

Keys to the taxa of the genera *Cordyceps* and *Torrubiella*

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Key Word Index—*Cordyceps* spp.; *Torrubiella* spp.; keys; new species; new combinations; teleomorph-anamorph connections; host-parasite relationships.

Summary

Keys to the taxa of the genera *Cordyceps* and *Torrubiella* are given; i.e., the 282 species of the former genus and 59 species of the latter genus are treated. Appendixes include a list of 19 allied genera and 73 species to *Cordyceps* and *Torrubiella*, teleomorph-anamorph connections, host-parasite relationships, 5 new combinations and 2 new species of *Cordyceps*, a list of synonyms of *Cordyceps*, and a list of excluded species.

In these fifty years, the present author has been continuing the investigation on the genus *Cordyceps* and its allied genera. As the results, he could arrange the system for their taxonomy based upon 282 species of *Cordyceps*, 59 species of *Torrubiella*, and 75 species of other genera. Most of the species published before 1900 are not accompanied with detailed microscopical descriptions. The author examined these specimens as many as possible, although he was obliged to refrain from dissection of some specimens. Accordingly the systematic features of these species could not be adopted in the keys.

By courtesy of the following main herbaria, he could examine the type and authenticated specimens.

The Herbarium, Royal Botanic Gardens, Kew; Dr. Corner's private herbarium; The Herbarium of Instituto Orto Botanico dell'Universita, Padova; Rijksherbarium, Leiden; Herbarium in Leningrad Museum; National Herbarium of New South Wales, Botanic Gardens, Sydney; Plant Diseases Division, Department of Scientific and Industrial Research, Auckland; Instituto de Botanico C. Spegazzini, La Plata; The New York Botanical Garden, New York; Lloyd Library and Museum, Cincinnati; Herbarium Bogoriense, Bogor; Herbarium of Jardin de Plant, Paris.

The author tenders his sincere thanks to the curators of these herbaria and many other herbaria of all over the world.

**Key to the subgenera, sections and subsections
of the genus *Cordyceps* (Fig. 1)**

- I. Subg. *Ophiocordyceps* (Petch) Y. Kobayasi Ascospores fusiform, septate, not separating into secondary spores
1. Sect. *Epicarposoma* Y.K. Fertile part apical. Perithecia superficial.
 2. Sect. *Neocarposoma* Y.K. Fertile part lateral. Perithecia immersed.
 3. Sect. *Capitatae* Y.K. Fertile part apical. Perithecia immersed.
- II. Subg. *Eucordyceps* Y.K. Ascospores cylindrical, septate, separating into truncate, secondary spores.
4. Sect. *Laterales* Y.K. Fertile part lateral. Perithecia immersed.
 5. Sect. *Racemella* Cesati. Fertile part nonlateral. Stromata carneous or fibrillose. Perithecia superficial or half-immersed.
 - Subsect. *Sparsae* Y.K. Stromata tuberculate, filiform or cylindrical. Perithecia superficial.
 - Group. *Clavicipitcola* Y.K. Growing on sclerotium of *Claviceps*.
 - Subsect. *Confertae* Y.K. Fertile part distinct. Perithecia superficial or half-immersed, seemingly immersed by aggregation.
 - Subsect. *Pseudoimmersae* Y.K. Fertile part distinct or obscure. Perithecia densely arranged, half-immersed.
 6. Sect. *Cystocarpon* Y.K. Subsect. *Eucystocarpon*. Fertile part apical or intercalary. Stroma entomogenous or mycophilous, carneous, fibrillose or marasmiod. Perithecia immersed.
 - Ser. *Entomogenae* Tul. Entomogenous including spider.
 - Group. Without apical appendage.—Pseudoparenchymatic walled, hyphal walled, palisadewalled, unknown walled. Sphaeroid or discoid group.
 - Group. With apical appendage. Special species.
 - Ser. *Mycogenae* Tul. Mycogenous. Ascospores truncated group, ascospores fusiformed group.
 7. Sect. *Cremastocarpon* Y.K. Stromata carneous or marasmiod. Perithecia obliquely immersed.
 - Subsect. *Carnosae* Y.K. Stromata carneous.
 - Subsect. *Marasmioideae* Y.K. Stromata marasmiod.
- III. Subg. *Neocordyceps* Y.K. Perithecia obliquely immersed. Ascospores fusiform, septate.

