Accepted *Trichoderma* names in the year 2015

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**Abstract:** A list of 254 names of species and two names of varieties in *Trichoderma* with name or names against which they are to be protected, following the ICN (Melbourne Code, Art. 14.13), is presented for consideration by the General Committee established by the Congress, which then will refer them to the Nomenclature Committee for Fungi (NCF). This list includes 252 species, one variety and one form. Two new names are proposed: *T. neocassum* Samuel (syn. *Hypocrea crassa* P. Chaverri & Samuels), *T. patellotropicum* Samuels (syn. *Hypocrea patella f. tropica* Yoshim. Doi). The following new combinations in *Trichoderma* are proposed: *T. brevipes* (Mont.) Samuels, *T. cerebiforme* (Berk.) Samuels, *T. latizonatum* (Peck) Samuels, and *T. poronioideum* (A. Möller) Samuels.


**Key words:** *Hypocrea* *Hypocreales* Lists of Protected Names Nomenclature Pleomorphic fungi

**INTRODUCTION**

On 30 July 2011, the provision to permit different morphs of the same fungal species to bear separate names was ended at the XX International Botanical Congress (IBC) in Melbourne. This decision was retroactive, but names published before 1 January 2013, which would otherwise have been illegitimate, were ruled to nevertheless be published before 1 January 2013, which would otherwise be protected. Further, Art. 56.3 allows for the preparation of a list of names to be suppressed. The lists are to be presented against which they are to be protected. Further, Art. 56.3 allows for the preparation of a list of names to be suppressed. The lists are to be presented.

As regards whether *Trichoderma* or *Hypocrea* should be adopted for the genus, the ICN concluded that the choice between two names should be determined not only by priority of publication, but also by consensus among users. In this case *Trichoderma* Pers. 1794 was published earlier than *Hypocrea* Fr. 1825 and, pursuant to Art 14.13, a poll taken by the ICTF (International Commission on the Taxonomy of Fungi) International Subcommission on the Taxonomy of *Trichoderma* and *Hypocrea* (www.isth.info) indicated a strong preference to maintain *Trichoderma* over *Hypocrea* (Rossman et al. 2013). Having decided to give priority to *Trichoderma* (with an asexually typified type species) over *Hypocrea* (with a sexually typified type species), Art. 14.13 further allows for the presentation of a list of names in *Trichoderma* with name or names against which they are to be protected. Further, Art. 56.3 allows for the preparation of a list of names to be suppressed. The lists are to be presented.
to the General Committee established by the Congress, which then will refer them to the Nomenclature Committee for Fungi (NCF). Following approval by the appropriate committees, rejected names are to be treated as rejected under Art. 56.1 and may become available for use only by conservation under Art. 14. We have not presented a list of names to be suppressed (Art. 56.3) because any names of Trichoderma or Hypocreinae that are not in current use (i.e. have not been cultured and/or their DNA sequenced) can be epitypified and added to the list of names in use.

Subsequent to the Melbourne Congress, it emerged that in order to promote stability of names it was essential that listed names should be protected against unlisted names and not just listed names against which they were protected (Hawksworth 2014). This view was overwhelmingly supported by the 10th International Mycological Congress (IMC10) in Bangkok in 2014, which agreed that the lists be referred to as “Lists of Protected Names” (Redhead et al. 2014). There was little support at the Congress for having any lists of names not to be used, but if lists were prepared the Congress concluded they should be referred to as “Lists of Suppressed Names” to differentiate them from the existing lists of rejected names. Following discussions by the International Commission on the Taxonomy of Fungi (ICTF), formal proposals to modify the ICN to allow these strongly supported changes have now been made (Hawksworth 2015).

We have included in the present list of accepted names all those names in Trichoderma that are ‘in use’ as of the middle of 2015; thus the list includes those names that were ‘in use’ as of 1 January 2013, the date on which the revision to Art. 59 came into effect. With only a few exceptions noted in the current list, a name is considered to be ‘in use’ if it is represented by a culture and/or diagnostic DNA sequences that are deposited in GenBank (http://www.ncbi.nlm.nih.gov) in the belief that reliable identification of a species of Trichoderma can, with rare exceptions, only be achieved through comparison of a diagnostic sequence such as tef1. Jaklitsch & Voglmayr (2015) have published the most complete phylogeny of the genus Trichoderma, based on rpb2.

A list of species of Trichoderma that are not currently in use as defined by our criteria is appended at the end. The identity of most of these species is unknown; many are illegitimate later homonyms, synonyms of other Trichoderma species, or are not species of Trichoderma. Many of the names found in this list can be placed in use by epitypification.

In the following, the nomenclature of the Trichoderma Hypocreinae pairs is examined and the correct or preferential name for each species is presented. At least 400 species have been described as Hypocreinae and only a small number of them have been accounted for in modern terms. Many are not actually species of Trichoderma. A number of Hypocreinae names that did not have named Trichoderma asexual morphs were transferred into Trichoderma recently (Jaklitsch & Voglmayr 2014) and a few more names are added here because of their usage in recent literature.

Recent research has shown that a few reported links between a Trichoderma and a Hypocreinae are incorrect. Most notable is the link between T. harzianum and H. lixi (Chaverri & Samuels 2002). Revision of the T. harzianum species complex has revealed that T. harzianum and H. lixi are distinct species and the new combination T. lixi was proposed (Chaverri et al. 2015).

In most cases the asexual and sexual morph names of Trichoderma species with named teleomorphs are based on different type specimens. Consequently, from a nomenclatural point of view they represent distinct and pricable species names. In a nomenclatural sense, the species having named teleomorphs fall into four groups which can be defined as follows:

(I) The Trichoderma name is older than the Hypocreinae name and thus automatically has priority.

(II) Asexual and sexual morph names were proposed simultaneously and using the same epithet. In this case the Trichoderma name has priority in the genus Trichoderma.

(III) Asexual and sexual morphs share the same epithet but the Hypocreinae name is older than the Trichoderma name. In these cases the older epithet cannot be adopted because it is already occupied in Trichoderma. Under Art. 11.4 of the ICN the next available name is to be adopted (Art. 11.4), and in these cases the next available name is always the Trichoderma name, which is adopted here.

(IV) The asexual and sexual morphs have different epitheps and the sexual name is the older and should be adopted, but because of common usage it is preferable to maintain the younger Trichoderma name. Accordingly, several names have been proposed for conservation (Samuels 2014) but additional names remain to be conserved as proposed herein.

PROPOSAL FOR A PROTECTED GENERIC NAME IN HYPocreales

Rossman et al. (2013) proposed the protection or suppression of several generic names in Hypocreales. Since then, it has been found necessary to suppress two additional sexually-typified names against Trichoderma.

Trichoderma Pers. 1794 vs. Sarawakus Lloyd 1924 and Aphysiostroma A.T. Martinez & G. Moreno 1986

Trichoderma Pers. 1794, typified by T. viride Pers. 1794, is an asexual morph-typified name and has priority over Sarawakus Lloyd 1924, typified by S. lycogaloides (Berk. & Broome) Lloyd 1924, and Aphysiostroma A.T. Martinez & G. Moreno 1986, typified by A. stercorarium A.T. Martinez & G. Moreno 1986. Since 2008 (Jaklitsch et al. 2008, Jaklitsch 2011) it has been known that the type species of Aphysiostroma clusters within Trichoderma and thus Aphysiostroma should be considered a synonym of Trichoderma. Similarly, Jaklitsch & Voglmayr (2014b) have shown that the type species of Sarawakus clusters in Trichoderma and it too should be considered as a synonym of Trichoderma. Jaklitsch & Voglmayr (2014b) transferred S. lycogaloides and several additional species (see below) into Trichoderma and Jaklitsch & Voglmayr (2015) recombined A. stercorarium in Trichoderma. However, Art 57.2 of ICN stipulates that "an asexual morph-typified name that has priority is not to displace the teleomorph name(s) unless and until a proposal to reject the former under Art. 56.1 or 56.3 or to deal with the latter under Art. 14.1 or
14.13 has been submitted and rejected." Until now, no such proposal has been made for the protection of *Trichoderma* over *Aphysiostroma* or *Sarawakus*, but as that provision in the ICN is proposed for deletion (Hawksworth 2015) this may not become necessary.

**ACCEPTED TRICHODERMA NAMES IN 2015**

Current ICN only permits names to be protected against listed names which otherwise would take precedence. While it is anticipated that the provisions will be changed to permit listed names to be protected against unlisted names (see above), the current mandate of the General Committee and the Nomenclature Committee for Fungi is consider for protection only names where there are competing names. In order to facilitate the work of the Committees, the few names which require protection against competing names are prefixed by an asterisk (*), although most are already proposed for conservation. However, we wish all names published prior to 1 January 2013 and accepted here to be included in the eventual list of protected names as soon as that is permitted by the ICN.

The entries are presented here largely in the form that is likely to be adopted for publication in the eventual list of protected names, though for completeness we have not abbreviated the authors of names where there are more than two to "& al.", omitted "in" before journal titles, and retained the names of authors of papers in which they were published ("in" citations).

Typus: [specimen] (BBH 27841).  
Ex-type culture: BCC 36135 = NBRC 108034.  
Representative sequences: *tef*1: AB646530, *rp2*: AB646526.

Typus: [dry culture] (WU 29301a).  
Typus: [specimen] (WU 29301).  
Ex-type culture: CBS 120548.  

Typus: [dry culture] (BPI 882291).  
Ex-type culture: CBS 130628.  

Typus: [dry culture] (BPI 88109).  
Ex-type culture: G.J.S. 99-227 = CBS 130755 = IMI 393967.  
Representative sequences: *tef*1: AF348093, FJ463327; *rp2*: FJ442778, FJ442799.

Typus: [dry culture] (BPI 881096).  
Ex-type culture: G.J.S. 04-186 = CBS 124620.  
Representative sequences: *tef*1: FJ463301, FJ463401, AF469194; *rp2*: FJ442691, FJ442726.

Typus: [dry culture] (BPI 748201).  
Ex-type culture: DAOM 222156 = IMI 393971.  
Representative sequences: *tef*1: AF348098, AY605809; *rp2*: AF348098.

Typus: [dry culture] (BPI 748204).  
Ex-type culture: CBS 105026.  
Representative sequences: *tef*1: FJ467645, AF348089, KP008993; *rp2*: AF545541, FJ442706.


Representative sequences: *tef*1: AY937440.

*Note:* The culture derived from the original collection of this species has been lost. Another Japanese (Kagoshima) collection, not a paratype, was cultured by Doi and deposited as IFO 30608.

Typus: [specimen] (CEYLON, Nuwara Eliya), No. 5 (K, ex herb. Berkeley).


*Note:* The species we have selected as epitype is a recent collection from Thailand that agrees with the type collection, from Sri Lanka in its morphology and geography. Its culture was derived from ascospores germinating in asci. Additional sequences deposited in GenBank for culture G.J.S. 01-234 (= CBS 114788; *tef*1: DQ846668, ITS: DQ84666) are divergent, representing a species in the Viride clade but distinct from *T. alboconerum* as accepted here. The spores isolated from this collection were not germinating in asci.


