heimuera*, *A. minutissima*, *A. villosula*, and *A. thailandica*. These results support the hypothesis that *A. auricula-judae* sensu stricto is distributed only in Europe^{6, 16)}. Additionally, another 26 specimens and cultures, including specimens previously identified as *A. polytricha* (Mont.) Sacc., have been reidentified as *A. cornea*¹⁵⁾.

As described above, the recent taxonomic reexaminations of *Auricularia* species based on phylogenetic relationships have led to the revision of morphological criteria for species identification. Therefore, taxonomic reexaminations, together with the molecular phylogenetic studies, based on the updated criteria are necessary for the herbarium specimens previously identified as *Auricularia* spp. In this study, we aimed to reexamine the identification of the *Auricularia* specimens deposited in the National Museum of Nature and Science, Japan, by microscopic observation and morphological comparison. We attempted to extract DNA from the pieces of specimens. PCR and sequencing of the ITS (internal transcribed spacer) region of nrDNA (ITS1-5.8S rDNA-ITS2) were attempted using the same method in the previous study by Shirouzu et al.¹⁵⁾, but the target sequences could not be obtained in all specimens probably because of age and poor storage conditions. Therefore, in the present study, we solely focused on a careful examination of morphological characters, following the most current species standards.

Materials and Methods

Twenty-six specimens of *Auricularia* were selected from the collections of the National Museum of Nature and Science, Japan (TNS, Tsukuba, Ibaraki) with recorded specimen information such as collection site and date (Table 1). The dried basidiocarps were rehydrated in Milli-Q water, and morphological observations and measurements were made macroscopically and with a stereomicroscope (Stemi 305, Carl Zeiss, Göttingen, Germany). Abhymenial hairs, medullae, basidia, and basidiospores were observed using a biological microscope (Axiophot, Carl Zeiss, Göttingen, Germany). Abhymenial hairs and medullae were observed with 10× or 20× objective lenses, while basidiospores and basidia were observed with a 40× objective lens. For the observation of basidiospores and basidia, 10–15µm thick sections of basidiocarps were prepared using a freezing microtome (Litratome, REM-710, Yamato Kohki, Asaka, Saitama, Japan). When basidiospores were not observed in the sections, they were collected from the surfaces of the hymenia, and microscopic preparations were made. For the observation of medullae, thicker sections (>100µm) were prepared by manual sectioning. A 5% KOH aqueous solution was used as the mounting medium. The obtained morphological characteristics were compared with the descriptions of previous studies for species identification^{5-9, 15, 16)}.

Table 1. *Auricularia* specimens observed in this study.