Cordyceps Fr., Summa Veg. Scand. p. 381 (1849).

Entomogenous, arachnidicolous or mycogenous. Mycelial mass forming endosclero-

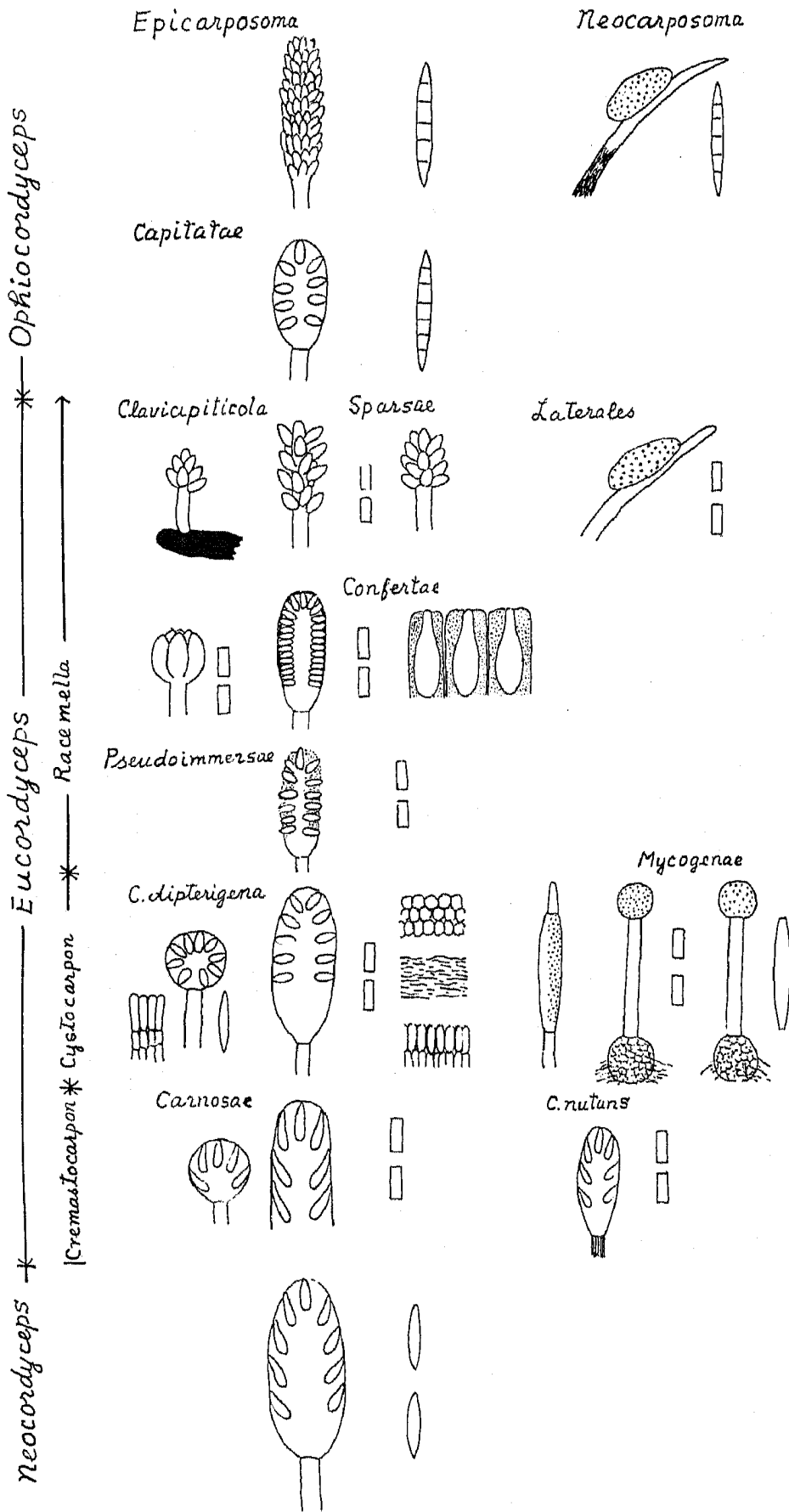


Fig. 1. Diagram showing subgenera, sections and subsections of *Cordyceps*.

tia inside insect-bodies, partly forming mycelial mat on surface of host. Stromata solitary or caespitose, carnose, fibrillose or rarely marasmoid. Stalk simple or ramose, filiform, cylindrical, clavate, with or without peridial layer. Fertile part apical or lateral; peridial layer pseudoparenchymatic, hyphal or palisade-like, hairy or glabrous.