Typus: [dry culture] (WU 29177a).

(≡) Hypocrea citrina (Fr.) Fr. var. americana Canham, Mycologia 61: 320. 1969.

Typus: [specimen] BPI 1109854.


Ex-type culture: CBS 433.97.  
Representative sequences: tef: JN175531.  
rtfb: DM48462.  


Ex-type culture: CBS 119575 = ATCC 90237.  

Ex-type culture: CBS 120535.  
Note: In the protologue for H. bicarinata var. bicarinata the holotype is given as deposited in CUP and NY, and the specimen indicated as type of H. bicarinata var. americana in the hand of S. C. Canham is marked ‘EX CUP 38045.’ Because Susan Canham worked at NY, we presume that the NY portion is the portion she worked with and, accordingly, designate it here as lectotype.
Accepted names in *Trichoderma*

Typos: [dry culture] (WU 291928a).
Ex-type culture: CBS 120632.

(≡) **Hypocrea atlantica** Jaklitsch, Fungal Divers. 48: 83. 2011.
Typos: [specimen] (WU 29280).

Typos: [specimen] (BPI 802854).
Ex-type culture: G.J.S. 548.92.
Representative sequences: tef1: AF443942, AF443943, FJ463297; rpb2: FJ442745, FJ442735, FJ442777.

**Trichoderma atrogelatinosum** (Dingley) Jaklitsch & Voglmayr, Mycotaxon 126: 146. 2013.
Typos: [specimen] (PDD 10471).

**Epitypus** *(hic designatus, MBT 202235):* [metabolically inactive culture] NEW ZEALAND (CBS 237.63).
Ex-epitype culture: CBS 237.63.

**Note:** **Hypocrea atrogelatinosa** had no ex-type culture but Joan Dingley sent either a culture or a specimen identified as *H. atrogelatinosum* to John Webster, who deposited a culture in CBS as CBS 237.63. The specimen from which this culture was isolated cannot be located. It was isolated from basidiomata of a species of *Bordarzewia* (*Russulales, Bondarzewiaceae*). No specific substrate is indicated for the type collection of *H. atrogelatinosa*, but a paratype was collected on a species of *Fuscoropia* (*Hymenochaetales, Hymenochaetaceae*). We interpret the culture derived from *Fuscoropia* (CBS 237.63) as being representative of the species *H. atrogelatinosa*. Additional soil isolations made in New Zealand (LU498, LU501, LU502, LU503, LU504, LU505) can be identified as this species.


Ex-epitype culture: CBS 142.95.

(≡) **Hypocrea atroviridis** Dodd, Lieckfeldt & Samuels, Mycologia 95: 36. 2003.
Typos: [specimen] (BPI 748312).

Ex-type culture: CBS 110086 = NBRC 10177 = ATCC MYA-2687.
Representative sequences: tef1: AF456887, AF456891, AY376051, FJ80611; rpb2: EU341801, FJ806518.

Typos: [dry culture] (WU 29183a).
Ex-type culture: CBS 119284.

(≡) **Hypocrea aurantefusum** Jaklitsch, Fungal Divers. 48: 162. 2011.
Typos: [specimen] (WU 29183).

Typos: [dry culture] (SHD-M 2663).

(≡) **Hypocrea aureoviridis** Plowr. & Cooke, Grevillea 8: 104. 1880.

Epitypus *(vide Jaklitsch, ibid.):* ENGLAND, Norfolk, Thetford, Thetford National Forest Park, close to Lynford, MBT 3530/1, 52°28′54″ N, 00′41′01″ E, elev. 30 m, on decorticated, well-rotted hardwood, 3–4 cm thick, soc. Eutypa sp., 13 Sep. 2004, W. Jaklitsch & H. Voglmayr (W.J. 2708) (K(M) 162235).
Ex-epitype culture: CBS 120536.

Typos: [dry culture] (WU 29193a).

Typos: [specimen] (WU 29193).
Ex-type culture: CBS 122494.

Typos: [dry culture] (BP) 870962B.
Ex-type culture: CBS 119092.

Typos: [specimen] (BPI 870962A).


Ex-type culture: CBS 121667.
Representative sequences: tef1: AY225857, rpb2: AF545562.

**Trichoderma balearicum** Jaklitsch & Voglmayr, Stud. Mycol. 80: 42. 2015.
Trichoderma barbatum
Typus: [dry culture] (BPI 881029).
Ex-type culture: CBS 125733.

Trichoderma bavaricum
Typus: [dry culture] (WU 29196a).
Ex-type culture: CBS 120538.
Typus: [specimen] (WU 29196).

Trichoderma bissetti
Typus: [dried culture] (CBS H21626).
Ex-type culture: CBS 137447 = UTHSC 08-2443 = FMR 12635.

Trichoderma breviviride
Typus: [dry culture] (WU 28233a).
Ex-type culture: CBS 121130.
Typus: [specimen] (K(M) 89878).
Representative sequences: tef1: JQ685865, rpb2: JQ685881.

Trichoderma calagrostidis
Typus: [dry culture] (WU 29198a).
Typus: [metabolically inactive culture] (CBS 137272).

Trichoderma camerunense
Typus: [metabolically inactive culture] (CBS 137272).
Accepted names in Trichoderma

Representative sequences: tef1: AF348107, AF348108.

Typos: [dried culture] (BPI 882292).
Ex-type culture: CBS 130629
Representative sequences: tef1: JN182283, JN175585; rpb2: JN182312, JN175530.

Typos: [dry culture] (BPI 746700).
Ex-type culture: G.J.S. 97-3 = CBS 119093
Typos: [specimen] (BPI 746700).

Typos: [dry culture] (BPI 870965).
Ex-type culture: DIS 320c = CBS 119055 = IMI 393638
Representative sequences: tef1: DQ289010, rpb2: KT028596.

*Trichoderma catoptron* P. Chaverri & Samuels, Stud.
Typos: [dry culture] (BPI 8543653).
(=) *Hypocrea catoptron* Berk. & Broome, Grevillea 12: 100. 1873.
Ex-epitype culture: G.J.S. 02-76 = CBS 114232 = DAOM 232830.
(≡) *Hypocrea flavovirens* Berk., Grevillea 12: 100. 1883.
Representative sequences: tef1: AY737726, rpb2: AY391900.
Note: The protologue cites three specimens, viz. no. 5 in part, and no. 557, both from Sri Lanka(Central Province, Feb 1865), and Dolosbagy. Four specimens in K are noted as being ‘type,’ including these three collections and no. 557 bis.
The Dolosbagy specimen was described later as *H. subrufa* Berk. & Cooke (Cooke 1884). The other three specimens are apparently the same species. Chaverri & Samuels (2003) designated the specimen ‘557’ as lectotype and redescribed and illustrated the species. They also described its asexual morph as *Trichoderma catoptron* and epitypified the specimens with the recent Sri Lankan specimen from which the type of *H. catoptron* was derived. Samuels (2014) proposed conservation of *T. catoptron* over *H. catoptron*, *H. sulfurella*, and *H. flavovirens*. *Trichoderma catoptron* is known only from South Africa, India and Sri Lanka. It occurs on bark of decaying trees, less frequently on decorticated wood and resupinate basidiomycetes. Chaverri & Samuels (2003) redescribed the species. It is most closely related to *T. cereceum* Chaverri & Samuels, *T. cinnamomeum* Chaverri & Samuels and *T. stramineum* (Chaverri & Samuels 2003).

Typos: [dried culture] (BPI 836565).
Ex-type culture: CBS 130010

**Trichoderma ceraceum** P. Chaverri & Samuels, Stud. Mycol. 48: 45. 2004 ["2003"].
Typos: [dry culture] (BPI 843654).
Ex-type culture: CBS 114245 = DAOM 232831 = ATCC MYA-3222.
Representative sequences: tef1: AY937437, rpb2: AF545508.

**Trichoderma ceramicum** P. Chaverri & Samuels, Stud. Mycol. 48: 47. 2004 ["2003"].
Typos: [dry culture] (BPI 843655).
Ex-type culture: G.J.S. 88-70 = CBS 114576.
Representative sequences: tef1: AY737738, rpb2: AF545510.

**Trichoderma cerebriforme** (Berk.) Samuels, comb. nov.
MycoBank MB812055
Typos: "Hypocrea cerebriformis" B., AUSTRALIA, M & B" (K, ex herb. M.C. Cooke 1885).
Representative culture: G.J.S. 85-245 = CBS 139045.
Representative sequence: tef1: KP109824.
*Note: Trichoderma cerebriforme* is distinctive because of the stout stipe and convoluted cap of the teleomorph. Similar species having stipitate/capitate stromata include *H. brevipes* Mont., *H. poronioidea* Möller, and *H. capitata* Samuels & Lodge (Samuels & Lodge 1996). *H. petersii* Berk. & M.A. Curtis and *H. peitata* (Jungh.) Berk. have large, centrally attached stromata, the stipe being greatly reduced. Doi (1976) reported but did not illustrate a *cf. longibrachiatum* like asexual morph for *T. cerebriforme* based on collections made in Peru. Rogerson et al. (1990) reported the species from central Brazil (Roraima). The culture cited above was reported by Doi (in Samuels et al., 1990) from an Indonesian specimen (BPI 881335 ex NY). The sequence cited above was derived from this Indonesian collection; it indicates that *T. cerebriforme* may be a member of the Viride clade. Whether any of these collections made outside of Australia are actually *T. cerebriformis* remains to be proven, but the name is being used and for this reason we place it in *Trichoderma*. 

VOLUME 6 · NO. 2

269
Typus: [dry culture] (DAOM 230012).
Ex-type culture: CBS 230012.
Representative sequences: tef1: AY605802, AY937443; rpb2: KF134788.

Typus: [dry culture] (BPI 843658).
Ex-type culture: G.J.S. 88-33 = CBS 114231 = DAOM 232832 = ATCC MYA-3223.
Typus: [UNITED STATES: New York.] New York, mountains on decorticated wood, Curtis 4466 (K 114744).
Representative sequences: tef1: AY737737, AY391966, AY391968; rpb2: AY391903, AY391906.

Typus: [specimen] (WU 33379).
Ex-type culture: CBS 132572.

Typus: [dry culture] (BPI 843683).
Ex-type culture: G.J.S. 94-68 = CBS 114577.
Typus: [dry culture] (BPI 843683).
Representative sequences: tef1: AY737737, AY391966, AY391968; rpb2: AY391903, AY391906.

Typus: [dry culture] (BPI 843658).
Typus: [specimen] (BPI 744716).
Ex-type culture: G.J.S. 94-68 = CBS 114231 = ATCC MYA-3224 = DAOM 232833.
Representative sequences: tef1: AY737732, AY391979; rpb2: AY391918, AY391920.

Typus: [dry culture] (DAOM 172792).
Ex-type culture: DAOM 172792 = CBS 258.85.