Identification in previous study	TNS-F No.	Host	Locality	Date	Collector	Reference	Identification in this study
<i>Auricularia auricula-judae</i>	427	-	Japan, Chiba	22 Apr. 1964	Y. Kobayasi	-	<i>A. villosula</i>
<i>A. auricula-judae</i>	6621	-	Japan, Tokyo	Nov. 1940	Y. Kobayasi	-	not <i>A. auricula-judae</i> s. str.
<i>A. auricula-judae</i>	6635	-	Japan, Oita	7 Dec. 1919	N. Nakayama	-	not <i>A. auricula-judae</i> s. str.
<i>A. auricula-judae</i>	6640	-	Japan, Bonin Islands	1 Jul. 1912	S. Hori	10)	not <i>A. auricula-judae</i> s. str.
<i>A. auricula-judae</i>	195314	<i>Picea jezoensis</i>	Russia, Sakharin	30 Jul. 1940	Y. Kobayasi	13)	<i>A. amreicana</i>
<i>A. auricula-judae</i>	196668	-	Taiwan, Kanko	25 Mar. 1940	Y. Kobayasi	13)	not <i>A. auricula-judae</i> s. str.
<i>A. auricula-judae</i>	196708	<i>Robinia pseudoacacia</i>	Japan, Wakayama	20 Jul. 1918	Ui	-	<i>A. cornea</i>
<i>A. auricula-judae</i>	196710	-	Japan, Nagano	23 Sep. 1923	Kohinata	-	<i>A. auricula-judae</i> complex
<i>A. auricula-judae</i>	196790	-	Japan, Hyogo	20 Nov. 1916	Matsushima	-	<i>A. auricula-judae</i> complex
<i>A. auricula-judae</i>	196792	-	Japan, Fukushima	5 Sep. 1921	Narita	-	<i>A. villosula</i>
<i>A. minor</i>	428	-	Taiwan	Dec. 1979	Y. Kobayasi	-	Poor specimen condition
<i>A. minor</i>	433	-	Papua New Guinea, Rabaul	29 Dec. 1969	Y. Kobayasi	-	not <i>A. minor</i>
<i>A. minor</i>	434 ^a	Broad-leaved tree	Taiwan	Aug. 1977	Y. Kobayasi	3)	Poor specimen condition
<i>A. minor</i>	51392	-	-	4 Oct. 1981	Y. Kobayasi	-	Poor specimen condition
<i>A. minor</i>	196884	-	Taiwan	-	Y. Kobayasi	-	not <i>A. minor</i>
<i>A. polytricha</i>	6555	-	Japan, Miyazaki	Aug. 1950	Y. Kobayasi	-	<i>A. cornea</i>
<i>A. polytricha</i>	6569	-	Japan, Kagoshima	Nov. 1953	Y. Kobayasi	-	not <i>A. polytricha</i> or <i>A. nigricans</i>
<i>A. polytricha</i>	6574	-	Taiwan, Kanko	25 Mar. 1940	Y. Kobayasi	13)	not <i>A. polytricha</i> or <i>A. nigricans</i>
<i>A. polytricha</i>	6609	-	Taiwan, Kanko	25 Mar. 1940	Y. Kobayasi	13)	not <i>A. polytricha</i> or <i>A. nigricans</i>
<i>A. polytricha</i>	6610	-	Japan, Miyazaki	Aug. 1950	Y. Kobayasi	-	not <i>A. polytricha</i> or <i>A. nigricans</i>
<i>A. polytricha</i>	6642	-	Japan, Bonin Islands	23 Nov. 1936	Y. Kobayasi	13)	<i>A. cornea</i>
<i>A. polytricha</i>	6650	-	Japan, Tokyo	-	Y. Kobayasi	-	not <i>A. polytricha</i> or <i>A. nigricans</i>
<i>A. polytricha</i>	195396	-	Japan, Bonin Islands	28 Mar. 1936	Y. Kobayasi	13)	not <i>A. polytricha</i> or <i>A. nigricans</i>
<i>A. polytricha</i>	196722	-	Japan, Hachijojima Island	24 Mar. 1936	Y. Kobayasi	13)	<i>A. cornea</i>
<i>A. polytricha</i> f. <i>leucochroma</i>	193009 ^a	<i>Hibiscus glaber</i>	Japan, Bonin Islands	Nov. 1936	M. Okabe	3, 13)	Poor specimen condition
<i>A. polytricha</i> f. <i>tenuis</i>	6563 ^a	-	Micronesia, Saipan	21 Aug. 1936	Y. Kobayasi	13)	Poor specimen condition

a) Type specimen.

- No information available

Results and Discussion

Identified specimens

Species identification of 26 specimens were reexamined in this study (Table 1). Of these, seven specimens were reidentified as belonging to three different species - one specimen as *A. americana*, two as *A. villosula*, and four as *A. cornea*. The morphological descriptions of these three species are as follows.

Auricularia americana Parmasto & I. Parmasto ex Audet, Boulet & Sirard, in Boulet, Les Champignons des Arbres de l'Est de l'Amérique du Nord: 287, 2003. (Figs. 1, 2)

Basidiocarps cupulate, with undulate margin, hard-gelatinous to cartilaginous, 2.3–2.6 cm broad; upper surface velvety, brown; hymenial surface smooth, dark brown. Medullae pale brown, 95.5–153 μm broad. Internal hyphae branched, septate, thin-walled, hyaline, with clamp connections, 1–2.5 μm diam. Abhymenial hairs gregarious, cylindrical, flexuous, thick-walled with a narrow rumen, apically acute to obtuse, hyaline with pale brown pigmentation at the base, 74.5–144 \times 4–6 μm . Basidia clavate to cylindrical, transversely 3-septate, hyaline, 52.5–67 \times 5–7 μm . Basidiospores allantoid to reniform, thin-walled, hyaline, 14–17 \times 5–6.5 μm (15.7 \times 5.8 μm on average, $n = 10$), l/w 2.6–3.3 (2.8 on average, $n = 10$).

Specimen used for description: RUSSIA, Sakhalin, on *Picea jezoensis*, 30 Jul. 1940, Y. Kobayasi, TNS - F-195314 (as *A. auricula-judae*).

Auricularia americana is a species reported in North America and Asia⁷⁾. The molecular phylogenetic analysis by Looney et al. suggested that this species can be divided into two lineages, one on broad-leaved trees and the other on coniferous trees⁵⁾. Wu et al. described the lineage without medulla and on broad-