Perithecia superficial, immersed, or half-immersed, rectangularly or obliquely arranged. Asci long cylindrical with hemispherical or elongated caps, J —, eight- or four-spored. Ascospores hyaline, long cylindrical or long fusiform, septate, mostly separating into, but rarely not separating into secondary spores. Secondary ascospores fusiform or truncated cylindrical. Anamorphs: *Isaria*, *Hirsutella*, *Hymenostilbe*, etc. Four species producing conidia on peridial layer of stromata. Type species: *Cordyceps militaris* (L.) Fr.

Key to the species of *Cordyceps*

Subgenus *Ophiocordyceps*

Sect. 1. *Epicarposoma*

Cap of ascus very thin

C. blattae

Cap of ascus not thin

Fertile part (Abbreviation: F.p.) globose. On ant

C. sherringii

F.p. globose. On cocoon of Lepidoptera

C. atropuncta

F.p. ellipsoid without appendage

Stroma dark red

C. ampullacea

Stroma dark blue

C. pseudoatrovirens

Stroma white

C. alba

Stroma citron-yellow

C. shimaensis

F.p. ellipsoid with appendage. On scale insect

C. coccidiicola

F.p. elongated with long appendage. On termite

C. termitophila

F.p. clavate

Perithecia half-immersed. Stroma pale olivaceous

C. pallidiolivacea

Perithecia immersed. Stroma rose-coloured

C. rosea

Perithecia immersed. Stroma pale ochraceous

C. koreana

F.p. filiform without elongated fertile part

C. rhizoidea

F.p. filiform with elongated fertile part

C. acicularis

Sect. 2. *Neocarposoma*

C. nigripoda

Sect. 3. *Capitatae*

Stalk divided into two parts. Perithecia 240–260 μm long. F.p. reddish brown

C. smithii

Stalk simple

Perithecia 170–220 μm long. F.p. almost black

C. clavulata

- Perithecia 450 μm long. F.p. red-fuscos *C. brittlebankii*
 Perithecia 475–550 μm long. F.p. dark green *C. atrovirens*

Subgenus Eucordyceps

Sect. 4. Laterales

Several fertile parts interruptly on slender stalk

- On adult of Coleoptera *C. interrupta*
 On larva of Diptera *C. corallomyces*

F.p. subapically situated

- On larva of Coleoptera
 Stroma ochraceous. Perithecia 500–600 μm long *C. inconspicua*
 Stroma ochraceous to ochraceous orange. Perithecia 400–500 μm long
C. variabilis

Stroma pale ochraceous. Perithecia 420–550 μm long

- C. clavata*
 Stroma ferruginous. Perithecia 600–650 μm long *C. ferruginosa*
 Stroma pale purple. Perithecia 430–450 μm long *C. purpureostromata*
 On cicada *C. ramosopulvinata*
 On larva of Lepidoptera *C. baumanniana*
 On ant *C. unilateralis*
C. unilateralis var. *clavata*
 On adult of Hemiptera *C. pentatomi*

Sect. 5. Racemella Subsect. Sparsae

Stroma filiform. Perithecia scattered

- Perithecia ovoid, ostiola protruding, 300–330 μm long *C. crinalis*
 Perithecia ovoid, ostiola not protruding, 350–550 μm long
C. agriota
 Perithecia ovate conic, 380–450 μm long *C. filiformis*
 Perithecia svoid, with flat base, 350–500 μm long *C. michiganensis*
 Perithecia pyriform, 500–550 μm long *C. paludosa*

Stroma clavate or cylindric. Perithecia intermediately and scattered and aggregated

- Stroma cylindric *C. engleriana*
 Stroma cylindric, geniculate *C. geniculata*
 Stalk clavate, with hairy hyphae *C. yahagiana*
 Stalk clavate, without cortex, perithecia scattered *C. konnoana*
 Stalk clavate, without cortex, perithecia aggregated *C. chichibuensis*
 Stalk very small, densely covered with short hairs *C. minutissima*
 Stalk very small, without hairs *C. osuzumontana*