(≡) Sphaeria schwariniizii Fr., Elench. Fung. 2: 60. 1828.
(≡) Hypocreom schwariniizii (Fr.) Sacc., Syll. Fung. 2: 522. 1883.

Note: Samuels (2014) proposed conservation of *T. citrinoviride* over *H. schwariniizii* (*S. schwariniizii*), *S. contorta* Schwein., *H. minima* Sacc. & Ellis, and *H. repanda* Fuckel.

Ex-neotype culture: CBS 853.70.
Typus: [dry culture] (DAOM 167644).
(≡) Sphaeria lactea Fr., Obs. mycol. 1: 141 (1815).
(≡) Hypocreom lactea (Fr.) Fr., Summa veg. Scand. 2: 383. 1849.
Ex-epitype culture (T. lacteum): CBS 894.85.
Representative sequences: tef1: FJ860631, DQ835411; rpb2: FJ179630, AF545561.

Typus: [dried culture] CHINA: Yunnan Prov.: near Yuxi County, isolated from tobacco rhizosphere, Jun 2002, Z.F Yu (YMF 1.01693 [Key Laboratory of Yunnan Microbiology Fermentation]).
Ex-type culture: CBS 121218.
Representative sequences: tef1: KF134798, rpb2: KP115276, KF134789.

Typus: [metabolically inactive culture] (CBS 133497).
Ex-type culture: CBS 133497.
Representative sequences: tef1: KC285631, rpb2: KC285754.

Trichoderma corneum (Pat.) Jaklitsch & Voglmayr, Mycotaxon 126: 147. 2013.
(≡) Hypocreom corneum Pat., J. Bot. 4: 64. 1890.
Typus: TONKIN: Forests of Mt. Bavi, on decorticated wood, May 1886, Balansa (K).
Ex-type culture: None.


Ex-epitype culture: NBRC 9005 = IFO 9005 = G.J.S. 06-03.

Note: Doi (1973) illustrated gliocladium-like conidiophores for this species. Among others, he cited the Japanese collection TNS-F-190012, from which we designate here as epitype. ITS sequences derived from this culture indicate a relationship to T. brevicompactum, as do 5.8S ribosomal RNA, internal transcribed spacer 2, and 28S ribosomal RNA partial sequences of the Japanese strain 105-491 (GenBank No. AB509797; Forestry and Forest Products Research Institute, Kansai Research Center, Kyoto).


Typus: [specimen] (INB 0003527695).

Ex-type culture: P.C. 21 (Lost).

Representative DNA sequences: tef1: AY737741, AY391980; rpb2: AY391921.

Note: There are apparently no live cultures of T. costaricense.


Typus: [dry culture] (DAOM 164916).

Ex-type culture: JN175544

Representative sequences: tef1: EU280048 + AF534615; rpb2: AF545542.

Note: The link of T. crassum to H. crassa P. Chaverri & Samuels (Chaverri & Samuels 2003) is incorrect; see T. neocrassum.


Typus: [specimen] (WU 33300).

Ex-type culture: CBS 131486.


Typus: [dry culture] (BPI 843659).

(≡) Hypocreacremea P. Chaverri & Samuels, Mycologia 95: 1115. 2004 ["2003"].

Typus: [specimen] (BPI 1112894).

Ex-type culture: G.J.S. CBS 111146 = DAOM 231312 = ATCC MYA-2862.

Representative sequences: tef1: AY737736, rpb2: AF545511.


Typus: [dry culture] (WU 24041a).


Typus: [specimen] (WU 24041).

Ex-type culture: CBS 118980.

Representative sequences: tef1: DQ345342, rpb2: DQ345347.


Typus: [specimen] (WU 29042a).

Ex-type culture: None.

Representative culture: None.


(≡) Hypocre dacrymycella Cooke & Plowr., Grevillea 12: 100. 1884.

Typus: UK: Norfolk: Brandon, on Scotch pine (= Pinus sylvestris), 7 Nov. 1881, C.B. Plowright (K m 114743).


Typus: CZECH REPUBLIC: Central Bohemia, Mnichovice near Prague; on Picea abies in cavities of a stump, Nov. 1956.


Note: Trichoderma dacrymycellum has not been grown in pure culture. The asexual morph of T. dacrymycellum described by Jaklitsch (2009) is based on frequent association of the asexual morph with stromata agreeing with type material of H. dacrymycella. Gene sequences for this species reported by Jaklitsch (2009) were derived from stromata.


Typus: [specimen] (WU 29046).

Ex-type culture: CBS 121273.

Typus: [specimen] (BPI 747356).
Ex-type culture: CBS 121307.
Representative sequences: tef1: FJ860635, EF550995; rpb2: DQ835520.

Typus: [dry culture] (WU 29225a).
Ex-type culture: CBS 120631.
Ex-epitype culture: CBS 120631.


(≡) Gliocladium delicuencescens Sopp, Monogr. Penicillium: 89. 1912.
(≡) Sphaeria gelatinosa var. lutea Tode, Fungi Mecklenb. 2: 48. 1791, as ‘α’.
(≡) Hypocrea lutea (Tode : Fr.) Petch, J. Bot. 75: 231. 1937.
Ex-type culture: TUFC 100002 = CBS 119056.

Typus: [dry culture] "Typus anamorphism T. dingleyae cultura sicca ex ascospora orientis PDD 83839" (PDD 83839).
Typus: [specimen] (PDD 83839).
Ex-type culture: CBS 119056.
Representative sequences: tef1: AF348117, DQ289008, J665467; rpb2: EU341803, KJ665257.

Typus: [dry culture] NEW ZEALAND "... holotype asexual morphosis T. dorotheae cultura sicca ex ascospora orientis PDD 83839") (PDD 83839).
Typus: [specimen] (PDD 83839).
Representative sequences: tef1: DQ307536, rpb2: EU248602.

Typus: [dry culture] (DAOM 23000).
Ex-type culture: DAOM 230007.

Typus: [specimen] (TUMH 40457).
Ex-type culture: TUF 100002 = CBS 133190.
Representative sequences: tef1: JX684011, rpb2: X238484.

Typus: [metabolically inactive culture] (CBS 130729).
Ex-type culture: DIS 217a = CBS 130729 = IMI 395208.

Typus: [dry culture] (WU 28237a).
Ex-type culture: CBS 120524.
(≡) Hypocrea epimyces Sacc. & Pat., in Patouillard, Tabulae Analyticae Fungorum 4: 175. 1891.
Representative sequences: tef1: X238484, rpb2: EU498360.

Note: Gliocladium viride Matr. is recognized to be an older facultative synonym of G. delicuencescens Sopp (e.g., Jaklitsch 2011) but the existence of the name Trichoderma viride Pers. 1791 precludes transfer of the epithet to Trichoderma. At the rank of species, the name Gliocladium delicuencescens has priority from 1912, while the sanctioned (Fries, Syst. Mycol. 2: 336. 1823) and older epithet ‘lutea’ dates from 1791, but only at an undefined infraspecific rank; at species rank it dates from 1937. However, because G. delicuencescens (= T. delicuencescens) is typified by an asexual morph, while H. lutea is typified by a teleomorph, and both are in current use, Art. 57.2 requires that a proposal to conserve H. lutea be submitted and rejected before adopting the older asexual morph-typified name (Samuels 2014).
Trichoderma erinaceus  Bissett, C.P. Kubicek & Szakács, in Bissett & al., Can. J. Bot. 81: 583. 2003. [as ‘erinaceum’, to be corrected as masculine for a noun in apposition; the hedgehog ‘erinaceus’ cannot be used as an adjective].

Typus: [dry culture] (DAOM 230019).
Ex-type culture: DAOM 230019.
Representative sequences: tef1: AY737733, AF534604, FJ860637; rpb2: AF545514, FJ860536.

Note: Unidentified Hypocreopsis rufa-like stromata collected once in Sri Lanka (BPI 843661).

Trichoderma estonicum  P. Chaverri & Samuels, Stud. Mycol. 1: 140. 1885.

Typus: [dry culture] (BPI 882293).
Ex-type culture: DAOM 167161.
Representative sequences: tef1: AY605801, AF534617; rpb2: AF545545, AF545546.


Typus: [dry culture] (BPI 882293).
Ex-type culture: CBS 130626.


Typus: Costa Rica, Coto Brus, Las Tablas, Sendero Siénega, elevation 1500 m, on bark; 29 Jun. 1999, G. J. Samuels (8475), P. Chaverri, H.L. Chamberlain (INB 386298, Isotype BPI 746538).
Ex-type culture: Lost, G.J.S. 99-51.

Representative sequences: tef1: AY665710, 665711; rpb2: DQ835557.

Note: The authors of H. flaviconidia noted that of the three collections of this species, only one was suitable to serve as the type; unfortunately the culture derived from that collection was no longer viable. Two paratypes were cited and their cultures were sequenced and preserved in CBS (CBS 130688, 116238). In order to stabilize this name, we designate one of them as epitype.


Ex-type culture: None. 


Typus: [dry culture] (BPI 882294). 

Ex-type culture: CBS 130009. 

Representative sequences: tef1: AY391983, FJ179569; rpb2: AY391924, FJ179604. 


Typus: [dry culture] (BPI 871616). 

Ex-type culture: G.J.S. 01-238 = CBS 124372. 

Representative sequences: tef1: HQ342454, rpb2: HQ344461. 

Trichoderma foliicola (Jaklitsch & Voglmayr) Jaklitsch & Voglmayr, Mycotaxon 126: 149. 2014 ["2013"]. 


Typus: [specimen] (WU 31611) (ex-type culture CBS 130008 = Hypo 645). 

Ex-type culture: CBS 130008. 

Representative sequences: tef1: HQ342218, rpb2: HQ342281. 


Typus: [dry culture] (WU 29050a). 


Typus: [specimen] (WU29050). 

Ex-type culture: CBS 121136. 


Typus: [dry culture] (BPI 872183). 

Ex-type culture: G.J.S. 06-09 = CBS 120075. 

Representative sequences: tef1: DQ307541, DQ841722; rpb2: JN133561. 


Typus: [dry culture] (BPI 747556). 

Ex-type culture: CBS 114246 = DAOM 232835. 


Typus: [icon] Tab. 123 a-d, 124 a-f in Tode, Fungi Mecklenb. 2. 1791. 


≡ Hypoecia cupularis Fr., Linnaea 5: 539. 1830. 


Representative sequences: tef1: AY937423, rpb2: JN175559. 


Typus: [dry culture] TNS-F-237181. 

Ex-type culture: G.J.S. 95-137 = ATCC 208858 = IAM 13109. 


Typus: [dry culture] (DAOM 165773). 

Representative sequences: tef1: AY937423, rpb2: JN175559. 


Ex-type culture: CBS 130435. 

Representative sequences: tef1: JN175583, rpb2: JN175527. 


Typus: [specimen] (WU 32187). 

Ex-type culture: CBS 130009. 


Typus: [dry culture] (BPI 882295). 

Ex-type culture: CBS 130009. 