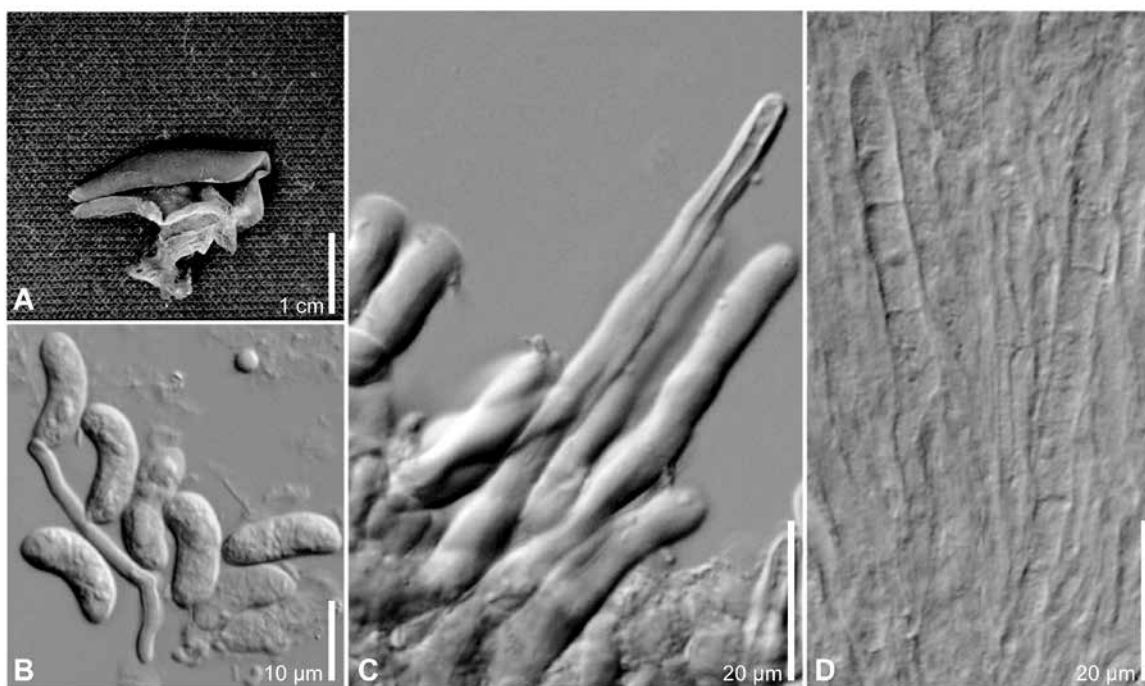


Fig. 1 *Auricularia americana* TNS-F-195314. A. basidiocarp, B. basidiospores, C. abhymenial hairs, D basidia.

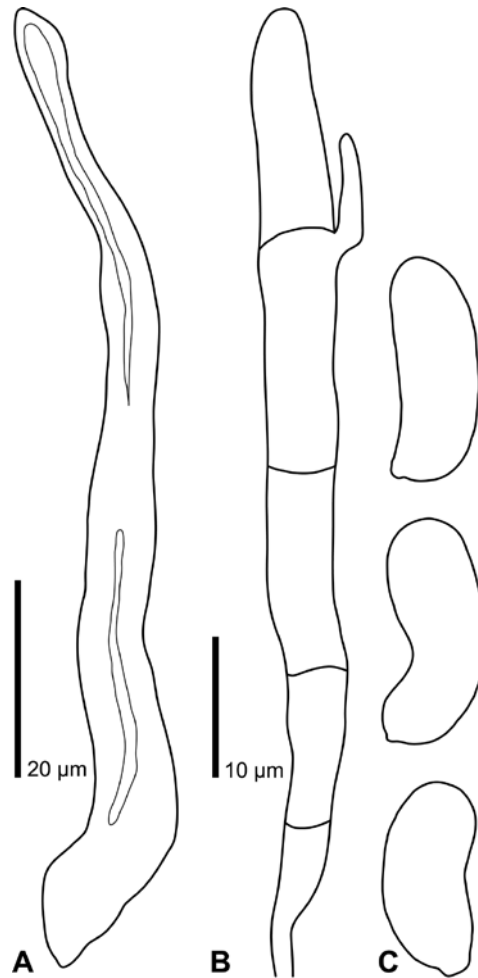


Fig. 2 *Auricularia americana* TNS-F-195314. A. abhymenial hair, B. basidium, C. basidiospores

leaved trees as *A. angiospermarum* and considered the lineage on coniferous trees as *A. americana* s. str.⁷⁾. TNS-F-195314 was identified as *A. americana* s. str. because its habitat and morphological characteristics were consistent with the description by Wu et al.: abhymenial hairs less than 150 µm long, distinct medullae, basidia less than 75 µm long, basidiospores reaching more than 15 µm in length, and inhabiting a coniferous tree⁷⁾. The species with morphological characteristics similar to *A. americana* s. str. are *A. angiospermarum*, *A. auricula-judae* s. str., *A. heimuer*, and *A. tibetica*. Of these species, *A. angiospermarum*, *A. auricula-judae* s. str., and *A. heimuer* differ from *A. americana* in that they inhabit broad-leaved trees⁷⁾. *Auricularia tibetica* (70–103 µm) is distinguished from *A. americana* (<75 µm) by the longer basidium length⁷⁾.