- Stalk frequently branched. Fertile part apical, globose
- F.p. orange yellow. On larva *C. truncata*
- F.p. white. On coccon *C. ramosostipitata*
- F.p. elongated
- On cicada *C. prolifica f. terminalis*
- On pupa of Lepidoptera. Stroma robust, 18–20 cm long
C. henleyae
- On larva of Lepidoptera. Stroma up to 7 cm long
C. petchii
- Stalk normally simple
- F.p. with apical appendage, globose or fusiform
- F.p. pale brown. On Diptera *C. iriomoteana*
- F.p. red *C. rubripunctata*
- F.p. black *C. uchiyamae*
- F.p. red brown. Stalk furcate *C. furcata*
- F.p. chocolate brown *C. ravenelii*
- F.p. pink or reddish *C. falcata*
- F.p. with apical appendage, elongated
- F.p. ochraceous. Stalk with hairs. Secondary spores cuboid
C. cuboidea
- F.p. orange yellow. Stalk with hairs. Secondary spores cuboid
C. chichibuensis
- F.p. orange yellow. Stalk without hairs. Secondary spores elongated
C. falcatoidea
- Stromata clavate, not distinctly defined from stalk. Without apical appendage
- Perithecia scattered
- Perithecia 620–700 μm long, cinereous *C. elongatoperitheciata*
- Perithecia 250–330 μm long, orange yellow *C. aurantia*
- Perithecia aggregated
- Stromata ochraceous. Perithecia unilateral. On pupa of Coleoptera
C. lateritia
- Stromata white. Perithecia pale cream-yellow. On spider
C. ogurasanensis
- Stromata thin-cylindric, very long, pale cinereous brown. On pupa of Lepidoptera
C. hiugensis
- Stromata attenuated, almost white. On larva of Coleoptera
C. ryogamiensis
- F.p. distinct from stalk, red. On larva of Coleoptera
C. rubricapitata

- F.p. dark olivaceous. On cicada *C. inegoensis*
- F.p. reddish brown. On larva of Lepidoptera *C. polyarthra*
- Stromata clavate, pale ochraceous with brown perithecia. On pupa of
Lepidoptera *C. chichibuensis*
- Stromata long cylindric, white. On larva of Diptera *C. ovoideoperitheciata*
- Stromata clavate, gregarious, light pale yellowish brown. On larva of
Lepidoptera *C. venezuelensis*
- Stromata proliferate, attenuated, brown. On cicada *C. prolifica*
- Stromata clavate, orange yellow. Host unknown *C. norvegica*
- Stromata capitata
- Stromata bright red small. On larva of Coleoptera *C. roseostromata*
- Stromata pale yellow. On larva of Lepidoptera *C. takaomontana*
- Stromata orange red or red. On larva of Lepidoptera *C. variegata*
- Stromata white. Perithecia crowded at its base with yellow ostiola. On adult
Diptera *C. sakishimensis*
- Stromata white with apical appendage. On larva of Coleoptera
C. alboperitheciata
- Stromata fuscous. On larva of Lepidoptera *C. sinensis*
- Stromata deep pink, small. On larva and cocoon of Lepidoptera
C. pruinosa
- Stromata yellow. On adult Orthoptera *C. grylli*
- Stromata dark grayish brown. On larva of Coleoptera
C. superficialis
- Perithecia incrustated *C. superficialis* f. *crustacea*
- Perithecia loosely aggregated on apical part of stalk
- Stromata 2 mm long, white. On cocoon of Lepidoptera
C. hokkaidoensis
- Stromata 10–20 mm long, griseous. On larva of Hymenoptera
C. odyneri
- Stromata 6–8 mm long, orange-yellow. On adult Coleoptera
C. memorabilis
- Stromata 2–3 mm long, orange-yellow. Perithecia half-immersed. On adult
locust *C. uleana*
- Stromata 4–6 mm long, orange-yellow. Perithecia 630–900 μ m long.
On cicada *C. ctenocephala*
- Stromata vairable, frequently destitute, white, with pale yellow perithecia. On
adult moth *C. tuberculata*
- Stromata orange-yellow. On pupa of Lepidoptera *C. aurea*