Typus: [dry culture] (HGUPd0038). 

Ex-type culture: HGUP 0038 = CBS 131803.
Representative sequences: tef1: JN215484, JX089585; rpb2: Q901400, JQ901401.


Ex-epitype culture: DAOM 167057.

Representative sequences: tef1: AF456911, AY750893; rpb2: AF545548.

*Note*: Bonorden did not cite a specific specimen in the protologue to *V. hamatum*, but his illustration (Fig. 117) can easily be interpreted as representing our modern concept of *T. hamatum*. Bissett (1991) noted the lack of type material and commented on Fig. 117, but he designated a neotype for this species. Under Art. 9.2 of ICN the illustration published with the protologue of *Verticillium hamatum* has to be adopted as lectotype of this species as it is a part of the “original material” in the sense of the ICN. The culture designated by Bissett (1991) as neotype for *T. hamatum* (DAOM 167057) should therefore be regarded as epitype of *V. hamatum*. Jaklitsch & Voglmayr (2014) described a teleomorph with yellow-brown to dull orange stromata and colorless ascospores.


Ex-neotype culture: CBS 226.95.

Representative sequences: tef1: AF348101, AF348100, AF348092; rpb2: AF545549.

*Note*: *Trichoderma harzianum* has been known to be a species complex for several years (Chaverri et al., 2003b; Druzhinina et al., 2010). Chaverri et al. (2015) recognized several taxonomic species in the complex.


Typus: [specimen] (WU 32168).

Ex-type culture: CBS 133493.


Typus: [specimen] (WU 33410).

Ex-type culture: CBS 133499.


Typus: [dry culture] (DAOM 230022).

Ex-type culture: DAOM 230022.

Representative sequences: tef1: EU280055, rpb2: DQ087239.

**Trichoderma hispanicum** (Jaklitsch & Voglmayr) Jaklitsch & Voglmayr, Mycotaxon 126: 149. 2013 [“2013”].


Typus: [specimen] (WU 31606) (ex-type culture CBS 130540 = S453).

Ex-type culture: CBS 130540.

Representative sequences: tef1: JN715659, rpb2: JN715600.

**Trichoderma hunua** (Dingley) Jaklitsch & Voglmayr, Mycotaxon 126: 149. 2013.


*Epitypus* (**hic designatus**, MBT 201073): **NEW ZEALAND** [dry culture] (CBS H 13531).

Ex-epitype culture CBS 238.63.

Representative sequence: tef1: AF401011.

*Note*: The original gathering of *H. hunua* was not cultured. Joan Dingley sent a subsequently collected specimen and/or culture (Dingley No. 5) of this species to John Webster, who deposited the culture in CBS (CBS 238.63). A dry culture was made and deposited in CBS (H 13531). We designate the dry culture as epitype. This culture has been sequenced and included in phylogenetic analysis. Thus the name ‘*Hypocrea hunua*’ is in current use and representative sequences have been deposited in GenBank. However, the specimen from which the culture CBS 238.63 was derived cannot be located (PDD) and is presumed lost. Thus its identity as *H. hunua* is uncertain. However, the phylogenetic results with Webster/Dingley’s culture of this species (Kullning-Gradinger et al. 2002) that is deposited in CBS is consistent with the morphology of part of the type that is now deposited in K (as IMI 50433). Sequences under this name are deposited in GenBank and Jaklitsch & Voglmayr (2014) have commented on its phylogenetic position in their list of *Trichoderma/Hypocrea* species based on this culture. Thus there is an established taxonomy and literature for *H./T. hunua*. Stability of this name is served by adopting an epitype as we do here, despite the uncertainty about the provenance of CBS 238.63.


Ex-type culture: CBS 273.78.

Representative sequences: tef1: AF348099, rpb2: FJ442725.

*Note*: Three dry cultures (CBS H-18863, CBS H-18864, CBS H-18865) were made from the same ex-type culture of *T. inhamatum* and deposited in the herbarium of CBS. We presume them all to be isotypes; accordingly, designate one of them as lectotype.


Typus: [dry culture] (BPI 745751B).

Typus: [specimen] (WU 33354).
Ex-type culture: CBS 130639.

Typus: [specimen examined] (WU 33310).
Ex-type culture: CBS 132567.

Typus: [dry culture] (BPI 881030).
Ex-type culture: CBS 125734.
Representative sequences: tef1: HQ342217, rpb2: HQ342280.

Typus: [dry culture] WU 29229a.
Typus: [specimen] (WU 292299).
Ex-type culture: CBS 120926.
Representative sequences: tef1: FJ860641, rpb2: FJ860540.

Typus: [dry culture] (BPI 802571B).
Ex-type culture: CBS 119075.
Typus: [specimen] (BPI 802571).

Typus: [specimen] JAPAN (TNS-F-38436).
Ex-type culture: TAMA 0193 = NBRC 109640.
Representative sequences: tef1: AB807645, rpb2: AB807657.

Trichoderma lacuombatense (B.S. Lu, Druzhinina & Samuels) Jaklitsch & Voglmayr, Mycotaxon 126: 149. 2014 [*2013*].
Typus: [specimen] (PDD 77489) (isotypus BPI 746621) (ex-type culture CBS 122668 = G.J.S. 99-198)
Ex-type culture: CBS 122668.

Trichoderma lanuginosum Samuels, in Samuels & Ismaiel, Mycol. Prog. 11: 240. 2011.
Typus: [specimen] BPI 863853.
Ex-type culture: CBS 125718.
Representative sequences: tef1: HQ342221, rpb2: HQ342284.

Trichoderma latizonatum (Peck) Samuels, comb. nov.
MycoBank MB812057
(≡) Hypocrea latizonata Peck in Ellis & Everhart, N. Amer. Pyrenom. p. 79. 1892.
Typus: [specimen] "A very curious species sent from Ohio under the above name [H. lati-zonata], by Prof. A.P. Morgan. Parasitic on Cyathus striatus, Hoff."
(NYS Specimen f 1661). Note: Sundberg & Kost (1989) redescribed this remarkable, distinctive, host-specific Trichoderma from North America. This unmistakable species has not been cultured or sequenced.

Typus: [specimen examined] (WU 33397).
Ex-type culture: CBS 30014.

(≡) Hypocreopsis Rehm, Hedwigia 37: 193 (1898).
Typus: [specimen] (BRAZIL: Santa Catarina State: on decaying leaves of Euterpe, Aug. 1888, Ule) (isotypus HBG #812).

Ex-epitype culture: G.J.S. 98-6 = CBS 100542.
Representative sequences: tef1: AF469195, AF443931; rpb1: FJ442687, FJ442749.

Typus: [dry culture] WU 29231a.
Ex-type culture: CBS 122499.
Representative sequences: tef1: FJ179571, FJ179570; rpb2: FJ179605, FJ179606.

Trichoderma lieckfeldtiae Samuels, in Samuels & Ismaiel, Mycologia 101: 149. 2009.
Typus: [dry culture] BPI 878745.
Ex-type culture: CBS 123049.
Representative sequences: tef1: EU856326, rpb2: EU883526.

Trichoderma lixii (Pat.) P. Chaverri, in Chaverri & al., Mycologia 107: 578. 2015
Ex-type culture: G.J.S. 97-96 = ATCC MYA-2478).
Representative sequences: tef1: AF443938, FJ716622; rpb2: KJ665290.

Note: Chaverri & Samuels (2002) considered H. lixii to be the sexual morph of T. harzianum. A revision of the T. harzianum species complex (Chaverri et al., 2015), however, shows that T. lixii and T. harzianum are closely related but distinct species.

Typus: [dry culture] USA: Ohio: Hamilton County, Duck Creek, on wood, 12 Sep. 1961, W.B. Cooke 4576 (SHD-M).
Ex-type culture: CBS 816.68 = ATCC 18648.
Representative sequences: tef1: EU401591, rpb2: DQ087242.

Typus: [dry culture] (DAOM 177227-1a).

Ex-type culture: DAOM 177227-1a.
Typus: [specimen] (WU 29106).
Ex-type culture: CBS 120953.
Typus: [dry culture] (BPI 843660).
(≡) Hypocreopsis cuneispora P. Chaverri & Samuels, Mycologia 95: 1118. 2004 ["2003"].
Typus: [specimen] (BPI 1112864).
Representative sequences: tef1: AF534622, rpb2: AF545550.

Typus: [dry culture] WU 29236a.
Typus: [specimen] (WU 29236b).
Ex-type culture: CBS 120537.

Typus: [dry culture] WU 29237a.
Typus: [specimen] (WU 29237b).
Ex-type culture: CBS 123828.

(≡) Hyphoxylon lycogaloides Berk. & Broome, J. Linn. Soc., Bot. 14: 120 (1873) [1875].
Typus: [specimen] (K(M) 177253; G.H.K. Thwaites 1090).
Ex-type culture: CBS 123493.
Representative sequences: tef1: KF134800, rpb2: KF134792.

Typus: [dry culture] WU 29201a.
Typus: [specimen] (WU 29201).
Ex-type culture: CBS 120540.
Representative sequences: tef1: FJ860625, rpb2: FJ860529.

Typus: [dry culture] (BPI 878377).
Ex-type culture: CBS 123052.
Representative sequences: tef1: EU248618, rpb2: EU248597.

Typus: UK: Aberdeenshire: Ballochbrae Forest, near Braemar, on Quercus leaf, Nov 1979, Abdullah (HME 3704; IMI 266915 authenticated specimen).
Ex-type culture: IMI 266015 = HME 3704.
Note: Although the oldest epithet for this species is Pap. viridis in Trichoderma the epithet ‘viride’ is occupied. The next available epithet is ‘matsushimae,’ which we have adopted here.

Typus: [specimen examined] (WU 33334).
Ex-type culture: CBS 125719.
Note: Trichoderma mediterraneum, very common in southern Europe (Jaklitsch & Voglmayr, 2015), may be a species complex comprising three or more phylogenetic species.

Trichoderma medusae Samuels, in Samuels & Ismaiel, Mycol. Prog. 11: 245. 2011.
Typus: [dry culture] (BPI 863841).
Ex-type culture: CBS 125719.
Representative sequences: tef1: HQ342214, rpb2: HQ342277.

Typus: [specimen] (TNS.D-50 = TNS-F-223220, Isotype NY No. 00965630).
Ex-type culture: (Lost) B.E.O. 00-09.
Representative sequences: tef1: AY225855, rpb2: AF545563.
Note: The ex-type culture of H. megalocitina has evidently been lost; sequences derived from it are deposited in GenBank.

Typus: [dry culture] (BPI 843663).
Ex-type culture CBS 114236.
Representative sequences: HQ342214, HQ342277; rpb2: AY391926.

Typus: [specimen] (TNS.D-181 = TNS-F 223325).
Trichoderma ochroleucum (Berk. & Ravenel) Jaklitsch & Voglmayr, Mycotaxon 126: 150. 2014. (= Hypocreopsis ochroleuca) Berk. & Rav. 1382, on trunks of Myrica cerifera, S[outh] C[arolina], HWR near S. luteovirens" (K, ISOTYPE NY 00965640).