Auricularia cornea Ehrenb., in Nees von Esenbeck, Horae Phys. Berol.: 91, 1820. (Figs. 3, 4)

Basidiocarps cupulate, with undulate margin, hard-gelatinous to cartilaginous, 2.6–3.1 cm broad; upper surface velvety, dark brown; hymenial surface smooth, dark brown. Medullae pale brown to brown, 114–189 µm broad. Internal hyphae branched, septate, thin-walled, hyaline, with clamp connections, 1.5–5 µm diam. Abhymenial hairs gregarious, cylindrical, flexuous, thick-walled with a narrow lumen, apically acute to obtuse, hyaline with pale brown pigmentation at the base, 155–376 × 5.5–8.5 µm. Basidia clavate to cylindrical, transversely 3-septate, hyaline, 42.5–53 × 3.5–6.5 µm. Basidiospores allantoid to reniform,

thin-walled, hyaline, $13.5\text{--}17.5 \times 5.5\text{--}6 \mu\text{m}$ ($15.5 \times 6 \mu\text{m}$ on average, $n = 9$), l/w 2.5–3 (2.5 on average, $n = 9$).

Specimen used for description: JAPAN, Miyazaki Pref., Aug. 1950, Y. Kobayasi, TNS-F-6555 (as *A. polytricha*).

Other specimens examined: Wakayama Pref., on *Robinia pseudoacacia*, 20 July 1918, Ui, TNS-F-196708 (as *A. auricula-judae*); Tokyo, Hachijojima Isl., 24 March 1936, Y. Kobayasi, TNS-F-196722 (as *A. polytricha*); Tokyo, Bonin Isls., 23 Nov. 1936, Y. Kobayasi, TNS-F-6642 (as *A. polytricha*).

Auricularia cornea are widely distributed in Asia⁵⁾. The above four specimens were identified as *A. cornea* because their morphological characteristics were consistent with the descriptions by Looney et al. and Shirouzu et al.: abhymenial hairs reaching more than 300 μm but not 600 μm in length, distinct medullae, and basidiospores reaching more than 17 μm in length^{5, 15)}. Morphologically similar species to *A. cornea* are *A. polytricha* and *A. nigricans* (= ? *A. polytricha*)⁵⁾. These two species differ from *A. cornea* in the length of their abhymenial hairs, which reach more than 600 μm in *A. polytricha* and more than 650 μm in *A. nigricans*^{3, 5)}.