- Stromata cream-coloured. On pupa of Lepidoptera *C. kusanagiensis*
- Stromata white. Perithecia orange-yellow. On spider *C. coccidioperitheciata*
- Stromata pale-yellow. On cicada *C. minuta*
- Stromata ochraceous. On adult Hemiptera *C. novae-zealandiae*
- Stromata dark brown. On adult Orthoptera *C. parvula*
- Stromata dark brown. On adult Lepidoptera *C. riverae*
- Stromata pale brown. On cicada *C. polycephala*
- Group *Clavicipiticola*
- Perithecia few on top of stromata, ovoid *C. clavicipiticola*
- Perithecia few on top of stromata, pyriform *C. sclerotium*
- Perithecia plenty on clavate fertile part *C. clavicipitis*
- Sect. 5. *Racemella* Subsect. *Confertae*
- Stromata flattened, apically branched like deer-horn. On larva of Lepidoptera
C. taylori
- Stromata capitate. On Lepidoptera *C. tarapotensis*
- Stromata capitate. On adult locust *C. locustiphila*
- F.p. surrounding short truncate stalk *C. dovei*
- Stromata clavate. On larva of Lepidoptera *C. robertsii*
- Stromata capitate. On adult Orthoptera *C. kirkii*
- F.p. elongated with long appendage. On larva of Lepidoptera
C. hauturu
- Sect. 5. *Racemella* Subsect. *Pseudoimmersae*
- F.p. globose
- Stroma 1 cm long, hyaline, translucent, then amber. Perithecia flask-shaped,
500 μm long *C. translucens*
- F.p. elongated
- On spider
- Stromata 3–12 mm long, pale brown or red. Perithecia ovoid, 325–550 μm long
C. singeri
- Stromata 9 cm long, coccineous. Perithecia 150 μm long
C. wittii
- Stromata 10–12 mm long, red. Perithecia 330–360 μm long
C. grenadensis
- On insect
- With rhizoidal strand at the base *C. deflectens*
- Without rhizoidal strand
- Stroma 5–12 mm long. Stalk 3–5 mm, fuscous villose
C. aspera
- Stroma 25–45 mm long, orange-yellow. Perithecia 450–670 μm long
C. militaris

- Stromata 20 mm long. Perithecia 300–400 μm long, flesh-coloured
C. typhulaeformis
- Stromata 5 mm long, yellow. Perithecia 380–400 μm long
C. erotyli
- Stromata 7–18 mm long, pale coloured. Perithecia 200 μm long, ostiola
brown-coloured *C. michaelisii*
- Stromata 15–30 mm long. F.p. globose, reddish purple.
Perithecia 250–300 μm long. On *Vespa* *C. langloisii*
- Stromata 10–25 mm long, pale yellowish brown. Perithecia yellow, no data
on length *C. flavobrunnescens*
- Stromata 30–40 mm long, white or pale citron-yellow. Perithecia
275–350 μm long *C. scarabaeicola*
- Stromata 20–70 mm long, orange-yellow. Perithecia 450–500 μm long.
On larva of Lepidoptera *C. kyushuensis*
- Stromata 30 mm long, ochraceous. Perithecia 250 μm long. On ant
C. doiana

Sect. 6. Cystocarpon Subsect. Eucystocarpon Ser. Entomogenae

Group without apical appendage. Pseudoparenchymatic walled group

F.p. globose

Stalk much branched

C. nipponica

Stalk simple

Stromata chestnut brown. Perithecia 620–650 μm long. On adult locust*C. amazonica**C. amazonica* var. *neo-*
*amazonica*Stromata orange-yellow. Perithecia 440–550 μm long. On nymph of

Lepidoptera

*C. sphaerocapitata*Stromata white. Perithecia 400–450 μm long. On cocoon of Orthoptera*C. mantidaecola*

Stromata brown. On larva

C. ainictos

F.p. ellipsoid

Perithecia longer than 500 μm in length

On larva of Lepidoptera. Peridium pseudoparenchymatous

*C. menesteridis*On larva of Lepidoptera. Head pale ochraceous *C. gunnii*On cocoon of Lepidoptera. Peridium palisade *C. obliqua*