Ex-type culture: None. Representative culture: CBS 119502.

Note: A second specimen in NY (00965641) identified as H. ochroleuca from the herbarium of J.S. Billings is annotated as being 'ex herb. Rav.' and is probably an isotype but the specimen lacks collecting information. Jaklitsch (2011) described an asexual morph for H. ochroleuca based on a British collection. Because he did not have a culture of a collection made in North America he did not epitypify the species with the British material.


Typus: [specimen] (WU 31622).
Ex-type culture: CBS 132574.


Ex-type culture HMAS 245079 = CGMCC 3.17527.


Typus: [specimen] (BPI 1109853).
Ex-type culture: CBS 130428.
Representative sequences: tef1: EU401581, JN175573, JQ685868; rpb2: JN175522, JQ685884.


Typus: [dry culture] (BPI 843692).
Ex-type culture: CBS 133299.
Representative sequences: tef1: AY376037, rpb2: FJ442742.


Typus: [dry culture] WU 29327a.
Ex-type culture: CBS 122126.


Typus: USA: South Carolina: "Hypocreopsis ochroleuca" Berk. & Rav. 1382, on trunks of Myrica cerifera, S[outh] C[arolina], HWR near S. luteovirens" (K, ISOTYPE NY 00965640).

Ex-type culture: None. Representative culture: CBS 119502.

Note: A second specimen in NY (00965641) identified as H. ochroleuca from the herbarium of J.S. Billings is annotated as being ‘ex herb. Rav.’ and is probably an isotype but the specimen lacks collecting information. Jaklitsch (2011) described an asexual morph for H. ochroleuca based on a British collection. Because he did not have a culture of a collection made in North America he did not epitypify the species with the British material.


Typus: [specimen] (WU 31622).
Ex-type culture: CBS 132574.


Typus: USA: South Carolina: "Hypocreopsis ochroleuca" Berk. & Rav. 1382, on trunks of Myrica cerifera, S[outh] C[arolina], HWR near S. luteovirens" (K, ISOTYPE NY 00965640).

Ex-type culture: None. Representative culture: CBS 119502.

Note: A second specimen in NY (00965641) identified as H. ochroleuca from the herbarium of J.S. Billings is annotated as being ‘ex herb. Rav.’ and is probably an isotype but the specimen lacks collecting information. Jaklitsch (2011) described an asexual morph for H. ochroleuca based on a British collection. Because he did not have a culture of a collection made in North America he did not epitypify the species with the British material.


Typus: [specimen] (WU 31622).
Ex-type culture: CBS 132574.


Ex-type culture HMAS 245079 = CGMCC 3.17527.


Typus: [specimen] (BPI 1109853).
Ex-type culture: CBS 130428.
Representative sequences: tef1: EU401581, JN175573, JQ685868; rpb2: JN175522, JQ685884.


Typus: [dry culture] (BPI 843692).
Ex-type culture: CBS 133299.
Representative sequences: tef1: AY376037, rpb2: FJ442742.


Typus: [dry culture] WU 29327a.
Ex-type culture: CBS 122126.

Typus: [specimen] (WU 29110a).
Ex-type culture: CBS 120636.
Representative sequences: tef1: FJ795787, AY937444; rpb2: FJ179614.

Typus: [dry culture] (WU 30015).
Ex-type culture: CBS 136496.

Typus: [metabolically inactive culture] (CBS 133496).
Ex-type culture: CBS 136489.


Typus: [specimen] (WU 24029).
Ex-type culture: CBS 119321.
Representative sequences: tef1: DQ672610, rpb2: KC285763.
Note: Jaklitsch et al. (2006) incorrectly regarded the new sexual morph H. viridescens as identical with Eidamia viridescens.

Typus: [dry culture] WU 29107a.
Typus: [specimen] (WU 29107a).
Ex-type culture: CBS 122769.

Typus: [dry culture] WU 29110a.
Typus: [specimen] (WU 29110a).
Ex-type culture: CBS 120636.

Trichoderma parastomoi (Overton) Jaklitsch & Voglmayr, Mycotaxon 126: 151. 2014.

Typus: [specimen] (BPI 843639).
Ex-type culture: TFC 97-143.
Representative culture: CBS 121139.
Representative sequences: tef1: FJ860668, DQ834456 (exon); rpb2: FJ860567, DQ834463.

Trichoderma patella (Cooke & Peck) Jaklitsch & Voglmayr, Mycotaxon 126: 151. 2014.

Ex-epitype culture: CBS 110081.
Note: Dodd et al. (2002) identified several collections and cultures as H. patella. From among them we select here a collection from Maryland as epitype. Dodd et al. (2002) recognized two forms of H. patella, including f. patella and f. tropica Yoshim. Doi. In the present work we elevate f. tropica to species rank as T. patellotropicum.

Trichoderma patellotropicum Samuels, stat. nom. nov.
MycoBank MB812059
Typus: [specimen] (D.1521 = TNS-F-224610).
Representative culture: CBS 208855 = MYA 2685 = CBS 110084.
Representative sequences: tef1 = AY937428, ITS = AF487661.

Typus: [dry culture] (BPI 870953).
Ex-type culture: CBS 118645.
Representative sequences: tef1: DQ109540, rpb2: FJ150787.
Trichoderma peltatum (Berk.) Samuels, Jaklitsch & Voglmayr, in Jaklitsch & Voglmayr, Mycotaxon 126: 151. 2014.


Typus: [specimen] (L00532089, Herb. L 910.250.1421).

Ex-type culture: None.


Note: Several species have been listed as synonyms of H. peltata (Samuels & Ismaiel 2011), but their types were collected over a wide, mainly Southern Hemisphere, geographic range. The type of Sphaeria peltata was collected in Indonesia. We do not have cultures from Indonesia, but sequences of Japanese collections are highly similar to those obtained from collections made in the USA, indicating the likelihood of a single species with a wide distribution. Druzhina et al. (2007) reported the isolation of ‘Hypocrea sp. MKZ-2007a’ (tef1: EF392731, rp2b: EF392733) from human lung tissue; that fungus was T. peltatum.


Typus: [dry culture] (BPI 864092B).


Typus: [specimen] (BPI 864029A).

Ex-type culture: CBS 119051.

Other cultures: DAOM 165782, CBS 119507, CBS 124375, CBS 124739.


Note: Originally described from the USA (Tennessee), T. petersenii appears to be a cosmopolitan and common species.


Lectotypus (*hic designatus*, MBT 202324): [specimen] "Hypocreopsis pezizoides No. 308, Cent Province, Dec 1868, sent before but these specimens in better fruit" (K, Herb. Berk 1879).

Isotypi: [specimens] [SRI LANKA:] "Hypocreopsis pezizoides, B. & Br., 308, Cent. Prov. (K, Hb. Berk 1879)." Hypocrea pezizoides, substrate undetermined, coll. Thwaites 308 (C.G. Lloyd mycological collection, Smithsonian Institution 6055; BPI 715639).

Ex-type culture: None.

Representative cultures: G.J.S. 01-231 (lost), CBS 101131 = C.P.K. 775 = G.J.S. 97-83.

Representative sequences: tef1: AY225859, rp2b: JN715610, AF545564.

Note: There are two collections of H. pezizoides in Berkeley’s herbarium; they appear to be parts of the same gathering. The portion in the Lloyd herbarium comprises a single stroma, which is identical to the other parts of this number in Berkeley’s herbarium. Samuels (2014) proposed conservation of H. pezizoides over the older T. pezizoideum Wallr. Sequences of the representative cultures place this species in the Viride clade of *Trichoderma*. Sequences deposited in GenBank are diverse and may represent more than one species. The sequenced culture of one of the cited representative cultures cited here was derived from ascospores (specimen THAILAND, BPI 841389) germinating in asci, giving us a high degree of confidence of its identity. However that culture has been lost.


Typus: [dry culture] WU 29402a


Typus: [specimen] (WU 29402a).

Ex-type culture: CBS 119283.


Typus: [dry culture] (BPI 843665).


Typus: [specimen] (BPI 802617).

Ex-type culture: G.J.S. 92-81 = CBS 114637 = DAOM 232100 = ATCC MYA-3067.

Other culture: G.J.S. 92-123 = CBS 114071 = DAOM 232101 = ATCC MYA 3066.

Representative sequences: tef1: AY737745, AY391986; rp2b: AF545513, AY391927.


Ex-type culture: CBS 120927.


Ex-type culture: CBS 814.68.

Representative sequences: tef1: AY737747, FJ860674; rp2b: AF545519, FJ179615.

Note: For comments see Lu et al. (2004).


Typus: [dry culture] (BPI 882296).

Ex-type culture: CBS 131292.
Representative sequences: tef1: JN175571, rpb2: JN175515.

**Trichoderma placentula** Jaklitsch, Fungal Divers. 48: 120. 2011.
Typos: [dry culture] (WU 29410a).

(≡) *Hypocrea placentula* Grove, J. Bot. (Lond.) 23: 133. 1885.
Ex-epitype culture: 120924.

**Trichoderma pleurotii** S.H. Yu & M.S. Park, in Park & al., Mycobiology 34: 111. 2006; [as *pleurotum*].
Typos: [dry culture] KOREA: Gangwon Province: "dried culture specimen on PDA, isolated from the waste cotton substrate of oyster mushroom, Chuncheon, April 1998, S.H. Yu" (CNUMH 501 Mycological Herbarium, Chungnam National University, Korea).
Ex-type culture: CBS 124387.
Representative sequences: tef1: HM142382, EU279975; rpb2: HM142372.

Ex-type culture: CNUMH 601 = CBS 124383.
Representative sequences: tef1: HM142381, EU918160; rpb2: HM142371.


Typos: *Sporotrichum polysporum* [scr. Link], Nees ab Esenbeck, alt e Sille [Nu?], Hb, Link" (B, *vide* S.J. Hughes in litt., comm. K.A. Seifert, 27 June 2014).


Typos: JAPAN: Otsuno, Kochi City, on bark, 3 May 1966, Y. Doi TNS-D-77 (TNS-F-190528).

Typos: [dry culture] (DAOM 167068).


Typos: [specimen] (PDD 77488, isotypus: BPI 746610).
Ex-epitype culture: CBS 820.68.
Representative sequences: tef1: AF750866, FJ860661; rpb2: FJ179613, JQ685878.