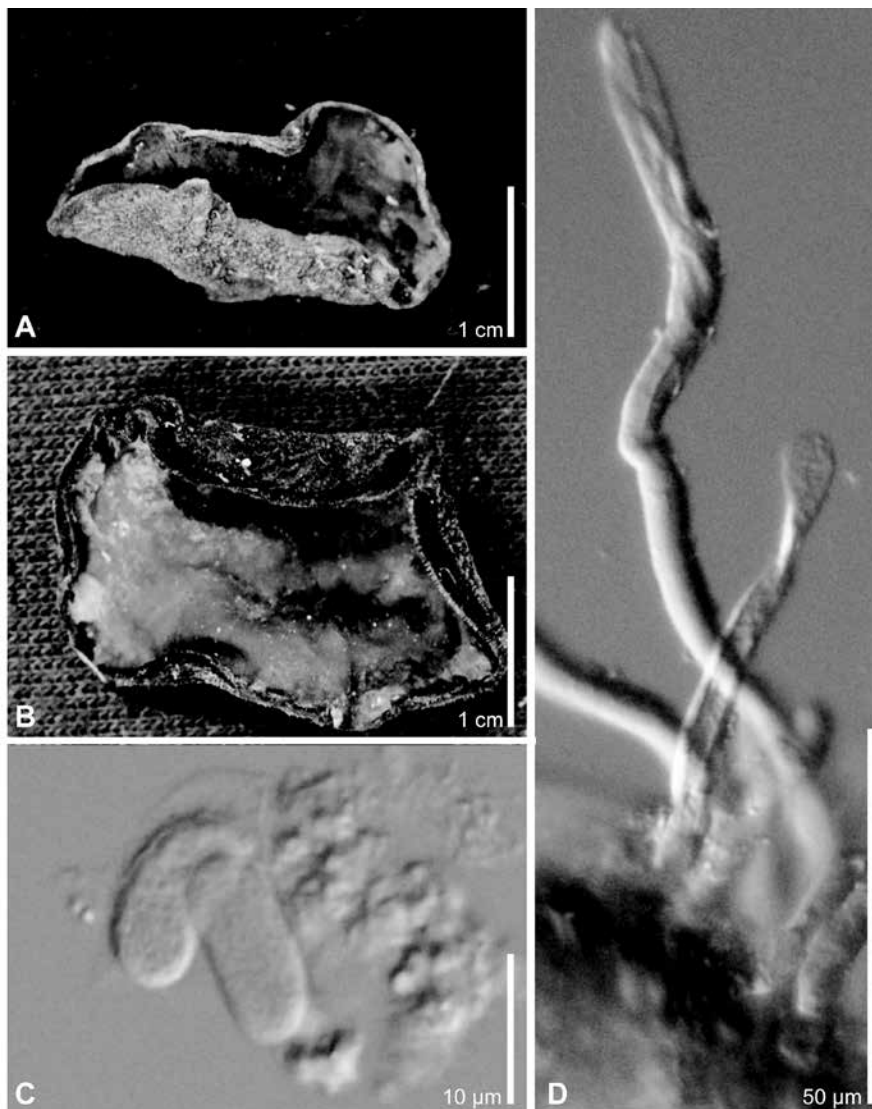


Fig. 3 *Auricularia cornea* TNS-F-6555. A, B. basidiocarps, C. basidiospores, D. abhymenial hairs.

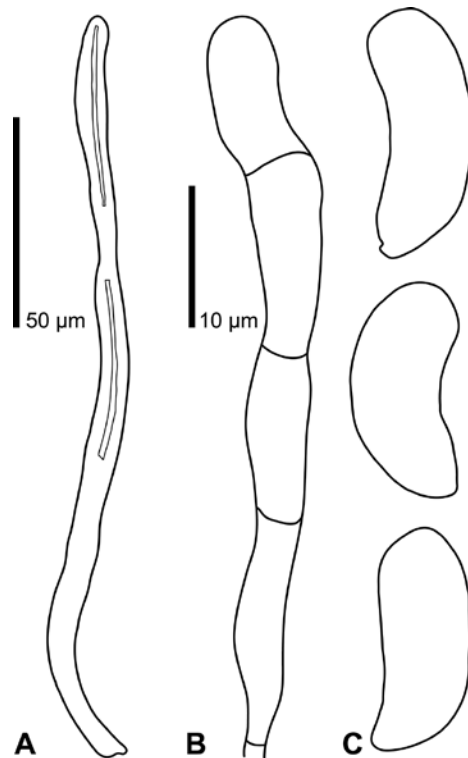


Fig. 4 *Auricularia cornea* TNS-F-6555. A. abhymenial hair, B. basidium, C. basidiospores.

Shirouzu et al. reidentified the Japanese samples previously identified as *A. polytricha* to *A. cornea*¹⁵). In the present study, three specimens identified as *A. polytricha* were also reidentified as *A. cornea*. One specimen, which has been considered to be *A. auricula-judae*, was reidentified as *A. cornea*.

Auricularia villosula Malysheva, in Malysheva & Bulakh, Nov. Sist. Niz. Rast. 48: 174, 2014. (Figs. 5, 6)

Basidiocarps cupulate, with undulate margin, hard-gelatinous to cartilaginous, 1.9–2.7 cm broad; upper surface smooth, light brown; hymenial surface smooth, bright yellow. Medullae absent or indistinct. Internal hyphae branched, septate, thin-walled, hyaline, with clamp connections, 2.5–4.5 µm diam. Abhymenial hairs gregarious, cylindrical, flexuous, thick-walled with a narrow lumen, apically obtuse, hyaline with pale brown pigmentation at the base, 43.5–86.5 × 5–9.5 µm. Basidia clavate to cylindrical, transversely 3-septate, hyaline, 44.5–71.5 × 3.5–6.5 µm. Basidiospores allantoid to reniform, thin-walled, hyaline, 10–15.5 × 5.5–7 µm (12.8 × 6.1 µm on average, n = 8), length/width 1.51–2.54 (2.1 on average, n=8).

Specimen used for description: JAPAN, Chiba Pref., 22 Apr. 1964, Y. Kobayasi, TNS-F-427 (as *A. auricula-judae*).

Other specimens examined: Fukushima Pref., 5 Sept. 1921, Narita, TNS-F-196792 (as *A. auricula-judae*).

Auricularia villosula is a species described based on a specimen collected from the Russian Far East¹⁶). This species has also been reported in China, Thailand, and Japan^{6, 9, 15}). TNS-F-427 and 196792 were identified as *A. villosula* because their morphological characteristics were consistent with the descriptions