On larva of Coleoptera. Peridium pseudoparenchymatous

C. olivacea

On adult of Coleoptera. Head black

C. entomorrhiza

- On Gryllotalpa *C. monticola*
 On cicada. Head black *C. hesleri*
 On cicada. Head olivaceous *C. paradoxa*
 On cicada. Head ochraceous *C. imagamiana*
- Perithecia shorter than 300 μm
 On ant. Head cinnamon-brown *C. myrmecophila*
 On larva of Coleoptera. Head citron-yellow or lurid
C. neovolkiana
 On larva of Lepidoptera. Head yellowish *C. bulolensis*
- F.p. short ellipsoid
 Perithecia. On larva of Lepidoptera *C. exasperata*
 Perithecia 900–1,300 μm long. On spider *C. arachnogenia*
 Perithecia 400–420 μm long. Stalk not hairy. On larva of Coleoptera
C. formosana
 Perithecia 440–450 μm long. Stalk hairy at base. On larva of Coleoptera
C. velutipes
 Perithecia 680–740 μm long. On cicada *C. tortuosa*
- F.p. elongated
 Stalk with distinct hairs *C. leucocephala*
 Stalk with short hairs. Head olive-coloured *C. hepialidicola*
- F.p. long cylindrical with appendage. Perithecia 230–250 μm long
C. stylophora
- F.p. cylindrical
 Perithecia 450–500 μm long. On larva of Lepidoptera
C. atrobrunnea
 Perithecia 450–480 μm long. On decaying wood *C. lignicola*
 Perithecia 500–550 μm long. On Larva of Lepidoptera
C. haukesii
 Perithecia 600–650 μm long. On cicada *C. longissima*
 Perithecia 620–680 μm long. On Gryllotalpa *C. neogryllotalpae*
 Perithecia 400–460 μm long. On cicada *C. ryogamimontana*
 Perithecia 740–800 μm long. On cicada *C. yakushimensis*
 Perithecia 240–270 μm long. On larva of Coleoptera
C. nigra
 Perithecia 400–450 μm long. On larva of Lepidoptera
C. ootakiensis
- Hyphal walled group
 Stromata 25 mm high pale yellow, Perithecia 1,200 μm long. On spider
C. cylindrica

- Stromata 20 mm high, pale ochraceous. Perithecia 270 μm long. On cicada
C. sinclairii
- Stromata 35–40 mm high, light cream-yellow. Perithecia 840–1,200 μm long.
On adult Coleoptera *C. salebrosa*
- Stromata 2 mm long, very small, light brown. Perithecia 250–300 μm long.
On Orthoptera *C. trinidadensis*
- Stromata 3–4 mm long, dark brown. Perithecia 260–300 μm long. On ant
C. ridleyi
- Stromata 3–7 mm high, red. Perithecia 180–210 μm long. On pupa of
Coleoptera *C. coccinea*
- Stromata 40–50 mm long, sulphur yellow. Perithecia 220–250 μm long. On
larva of Lepidoptera *C. sulphurea*
- Stromata 5–8 mm high, red brown with appendage. Perithecia 390–560 μm long.
On larva of Coleoptera *C. gemella*
- Stromata 30 mm high, fertile part elongated, bitter-sweet orange. Perithecia
250–300 μm long. On larva of Lepidoptera *C. elongata*
- Stromata 20–80 mm high, pale purpling brown. Perithecia 500–600 μm long.
On cicada *C. sobolifera*
C. sobolifera f. *takaoensis*
- Stromata 50–120 mm long, ochraceous. Stalk hairy. Perithecia 460–500 μm
long. On larva of Lepidoptera *C. nikkoensis*
- Stromata 15–30 mm high, sulphur-yellow. Perithecia 300–418 μm long. On
larva of Lepidoptera *C. washingtonensis*
- Stromata 15–40 mm long, purplish red. Perithecia 260–360 μm long. On larva
and pupa of Lepidoptera *C. vinosa*
- Stromata 20–30 mm long, yellow-ochraceous. Perithecia 900–1,100 μm long.
On adult Coleoptera *C. pseudoinsignis*
- Stromata clavate, cream yellow. On larva of Coleoptera
C. staphylinidaecola
- Stromata clavate, bright red. On larva of Coleoptera *C. coccidiocapitata*
- Palisade walled group
- F.p. globose
- Perithecia longer than 500 μm in length
- On adult grasshopper. Perithecia 1,000–1,100 μm long
C. stiphrodes
- On other larvae
- Perithecia 630 μm long. On other larvae *C. insignis*
- Perithecia 750–800 μm long. On other larvae *C. gracilis*
- Perithecia 830–900 μm long. On other larvae *C. gracilioides*