Note: S.J. Hughes (1958: 812) studied the specimens of both *S. polysporum* and *Aleurisma sporulosum* (L), placing both species in synonymy with *T. sporulosum* (ibid.: 820). He wrote the following about the type collection of *S. polysporum* (S.J. Hughes, hand-written notes deposited in DAOM): "[d]ots white or cream coloured now squashed on rotten bark. [looks like *Trichoderma candidum* (Sacc.) but no curly hyphae seen] [Trichoderma (white) no spirals].” Because it was sanctioned by Fries, the name *polysporum* was subsequently given preference over *sporulosum*. Rifai (Mycol. Pap. 116: 21. 1969) considered Gams C306 to be typical of *T. polysporum*. Accordingly, we designate this metabolically inactive culture as epitype of *Sporotrichum polysporum* here. Bissett (1991) distinguished between *T. croceum* and *T. pachybasioides* on the basis of morphology. However, phylogenetic analyses (Lu et al., 2004; Jaklitsch, 2011) have demonstrated that cultures isolated directly from substrate and identifiable as *T. polysporum* cluster with cultures isolated from ascospores of specimens identifiable as *H. pachybasioides*, including cultures studied by Bissett. Moreover, *T. polysporum* appears to represent a species complex that includes *T. croceum* and *T. stellatum*, which we include here as synonyms of *T. polysporum* (Lu et al., 2004; Jaklitsch & Voglmayr, 2015; Bissett unpubl.). Future study focused on this complex may resolve additional species, including some that today we consider as synonyms.

**Trichoderma poronioideum** (A. Möller) Samuels, comb. nov.
MycoBank MB812060


**Epitypus (hic designatus**, MBT 201065): [specimen]

Cameroon, S of Yaounde, vic. Mbemajme, Mbamayeo Forest Reserve, in secondary forest with heavy understory, 03°25.269′ N, 11°29.269′ E, alt. 657 m, on decorticated wood, 30 Jun 2001, G.J. Samuels (G.J. Samuels, personal coll.): [specimen]: CBS 139046. tef1 = KP109823, ITS = KP109821.
Ex-epitype culture: CBS 139046.
Representative sequence: tef1 = KP109823.

Note: Samuels & Lodge (1996) described the sexual and unnamed asexual morphs of this distinctive species. DNA
sequences indicate that T. poronioideum is a member of the Viride clade, closely related to T. asperellum.

Typus: [specimen] (WU 33327).
Ex-type culture: CBS 131487.


Typus: [specimen] (TNS-D-365 = TNS-F-223431, isotypus NY No. 0965650).
Ex-type culture: CBS 739.83.
Representative sequences: tef1: FJ860676, rpb2: FJ860574.

**Trichoderma protrudens** Samuels & P. Chaverri, in Degenkolb & al., Mycol. Prog. 7: 212. 2008.
Typus: [dry culture] BPI (878378).
Ex-type culture: CBS 121320.
Representative sequences: tef1: FJ860677, rpb2: FJ860574.


Typus: [specimen] (INB 0003719978).
Ex-type culture: CBS 114249.
Representative sequences: tef1: AY377742, AY391962; rpb2: AY391891.


Typus: [specimen] TNS-F-192712.
Ex-type culture: CNUN309.


Ex-type culture: CBS 408.91 = DAOM 167687 = ATCC 298861.
Representative sequences: tef1: JN175588, rpb2: JN175535.

Note: When they proposed the new species H. pseudokoningii, Samuels et al. (1998) said that the holotypes of both morphs were the same specimen. Therefore T. pseudokoningii and H. pseudokoningii are obligate synonyms.

Typus: [specimen] (TMI 8484) (ex-type culture TUFC 61490 = CBS 133191).
Ex-type culture: TUFC 61490 = CBS 133191.
Representative sequences: tef1: JX175588, rpb2: JX175535.


Typus: [dry culture] BPI 843664.
Ex-type culture: CBS 1143340.

Typus: [specimen] (BPI 842416).
Representative sequences: tef1: AY377744, AF534582; rpb2: AF545518.


Typus: [specimen] TNS-D-366 = TNS-F-223432.
Ex-type culture: TUFC 60104.
Representative cultures: CNU N109, CNU N334, TUFC 60440, TUFC 60753.
Representative sequences: tef1: HM920206, JQ797400, JQ797401; rpb2: HM920177, JQ797408, JQ797409.

Typus: [dry culture] (WU 29420a).
Ex-type culture: CBS 119129.

Typus: SWITZERLAND: Kanton Wallis: Brig, Aletschreservat, alter Belalpweg, on wood of Rhododendron ferrugineum, 12 Sep. 1968, E. Müller & B. Aebi (K(M) 155404).
Representative cultures: CBS 262.71, CBS 343.71.
Representative sequences: tef1: AY737752, JN133574, FJ860780, FJ860681; rpb2: AF545520, JN133564, FJ860575.

Note: Stromata of this species are produced readily in artificial culture.

Typus: [dry culture] (DAO 166162).
Ex-type culture: DAO 166162.
Representative sequences: tef1: AY750887, AF534624; rpb2: EU248613.

**Trichoderma pulvinatum** (Fuckel) Jaklitsch & Voglmayr, Mycotaxon 126: 152. 2013.

“GERMANY, Geis, Haenheimer Wald, on Polyporus sulphureus, L. Fockel, autumn, No. 876” (FH).

Representative cultures: CBS 119954, CBS 119611, CBS 121729.
Representative sequences: tef1: FJ860683; rpb2: AF545559, FH860577.

Typus: [metabolically inactive culture] (CBS 135574).
Ex-type culture: CBS 135574.

Ex-type culture: QM 6a ≡ CBS 119288.
Typus: [specimen] (WU 29442).

**Trichoderma rhododendri** (Jaklitsch & Voglmayr) Jaklitsch & Voglmayr, Mycotaxon 126: 152. 2014.
Typus: [specimen] (WU 29442).
Ex-type culture: CBS 119288.
Representative sequences: tef1: AF401004, rpb2: HM182969.

*Note:* Samuels (2014) proposed the conservation of the well-known younger name, *T. reesei*, over *H. jecorina*.

Typus: [metabolically inactive culture] (CBS 130746).
Ex-type culture: DIS 355b ≡ CBS 130746.

**Trichoderma rodmanii** (Samuels & P. Chaverri) Jaklitsch & Voglmayr, Mycotaxon 126: 152. 2014.
Typus: [specimen] (BPI 1112859).
Ex-type culture: CBS 120895.

Typus: [dry culture] (BPI 870964).
Typus: [specimen] (BPI 8709964A).
Ex-type culture: G.J.S. 04-158 ≡ CBS 119233.
Representative sequences: tef1: DQ307563, J860690; rpb2: JN133566, FJ860583.

Typus: [dry culture] (DAOM 230011).
Ex-type culture: DAOM 230011.
Representative sequences: tef1:AY937441, rpb2:HC342288.

Ex-type culture: HMAS 244906.
Representative sequences: tef1:KF729984, rpb2:KF730005.

Typus: [specimen] (WU 33316).
Ex-type culture: CBS 127380.

Ex-type culture: HMAS 244907.
Representative sequences: tef1: KF729984, KF729989; rpb2: KF730010, KF730007.

Typus: [specimen] (WU 29443).
Ex-type culture: None. Representative culture: CBS 126958.

*Note:* The representative sequences are derived from DNA isolated directly from a stroma (WU 29467).

Typus: [dry culture] (WU 31607).
Ex-type culture: CBS 130537.
Representative sequences: tef1: JN715655, rpb2: JN715599.

Typus: [dry culture] (BPI 882297).
Ex-type culture: CBS 130751.
Representative sequences: tef1: JQ685869, rpb2: DQ857348.

Typus: [dry culture] USA: ‘culture Hammill no. 85-68, isolated from forest soil in Clarke County, Georgia, June, 1968’ (SYRF).
Ex-type culture: ATCC 18903 = CBS 330.70
Representative sequences: tef1:AY937414; rpb2: DQ087243, JN182309.
Ex-type culture: CBS 120069. 
Representative sequences: tef1: DQ841726, rpb2: EU252007.

Trichoderma semiorbis (Berk.) Jaklitsch & Voglmayr, 
(≡) Sphaeria semiorbis Berk., J. Bot. (Hooker) 2: 146. 1840. 
(≡) Hypocreafusa semiorbis (Berk.) Berk., in Hooker, Fl. Tasm. 2: 278. 16 Aug 1859. 


Ex-epitype culture: CBS 130716. 
Representative sequences: tef1: JN133576, rpb2: JN133567. 

Note: The type locality of S. semiorbis is not known with certainty. Berkeley (1840: 146) described two fungi from the collection of William Jackson Hooker, Lentinus fasciatus and Sphaeria fasciatus. The Lentinus was listed previously as Lentinus villosus by Berkeley in an account of fungi from Van Dieman’s Land but he did not provide the provenance of the collection of S. semiorbis. In the protologue the only collecting information given is “On bark. Hab. unknown.” We assume the original collection to have been made in Australia because the second known collection of this species is reported in Hooker’s Botany of the Antarctic Voyage, although even in this report the only clue to its origin is its collector, Ronald Campbell Gunn, who sent specimens from Tasmania to J.D. Hooker in Kew between 1830 and 1860. Dingley (1956) examined a collection from Tasmania in Kew which she assumed to be the type collection, providing a description of this specimen and referring New Zealand collections she had earlier listed as Hypocreapatella to this species. In her description she described perithecia containing ascii with mostly immature spores. However, as Berkeley himself noted in the protologue, the type collection of S. semiorbis is immature, lacking spores and asci. Dingley (1957) later described a Trichoderma asexual morph that was derived from her collections. She subsequently sent material to John Webster in Exeter. It is not known whether she sent a culture or a specimen from which Webster made a culture, but eventually a culture was deposited as CBS 244.63 with provenance ‘Dingley No. 12,’ New Zealand: Mohoka. This culture was redescribed by Bissett (1991) as the asexual morph of H. semiorbis under the number DAOM 67636 = CBS 244.63. Bissett’s description of H. semiorbis is consistent with Dingley’s, and Dingley collections of H. semiorbis (PDD) are consistent with the type collection of S. semiorbis. However, the culture CBS 244.63 cannot be linked to any Hypocrea collection; there is no specimen of H. semiorbis in the Sheffield University Herbarium and none of the collections in PDD can be linked to a specimen or culture that Dingley (Dingley 12) sent to Webster. Thus a question remains as to the link between CBS 244.63, which is the only living culture that links Bissett and Dingley’s concepts of the species and for which DNA sequences have been deposited in GenBank, and H. semiorbis as typified. An epitype for S. semiorbis is needed. There are three Dingley collections of H. semiorbis in her herbarium (PDD), all made from the same place in April and May 1953 (NEW ZEALAND: Hawkes Bay: Upper Mohoka River, Kaimanawa Range, elev. 2000 ft, on Nothofagus fusca, J.M. Dingley s.n. (PDD 12751 (May 1953), PDD 12755 (31 May 1953), PDD 12756 (April 1953) but none of them can be linked to a living culture and thus none of them can serve as an epitype. The material sent to Webster (Dingley 12 = CBS 244.63) is derived from a Dingley collection of H. semiorbis that was made from the Mohaka River on Nothofagus sp., date unknown, and there is a culture in ICMP (ICMP 1693) that is derived from H. semiorbis collected by Dingley (Dingley 584) from the Mohaka River, from Nothofagus sp. in 1958, but the specimen from which this culture was derived cannot be located (PDD, SHU). DNA sequences (tef1, Samuels unpubl.) indicate that CBS 244.63 is the same species as ICMP 1693, but the question as to the identity of teleomorphic H. semiorbis remained open. A recent New Zealand collection from Nothofagus sp. and its culture complete this circle and permit stabilization of the name H. semiorbis by epitypification proposed above. DNA sequences derived from this specimen indicate that it is the same species as ICMP 1693 and CBS 244.63; morphologically the stromata agree well with the type collection of S. semiorbis and the Dingley collections of H. semiorbis in PDD cited above, and the asexual morph matches descriptions of the asexual morph of H. semiorbis in publications from Dingley and Bissett. Although we do not know the substratum of either of the collections of H. semiorbis reported by Berkeley, the type collection of S. semiorbis was possibly collected in Tasmania where Nothofagus is common and thus could have been the substratum of the type collection. All of Dingley’s collections were from Nothofagus. Finally, the recent New Zealand collection was made in the South Island, which has a south temperate climate similar to that of Tasmania. Bissett (1991) and Chaverri et al. (2003a) redescribed the Trichoderma asexual morph of H. semiorbis, the description in the latter reference is based in part on the epitype collection. Chaverri et al. (2003a) redescribed the teleomorphic based on the three Dingley collections cited above. Hypocreapatella semiorbis is common on Nothofagus in New Zealand but is not known outside of Australasia.