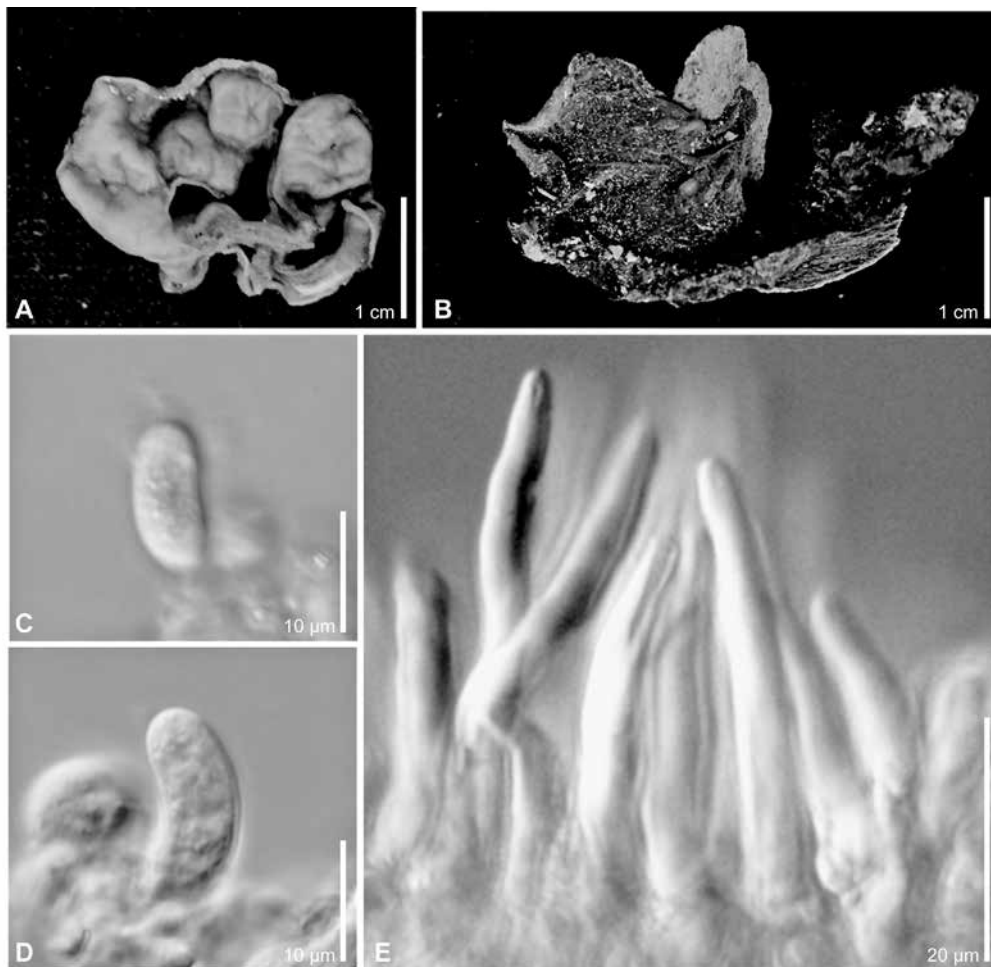


Fig. 5 *Auricularia villosula* TNS-F-427. A, B. basidiocarps, C, D. basidiospores, E abhymenial hairs.

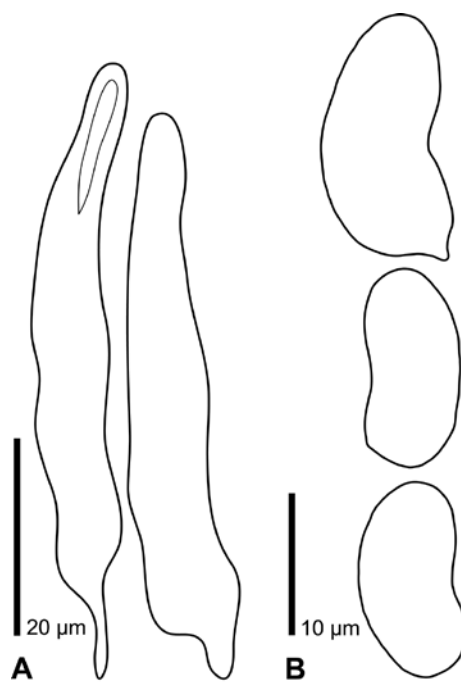


Fig. 6 *Auricularia villosula* TNS-F-427. A. abhymenial hairs, B. basidiospores.

by Malysheva and Bulakh, Wu et al., and Shirouzu et al.: abhymenial hairs less than 100 μm long, absent or indistinct medullae, and basidiospores reaching more than 15 μm in length^{6, 15, 16}). *Auricularia thailandica* is morphologically similar to *A. villosula*, which has short abhymenial hairs of less than 80 μm . *Auricularia thailandica* is distinguished from *A. villosula* in its distinct medullae, basidia less than 50 μm long, basidiospores less than 14 μm long, and has been reported only in Okinawa in Japan^{8, 15}). Similar species with no or indistinct medullae and similar-sized basidiospores are *A. americana* s. str., *A. angiospermarum*, and *A. auricula-judae* s. str. However, these species are distinguished from *A. villosula* by their abhymenial hairs reaching more than 100 μm in length⁷).