- Perithecia shorter than 500 μm long in length
- On adult Orthoptera *C. lilacina*
 - On larva of Coleoptera. F.p. yellow *C. citrina*
 - On larva of Coleoptera. F.p. dark yellow *C. scottiana*
 - Head pale yellow. Stalk annulated. On larva of Coleoptera
C. annullata
- F.p. clavate, continuous with stalk
- Stromata pink, cream yellow or bright red *C. bicolor*
 - Stromata clavate, pink. Stalk composed of two parts
C. pseudolongissima
 - Stromata clavate, cream yellow. On larva of Coleoptera
C. staphylinidaecola
 - Stromata clavate, bright red. On larva of Coleoptera
C. coccidiocapitata
- Unknown walled group
- F.p. globose
- Perithecia longer than 500 μm in length
 - F.p. bright brown-red *C. incarnata*
 - F.p. yellow. Stalk branched *C. volkiana*
 - F.p. yellow-red *C. subcorticicola*
 - Perithecia shorter than 500 μm
 - F.p. orange-yellow. On ant *C. japonensis*
 - F.p. cinereo-alutaceous *C. juruensis*
 - F.p. pale griseous, almost white. On nymph of termite
C. koningsbergeri
 - F.p. sanguineous. Stalk black. On adult Coleoptera
C. dimeropoda
 - F.p. castaneous. On Formica *C. subunilateralis*
- Perithecia no data
- On Vespa, Hymenoptera *C. humberti*
 - On larva of Lepidoptera *C. juruensis*
- F.p. elongated
- Stalk composed of two parts
 - F.p. blackish brown *C. nakazawai*
 - F.p. reddish yellow *C. cranstaunii*
 - Stalk simple
 - Stromata branched *C. proliferans*
 - Stromata simple
 - With appendage. Stromata without distinct stalk
C. chualasae

Without appendage. Stromata with cylindric stalk

C. consumpta

Without appendage

Perithecia longer than 500 μm in length

F.p. dark purplish brown. Perithecia 830–1,100 μm long

C. craigii

F.p. olive coloured. Perithecia 900–1,200 μm long

C. olivascens

F.p. yellowish red. Perithecia 600–700 μm long

C. vorobjovii

Stalk simple, hairy

C. puiggari

Sphaeroid or discoid group

F.p. globose

On nymph of Lepidoptera

C. sphaerocapitata

F.p. discoid

On adult wasp

C. coronilla

On spider. Perithecia immersed in disc

C. nelumboides

On spider. Perithecia superficial forming disc

C. pseudonelumboides

On larva of Coleoptera immersed in wood. Stalk slender filiform

C. subsessilis

On ant.

C. lloydii

On adult Diptera

C. discoideocapitata

On larva of Coleoptera. Stalk clavate. Perithecia half-immersed

C. facis

Sect. 6. Cystocarpon Subsect. Eucystocarpon Ser. Entomogaeae

Group with apical appendage

F.p. oblong

Appendage long, slender

C. pilifera

Appendage short

Stalk hairy, dark purplish red. Peridium pseudoparenchymatous

C. appendiculata

Stalk smooth, pale yellow. Fertile part reddish brown. Peridium pseudoparenchymatous