Typus: [metabolically inactive culture] (CBS 133498). 
Ex-type culture: CBS 133498. 

Typus: [specimen] (WU 28698).
Typus: [dry culture] (WU 29227a)
Ex-type culture: DAOM 230000.

Typus: [dry culture] (DAOM 230000).
Ex-type culture: DAOM 230000.
Representative sequences: tef1: AY750889, rpb2: JN175528.

Typus: [metabolically inactive culture] (SFC20130926-S001).
Ex-type culture: CBS 148.85 = ATCC 62321.
Representative sequences: tef1: AY737746, rpb2: KJ634744.

(≡) Hypocrea sinulosa Fuckel, Jahrh. Nassauischen Vereins Naturk. 23/24: 184. 1870 [*1869*].
Typus: [GERMANY] “... im Frühling, auf einem sehr faulen Stengel von Chelidonium majus. Am Mühlberg bei Oestrich” (G).
Ex-type culture. None. Representative cultures: CBS 310.50, CBS 311.50, CBS 121272.
*Note*: This species is not known to produce an asexual morph.

(≡) Hypocrea sinulosa Fuckel, Jahrh. Nassauischen Vereins Naturk. 23/24: 184. 1870 [*1869*].
Typus: [GERMANY] “... im Frühling, auf einem sehr faulen Stengel von Chelidonium majus. Am Mühlberg bei Oestrich” (G).
Ex-type culture. None. Representative cultures: CBS 310.50, CBS 311.50, CBS 121272.
*Note*: This species is not known to produce an asexual morph.

Typus: [dry culture] (DAOM 183974).
Ex-type culture: DAOM 183974.
Representative sequences: tef1: AY50890, rpb2: FJ442694, KJ665348.

Typus: [specimen] SPAIN: Puerto de Samossiera, on cow dung, 16 Sep. 1982, G. Moreno (MA-Fungi 3059 [JIFMA-12]).
Ex-type culture: CBS 148.85 = ATCC 62321.

Typus: [dry culture] (BPI 744463B).
Ex-type culture: CBS 992.97 = ATCC MYA 2970 = DAOM 231834.
Typus: [specimen] BPI 744463.
Representative sequences: tef1: DQ109546, rpb2: EU341805.

Ex-type culture: CBS 310.50, CBS 311.50, CBS 121272.
Representative sequences: tef1: KF29990, KF29991; rpb2: KF30011, KF320012.

Typus: [dry culture] (BPI 828298).
Ex-type culture: CBS 130506.
Representative sequences: tef1: JN175597, rpb2: JN175546.

Typus: [dry culture] (BPI 828298).
Ex-type culture: CBS 130506.
Representative sequences: tef1: JN175597, rpb2: JN175546.

Typus: [dry culture] (BPI 828298).
Ex-type culture: CBS 130506.
Representative sequences: tef1: JN175597, rpb2: JN175546.


Ex-type culture: DAOM 172827.


Typus: [specimen] (TNS.D-148 = TNS-F 191611; isotypus NY No. 01293246).


Typus: [dry culture] (DAOM 167646).

Representative sequences: tef1: AY937451, AF534628, FJ860704; rpb2: AF545555, FJ860594.

Note: Trichoderma strictipile and H. strictipilosa are based on the same type specimen; thus they are obligate synonyms.


Ex-type culture: CBS 102817

Representative sequences: tef1: EU248631, JQ425705; rpb2: EU248607, EU856360.


Typus: [dry culture] (DAOM 166121).

Ex-type culture: DAOM 166121 = CBS 348.93.

Representative sequences: tef1: AY376057, rpb2: AF545556.


Representative sequences: tef1: AY937607, rpb2: AF545555.

Ex-type culture: CBS 102817.

Representative sequences: tef1: EU248631, JQ425705; rpb2: EU248607, EU856360.


Typus: [dry culture] (WU 29481a).

Ex-type culture: CBS 119129.


Note: The original material of S. sulphurea is given as “1221. 75. S. sulphurea, L.v.S., rara in cortice insidens, Salem nec Pennsylv.” The specimen PH 01107658 includes two parts. One is labeled presumably in Schweinitz’s hand as “Sphaeria sulphurea 1221 – 75 Syn. Fung., Salem” The other is labeled in hand as “Sphaeria sulphurea Schwein.” The printed label that contains these two specimens gives “Salem, Ohio.” The specimen BPI 801107, a microslide.

Ex-type culture: None.

Epitypus (vide Jaklitsch, ibid.): [specimen] AUSTRIA (WU 294981).

Ex-eptype culture: CBS 119128.


Typus: [dry culture] WU 29487a.


Ex-type culture: CBS 120929.


Typus: [specimen] (NY No. 01169121).

Ex-type culture: G.J.S. 2000 (lost); Representative culture: G.J.S. 85-228 (lost).

Representative sequences: tef1: AY737730, AY392002; rpb2: AY391954.

Note: There are no longer living cultures of this species available.

Trichoderma sulphureum (Schwein.) Jaklitsch & Voglmayr, Mycotaxon 126: 154, 2013.


(≡) Hypocre a sulphurea (Schwein.) Sacc., Syll. Fung. 2: 535. 1883.


Isolectotypus: ”Salem. 45” (PH 01107658); “Salem and Bethlehem” (K); “Salem nec Pennsylv.” (BPI 801107, a microslide).

Ex-type culture: None.

Epitypus (hic designatus, MBT 202326): [specimen] AUSTRIA (WU 29493).

Ex-eptype culture CBS 119929.


Note: The original material of S. sulphurea is given as “1221. 75. S. sulphurea, L.v.S., rara in cortice insidens, Salem nec Pennsylv.” The specimen PH 01107657 includes two parts. One is labeled presumably in Schweinitz’s hand as “Sphaeria sulphurea 1221 – 75 Syn. Fung., Salem” The other is labeled in hand as “Sphaeria sulphurea Schwein.” The printed label that contains these two specimens gives “Salem, Ohio.” The specimen BPI 801107, from the Collins autograph collection (Shear & Stevens 1917a: 203), is labeled ‘North Carolina, Salem’ and is certainly part of the original material that was studied by Schweinitz. Unfortunately the packet is empty, save for a microscope slide. Schweinitz is known to have collected extensively both in Salem, North Carolina, and in Pennsylvania but he also travelled to Ohio, and he is known to have combined into one packet specimens of what he thought were the same species that were collected in different localities (Shear & Stevens, 1917a, b). We follow the Collins collection label in concluding that the original collection of
S. sulphurea was collected in Salem, North Carolina. The specimen in K is labeled ‘Salem and Bethlehem’ also is an isolecotype. We have not seen Schweinitz material of S. sulphurea from Pennsylvania.

Typos: [dry culture] BIPI 843666.
(≡) *Hypocrea surrotunda* P. Chaverri & Samuels, Mycologia 95: 1134. 2004 ["2003"].
Ex-type culture: G.J.S. 88-73 = CBS 111145
Representative sequences: tef1: AY737734, AF534594; rpb2: AF545540.

Typos: [dry culture] BIPI 737694.
Ex-type culture: G.J.S. 95-93 = CBS 119058.
Representative sequences: tef1: DQ284973.

Typos: [dry culture] BIPI 843669.
Ex-type culture: G.J.S. 97-174 = CBS 114233.

Typos: [metabolically inactive culture?] CHINA: *Jiangxi*: Guanshan Nature Reserve (28.2° N/114.3° E), isolated from old trunk of *Taxus mairei*, ZJUF0986 = CGMCC 1672 (China General Microbiological Culture Collection CGMCC 1672).
Ex-type culture: ZJUF0986 = CGMCC 1672.
Representative sequences: tef1: DQ859029, rpb2: DQ859032.

*Note:* In the protologue for *T. taxi* there is some confusion concerning its typification. The authors of this species do not specifically state that the holotype is a ‘metabolically inactive culture’ and the culture ZJUF0986 = CGMCC 1672 does not appear in the CGMCC on-line catalogue.

Typos: [dry culture] BIPI 843671.
(≡) *Hypocrea theilendoricola* P. Chaverri & Samuels, Stud. Mycol. 48: 962004 ["2003"].
Typos: [specimen] (BIPI 737702).
Ex-type culture: G.J.S. 95-135 = CBS 114237 = DAOM 232843 = ATCC MYA-3232.
Representative sequences: tef1: ATCC MYA-3232.

Typos: [dry culture] BIPI 871726.
Ex-type culture: DIS 85f = CBS 119120 = IMI 393419 = ATCC MYA-3640.
Representative sequences: tef1: EU856321, rpb2: FJ007374.

Typos: [dry culture] (DAOM 178713a).
Ex-type culture: DAOM 178713a.
Representative sequences: tef1: AY750882, rpb2: AF545557.

Neotypus: [dry culture] WU 29508a.
Ex-epitype culture: CBS 121140.

Typos: [metabolically inactive culture] (CBS 134702).
Ex-type culture: CBS 134702.
Representative sequences: tef1: DQ307526, DQ672606; rpb2: KC285770.

Ex-epitype culture: HMAS 249893.
Representative sequences: tef1: KF923286, rpb2: KF923313.

*Note:* Hypocrea tropicosinensis was described without
Typus: [specimen] JAPAN (TNS-F-38437).
Ex-type culture: TAMA 0203 = NBRC 109641.
Representative sequences: tef1: AB807647, rpb2: AB807659.

Typus: [dry culture] (PDD 88476).
Representative sequences: tef1: HQ342219, rpb2: HQ342262.

Typus: [dry culture] WU 29561a.
Typus: [specimen] (WU 29561).
Ex-type culture: CBS 120923.

Typus: [dry culture] (DAOM 230013).
Ex-type culture: DAOM 230013.
Representative sequences: tef1: AF510444, rpb2: KF134794.