Specimens previously considered as *Auricularia auricula-judae*

All 10 specimens previously considered as *A. auricula-judae* were demonstrated not to be *A. auricula-judae* s. str. Of these specimens, four were identified as different species, as described above. Three of the remaining six specimens (TNS-F-6621, 6640, 196668) had abhymenial hairs with a maximum length of approximately 100 μm , which is shorter than the length of *A. auricula-judae* s. str. (60–200 μm , Malysheva and Bulakh; 100–150 μm , Wu et al.)^{7, 16}). TNS-F-6635 exhibited abhymenial hairs of 166–555 μm in length, longer than those of *A. auricula-judae* s. str. These four specimens were considered different from *A. auricula-judae* s. str. However, due to poor specimen conditions, sufficient numbers of basidia (TNS-F-6621, 6640) and basidiospores (TNS-F-6635, 6640) could not be measured. For TNS-F-196668, no species with corresponding morphological characteristics were found among the previously known species. The remaining two specimens (TNS-F-196710, 196790) have morphological characteristics of several species in the *A. auricula-judae* complex, and could not be identified to the species level.

Specimens previously considered as *Auricularia minor*

Of the five specimens previously considered as *A. minor*, two were demonstrated not to belong to this species. The basidiospores of TNS-F-433 were longer (9–14.5 μm) than the original description of *A. minor* (7–8 μm)³). The basidiospores (9–12 μm) and abhymenial hairs (89–137 μm) of TNS-F-196884 were longer than the basidiospores (7–8 μm) and abhymenial hairs (30–80 μm) in the original description³). These two specimens were considered to be different species from *A. minor*, but no species with corresponding morphological characteristics could be found among previously known species. TNS-F-428 and 51392 were not identified because sufficient numbers of basidiospores could not be measured due to poor specimen conditions. The type specimen of *A. minor*, TNS-F-434, was in poor condition, and sufficient numbers of basidiospores could not be measured. The abhymenial hairs measured $46\text{--}85.5 \times 5.5\text{--}9$ μm ($n = 10$) and were almost consistent with the original description ($30\text{--}80 \times 5\text{--}7$ μm), and the basidia were $35.5\text{--}42.5 \times 4\text{--}7$ μm ($n = 10$), which is shorter than the original description (ca. 70×5 μm)³).

Specimens previously considered as *Auricularia polytricha*

The nine specimens previously identified as *A. polytricha* were all considered to be different species. Of these, three specimens were reidentified as *A. cornea* as described above. This result supports the conclusion of Shirouzu et al. that *A. cornea* is included among the specimens previously identified as *A. polytricha* in Japan¹⁵). The remaining six specimens (TNS-F-6569, 6574, 6609, 6610, 6650, and 195396) all had abhymenial hairs less than 300 μm long, shorter than those of *A. polytricha* and *A. nigricans*, which are known to have abhymenial hairs longer than 600 μm ^{3, 5}). TNS-F-6574, 6609, 6610, 6650, and 195396 could not be identified at the species level because the specimens were in poor condition, and sufficient numbers of basidiospores could not be measured. For TNS-F-6569, no species with corresponding morphological

characteristics were found among the previously known species.

TNS-F-193009 and 6563 are the type specimens of *A. polytricha* f. *leucochroma* and *A. polytricha* f. *tenuis*, respectively. Both specimens exhibited abhymenial hairs less than 400 µm long and were therefore not identified as *A. polytricha* or *A. nigricans*. The abhymenial hairs of TNS-F-193009 measured 131–375 × 6–10.5 µm (n = 10), shorter than the original description (500–700 × 3–8 µm), and the basidia were 37.5–50 × 3.5–5 µm (n = 10), almost consistent with the original description (45–50 × 2.5–3.5 µm)¹³. The abhymenial hairs of TNS-F-6563 were 84–183.5 × 5.5–7 µm (n = 10), longer than the original description (25–125 × 4–6 µm), and the basidia were 37.5–53.5 × 4.5–7 µm (n = 10), almost consistent with the original description (40–50 × 3.5–4 µm)¹³. Neither of the original descriptions included the morphological characteristics of their basidiospores. In this study, basidiospores were not observed in these specimens. Because of the lack of some critical characteristics, namely, basidiospores, we do not propose new combinations or names for these taxa, although they should not be placed under *A. polytricha*.

Conclusion

Species identification of 26 *Auricularia* specimens deposited in the TNS were morphologically reexamined, and seven of them were reidentified as different species. Reexaminations of existing specimens based on recent taxonomic criteria will contribute to updating the understanding of taxonomy and distribution of *Auricularia* spp. in Japan.