Typus: [dry culture] (BPI 881031).
Ex-type culture: PPRI 3359 = CBS 127103.
Representative sequences: tef1: HQ342219, rpb2: HQ342282.

Typus: [specimen] (BPI 747361).
Ex-type culture: G.J.S. 99-200 = CBS 140064.
Representative sequences: tef1: DQ835473, rpb2: DQ835517.

Typus: [dry culture] (PDD 88476).
(≡) Hypocrea vinoso Cooke, Grevillea 8: 65. 1879, non Pat. 1881.
Ex-epitype culture 119087 = ICMP 16294.
Representative sequences: tef1: AY376047, DQ307527; rpb2: KC285778, KC285779.

Typus: [specimen] (BPI 737768).
Representative cultures: ATCC 13213 = CBS 249.59. ATCC 13308 = CBS 248.59.
Representative sequences: tef1: AY750891, AF534631; rpb2: AF545558.

Note: Miller et al. (1957) did not indicate a place of deposit for the types of their new species, G. virens and G. flavofuscum, and no herbarium material can be found for them. Neither did the authors specifically indicate a culture collection into which the type cultures were deposited. However the type cultures of G. virens and G. flavofuscum, respectively, were deposited by the authors in ATCC, which subsequently (1959) deposited them in CBS. Because these cultures that are deposited in at least two culture collections are part of the original gatherings, they may be interpreted as isotypes. Accordingly, s we designate the metabolically inactive cultures that are stored in CBS for of each of these names as their respective lectotypes.

Trichoderma virencentiflavum (Spec.) Jaklitsch & Voglmayr, Mycotaxon 126: 154. 2014.
Typus: BRAZIL: Apiayh, on Bambusa, 1888, J. Puiggari 2353 (LPS).
Ex-type culture: None. Representative culture: P.C. 278 (lost).
Representative sequences: tef1: AY737749, AY392007; rpb2: AY391959.

Note: Chaverri & Samuels (2003) cultured and sequenced a Costa Rican collection (INB, culture P.C. 278) identified as this species. That culture was lost but the sequences were deposited in GenBank.

Typus: [specimen] (WU 31627).


Ex-epitype culture: CBS 119325.

Ex-type culture: CBS 132569.

Typus: [specimen] (WU 24013).

Representative sequences: tef1: AY94182, rpb2: GU198274.

Note: *Trichoderma viride* is the type species of *Trichoderma*. Its connection with *Hypocrea rufa*, though for a long time generally recognized, was fixed by the epitypification of *Hypocrea rufa*, though for a long time generally recognized, was fixed by the epitypification of *Hypocrea rufa* (Jaklitsch & al., Persoonia 33: 135. 2013).


Typus: CHINA: Yunnan: near Yuxi County, isolated from tobacco rhizosphere, Jun. 2002, Z.F. Yu (YMF 1.0169 [Key Laboratory of Yunnan Microbiology Fermentation]).

Ex-type culture: YMF 1.0169 = CBS 121219.

Representative sequences: tef1: AY94182, rpb2: GU198274.

Note: *Podostroma yunnanense* is distinct from *T. yunnanense*. Apparently *P. yunnanense* has not been cultured or sequenced.


Neotypus (*vide* Jaklitsch et al. in Persoonia 31: 126. 2013) [icon] (Horne & Williamson in Ann. Bot. 37: 397, Fig. 5. 1923).

Epitypus (*vide* Jaklitsch & al. in Persoonia 31: 126. 2013) [specimen] (WU 31264).

Ex-epitype culture: CBS 132573.

Representative sequences: tef1: KC2856476, rpb2: KC285758.

Note: Jaklitsch & al. (2006) linked *T. viridescens* to the sexual morph *H. viridescens* Jaklitsch & Samuels. However in a revision of the *T. viridescens* complex Jaklitsch et al. (2013) concluded that *H. viridescens* is actually the sexual morph of *T. paraviridescens* and that *T. viridescens* was linked to an unnamed sexual morph.


Typus: [metabolically inactive culture] (CBS 133495).

Ex-type culture: CBS 133495.

Representative sequences: tef1: KC285705, KC285706; rpb2: KC285774.


Typus: [specimen] (WU 31628).

Ex-type culture: CBS 132569.

Representative sequences: tef1: KJ665772, KC285692; rpb2: KC285767.


Typus: [dry culture] (WU 25711a).


Typus: [specimen] (WU 25711).

Ex-type culture: CBS 117711.


Typus: CHINA: Yunnan: near Yuxi County, isolated from tobacco rhizosphere, Jun. 2002, Z.F. Yu (YMF 1.0169 [Key Laboratory of Yunnan Microbiology Fermentation]).

Ex-type culture: YMF 1.0169 = CBS 121219.

Representative sequences: tef1: AY94182, rpb2: GU198274.

Note: *Podostroma yunnanense* is distinct from *T. yunnanense*. Apparently *P. yunnanense* has not been cultured or sequenced.

**Names in Trichoderma Not Currently in Use**

Where the names in *Trichoderma* are basionyms of accepted species names in other genera, the current pavement is indicated in **bold**, italic type.


**Trichoderma aeruginosum** Chevall., Fl. Gén. Env. Paris: 54. 1826; nom. illegit. (Art. 53.1); non *T. aeruginosum* Link, 1816.

Note: MycoBank gives *T. aeruginosum* Chevall. as a synonym of *T. violaceum* Oudem., but without explanation. In the original description of the latter species, no mention is made of *T. aeruginosum*. The protologue of *T. aeruginosum* Chevall. does not permit speculation as to the identity of the species.

**Trichoderma album** Preuss, Linnaea 24: 141. 1851.


(≡) *Trichoderma ghanense*.


**Trichoderma brassicae** Schum., Enum. Pl. 2: 235. 1803.


*Trichoderma corneum* (HKAS 32630, Isotypus: TNS F-7034 = Doi D.9754).


*Trichoderma flavum* Sommerf., *Suppl. Fl. Lapp.*: 312. 1826.


Note: When *H. fomitopsis* was described, a *Trichoderma* asexual morph having pachybasium-type branching and hyaline/white conidia was described for the species. However, no indication was given that a culture had been deposited in a public collection. The authors did not sequence the culture. An unpublished sequence (18S ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; 28S ribosomal RNA gene, partial sequence) was deposited in GenBank (JF905628) by N Fan (College of Life Sciences, Nanjing Agricultural University, No. 1 Weigang Xuanwu District, Nanjing, Jiangsu 210095, China) for a cellulose degrading culture identified as *H. fomitopsis*. Because there is no indication of how the culture was identified, and no specimen or culture number was indicated with the deposit, and because sequence of the RNA gene cluster are too highly conserved to distinguish *Trichoderma* species, the identity of this accession is in doubt. We do not include *T. fomitopsis* among the names of *Trichoderma* that we accept as being in use at this time.


**Trichoderma globosum**: When it was originally described a verticillium-like transformation was observed in the asexual morph having pachybasium-type branching and short, white conidia. The holotype specimen consists of a piece of stiff paper 5 cm diam, orange stromata are glued separately to the paper. Each stroma is a hemispherical aggregate comprising 100 or more cespitose, orange perithecia. Ascospores are filiform and remain entire in the asci. The ascal apex is typical of the Clavicipitaceae.


(≡) *Trichoderma citrinum*.


*Note*: Hughes (1958) did not offer an opinion on the application of this name.


(≡) *Pyrenium lignorum* Tode, Fung. mecklenb. 1: 33. 1790.

*Note*: *Trichoderma lignorum* is generally considered a synonym of *T. viride*.


Trichoderma minimum (Speg.) Gunth. Müller, Wiss. Z. Humboldt-Univ. Berl. 14: 775. 1965; as "minima".


*Note*: Rifai (1969) synonymized *T. minutum* Bain. under *T. polysporum*, but Bain.’s pl. XIV, figs. 14–16 do not appear to be *T. polysporum* and in fact might not even be a *Trichoderma*.


Ex-type culture CBS 316.31.


(≡) *Trichoderma pseudonigrovirens*.


(≡) *Trichoderma ghanense*.


Trichoderma pezizoideum Wallr., Fl. crypt. Germ. 2: 246. 1833; nom. rej. prop. (Art. 53, voted example 11); non *T. pezizoides*.

*Note*: Samuels (2014) proposed rejection of this name.


*Note*: This synonymy is from Hughes (1958). Hughes included this name in square brackets with the annotation: “Quid?” The identity of *T. pyrenium* (Tode) Pers. is not known.

Trichoderma pyrenium Schumach., Enum. pl. 2: 235. 1803; nom. illegit. (Art. 53.1); non *T. pyrenium* (Tode) Pers.


(≡) *Hyphelia spadicea* (Schwein.) Fr., Syst. mycol. 3(1): 212. 1829.
Accepted names in *Trichoderma*

(=) *Trichoderma polysporum*.

(=) *Trichoderma polysporum*.

**Trichoderma subsulphureum** (Syd.) Jaklitsch & Voglmayr, Mycotaxon 126: 153. 2013.  
Typus: “Kisantu, 1907 (H. Vanderyst).”

Ex-type culture. None. Representative culture: None.  
Note: Overton et al. (2006) did not locate the type specimen of *H. subsulphurea* in S, and the protocol did not include illustrations. Overton et al. (2006) identified a recent (2002) Japanese collection as *H. subsulphurea*, from which they obtained a culture and DNA sequences. Although Overton et al. (2006) reported that the specimen (Overton M 141) had been deposited in BPI, there are no specimens of *H. subsulphurea* or *Hypocrea* specimens collected in Japan in 2002 in BPI. Moreover, the culture from the Overton specimen has apparently been lost. Thus *T. subsulphureum* is only known from DNA sequences of doubtful origin deposited in GenBank (ITS DQ835509, tef1 DQ835492, rpb2 DQ83552).


**Trichoderma todica** Sokoloff & Toda, nom. inval. (Art. 32.1).

Note: This name has not been effectively published; it is referred to as ‘sp. nov NRRL 3091’ in U.S. patent no. US 3323996 A, which is *T. ghanense* (Samuels et al. 1998).


Note: Hughes (1958) did not offer an opinion on this species.


(≡) *Trichoderma aeruginosum* Chevall., Fl. Gén. Env. Paris 1: 54. 1826; nom. illegit. (Art. 53.1); non *T. aeruginosum* Link 1816.

Note: MycoBank indicates that the illegitimate name *T. aeruginosum* Chevall. is *T. violaceum*, but without explanation.  
Conidiophores of *T. aeruginosum* are described as ‘… presque globuleuses, violacé-tendre à la base, et appliquées par moyen de cette petite proéminence à l’entour du sommet de la hyphé, lequel par là semble cinglé d’un anneau colorié.’ This description suggests that the fungus is not a *Trichoderma*.

**Trichoderma viride** Schumach., Enum. Pl. 2: 235. 1803; non illegit. (Art. 53.1); non *T. viride* Pers. 1791.


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**REFERENCES**