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References

- 1) Barrett, M.F.: Three common species of *Auricularia*. *Mycologia*, **2**, 12-18 (1910)
- 2) Lowy, B.: A morphological basis for classifying the species of *Auricularia*. *Mycologia*, **43**, 351-358 (1951)
- 3) Kobayasi, Y.: The genus *Auricularia*. *Bull. Natl. Sci. Mus., Ser. B*, **7**, 41-67 (1981)
- 4) Weiß, M., F. Oberwinkler: Phylogenetic relationships in Auriculariales and related groups-hypotheses derived from nuclear ribosomal DNA sequences. *Mycol. Res.*, **105**, 403-415 (2001)
- 5) Looney, B.P., J.M. Birkebak, P.B. Matheny: Systematics of the genus *Auricularia* with an emphasis on species from the southeastern United States. *North Am. Fungi*, **8**, 1-25 (2013)
- 6) Wu, F., Y. Yuan, A.F. Malysheva, P. Du, Y.C. Dai: Species clarification of the most important and cultivated *Auricularia* mushroom “Heimuer”: evidence from morphological and molecular data. *Phytotaxa*, **186**, 241-253 (2014)
- 7) Wu, F., Y. Yuan, S.H. He, A.R. Bandara, K.D. Hyde, A.F. Malysheva, D.W. Li, Y.C. Dai: Global diversity and taxonomy of the *Auricularia auricula-judae* complex (Auriculariales, Basidiomycota). *Mycol. Prog.*, **14**, 95 (2015)
- 8) Bandara, A. R., J. Chen, S.C. Karunarathna, K.D. Hyde, P. Kakumyan: *Auricularia thailandica* sp. nov. (Auriculariaceae, Auriculariales) a widely distributed species from Southeastern Asia. *Phytotaxa*, **208**, 147-156 (2015)
- 9) Bandara, A. R., S.C. Karunarathna, A.J.L. Phillips, P.E. Mortimer, J. Xu, P. Kakumyan, K.D. Hyde: Diversity of *Auricularia* (Auriculariaceae, Auriculariales) in Thailand. *Phytotaxa*, **292**, 19-34 (2017)
- 10) Yasuda, A.: Notes of fungi (Kinrui zakki) 13. *Bot. Mag. Tokyo*, **26**, 419-420 (1912) (in Japanese)
- 11) Yasuda, A.: Notes of fungi (Kinrui zakki) 81. *Bot. Mag. Tokyo*, **32**, 331-333 (1918) (in Japanese)
- 12) Yasuda, A.: Notes of fungi (Kinrui zakki) 108. *Bot. Mag. Tokyo*, **35**, 66-68 (1921) (in Japanese)
- 13) Kobayasi, Y.: On the genus *Auricularia* from Eastern Asia (*Fungorum ordinis Tremellarium studia monographica V*). *Bull. Centr. Natl. Mus. Manchoukuo*, **4**, 19-35 (1942)

- 14) Kobayasi, Y.: Miscellaneous notes of fungi (4). J. Jap. Bot., **59**, 31-32 (1984)
- 15) Shirouzu, T., S. Inaba, S. Ushijima, Y. Okuda, E. Nagasawa: Taxonomic study of Japanese "*Auricularia auricula-judae*" and "*A. polytricha*" based on molecular phylogeny and morphological comparison. Jap. J. Mycol., **59**, 7-20 (2018) (in Japanese)
- 16) Malysheva, V. F., E.M. Bulakh: Contribution to the study of the genus *Auricularia* (Auriculariales, Basidiomycota) in Russia. Nov. Sist. Nizsh. Rast., **48**, 164-180 (2014)

Auricularia 標本の更新された形態的基準に基づく分類学的再検討

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要 旨

国立科学博物館に収蔵されている *Auricularia* 標本の形態を観察し, 近年の分類学的基準に基づく種同定および本属菌の日本における分類と分布の再検討を行った。その結果, *A. auricula-judae* とされていた 10 標本中, 4 標本がそれぞれ *A. americana* (1), *A. cornea* (1), *A. villosula* (2) に再同定された。残りの 6 標本は, 種の識別に有用な形態的特徴がみられなかったため, 種同定には至らなかった。*Auricularia minor* とされていた 5 標本のうち, 2 標本は本種とは別種と考えられた。残りの 2 標本とタイプ標本は状態が良好ではなく, 十分な担子胞子の観察ができなかった。*Auricularia polytricha* とされていた 9 標本のうち, 3 標本は *A. cornea* に再同定された。残りの 6 標本は *A. polytricha* や *A. nigricans* とは別種であると考えられた。*Auricularia polytricha* f. *leucochroma* と *A. polytricha* f. *tenuis* のタイプ標本は状態が良好ではなく, 担子胞子の観察ができなかった。近年の分類基準に基づいて過去の標本を再検討することにより, 日本における *Auricularia* spp. の分類と分布情報を更新することができるだろう。