C. rubiginosoperitheciata

Stalk pale pinkish. Peridium pseudoparenchymatous

C. elateridicola

Stalk purple-red. Fertile part dark ochraceous. Peridium pseudoparenchymatous

C. rubiginosostipitata

F.p. elongated

Peridium hyphal. Stromata ochraceous

C. ochraceostromata

- Peridium hyphal. Stromata orange yellow *C. rickii*
 Peridium palisade *C. stylophora*
 Stalk very long, 50 mm, brown with white f.p.
 Peridium pseudoparenchymatous *C. elongatostromata*
 Stalk with hair-like hyphae; hyphae long, slender
 Peridium pseudoparenchymatous *C. melolonthae*
 Stalk smooth
 Stroma dark brown *C. atrobrunnea*
 Stroma bright red *C. fleischeri*
 Stroma yellow *C. geotrupis*
 Stroma brown *C. barnesii*
- Sect. 6. *Cystocarpon* Ser. Entomogenae
 Group with apical appendage. Special species
 F.p. discoid. Perithecia rectangularly immersed. Secondary spores fusiform
C. dipterigena
- Sect. 6. *Cystocarpon* Subsect. *Eucystocarpon* Ser. Mycogenae
 Secondary spores truncated
 F.p. elongated
 With rhizoid. Secondary spores truncated *C. ophioglossoides*
 Secondary spores cubie *C. ophioglossoides* f. *cuboides*
 Secondary spores truncated, F.p. white
C. ophioglossoides f. *alba*
 Without rhizoid
 F.p. cylindric or clavate *C. japonica*
 F.p. obovate *C. tenuispora*
 F.p. globose
 Peridium palisade
 Stalk olivaceous *C. intermedia*
 Stalk pale yellow *C. intermedia* f. *michinokuensis*
 Stalk dark brown *C. valliformis*
 Peridium pseudoparenchymatous
 Stalk white, with transverse thickenings *C. miomoteana*
 Stalk olive-coloured *C. fracta*
- Secondary spores fusiform
 F.p. elongated
 F.p. ellipsoid *C. valvatostipitata*
 F.p. clavate *C. jezoensis*
 F.p. globose
 With rhizoidal base *C. delicatostipitata*

- Without rhizoidal base
- With transverse thickenings *C. minazukiensis*
 - Without transverse thickenings
 - Peridium pseudoparenchymatous *C. capitata*
 - Peridium palisade. Secondary spores 20–60 μm long *C. canadensis*
 - Peridium palisade. Secondary spores 13–21 μm long *C. rouxii*
 - F.p. elongated, Stalk branched
 - Stromata branched, lanceolate, with slender appendage and superficial perithecia *C. ramosa*
- Sect. 7. *Cremastocarpon* Subsect. *Carnosae*
- F.p. globose
 - F.p. with hairs. On adult Hymenoptera *C. lachnopoda*
 - F.p. without hairs
 - On dragon fly *C. odonatae*
 - On adult of Hemiptera *C. lutea*
 - On Diptera *C. bicephala*
 - F.p. fusiform. On larva of Coleoptera *C. indigotica*
 - F.p. clavate. On larva of Coleoptera *C. brasiliensis*
 - F.p. cylindric. On cicada *C. owariensis*
 - F.p. ellipsoidal, brown, red, orange or cinnabar. On larva of Coleoptera *C. martialis*
 - F.p. clavate, olivaceous. On larva of Diptera *C. novoguineensis*
 - F.p. ellipsoidal, yellow. On larva of some insect *C. subflavida*
 - F.p. ellipsoidal, orange-yellow. On larva of Lepidoptera *C. chanpaishanensis*
 - F.p. with apical appendage
 - F.p. lemon-shaped, yellow. On ant *C. irangiensis*
 - F.p. fusiform, ochraceous brown. On larva of Coleoptera *C. aphodii*
 - F.p. fusiform, cinnamon. On larva of Lepidoptera *C. cotopaxiana*
 - F.p. long attenuated, pale ochraceous. On larva of Coleoptera *C. obliquiordinata*
 - F.p. cylindric attenuated, orange red. On pupa of Lepidoptera *C. miniata*
 - F.p. clavate, cinnabar. On larva of Coleoptera *C. cinnabarina*
 - F.p. elongated, olive-coloured. On cicada *C. cicadicola*
- Sect. 7. *Cremastocarpon* Subsect. *Marasmioidea* *C. nutans.*

Subgenus *Neocordyceps*

- F.p. elongated
 On adult Hymenoptera
 Without appendage *C. sphecocephala*
 With appendage *C. sphecocephala* f. *oxycephala*
 On adult Hemiptera *C. tricentri*
- F.p. discoid. On cocoon of Lepidoptera *C. atropuncta*
- F.p. globose
 Stromata carnose
 Stromata fasciculate. F.p. 5 mm long. Perithecia 1.000 μ m long. On *Vespa*
C. thyrsoides
 Stromata single. F.p. 1-3.5 mm long. Perithecia 800-830 μ m long. On ant
C. myrmecophila
 Stromata fasciculate. F.p. 3 mm long. Perithecia 600-630 μ m long. On *Musca*
C. forquignoni
 Stromata single. F.p. 3 mm long. Perithecia 400-500 μ m long. On cicada
C. evdogeorgiae
 Stromata marasmoid, branched. F.p. 2.5-3 mm long. Perithecia 630-850 μ m
 long. On Coleoptera *C. curcurionum*

List of species of *Cordyceps**

Epicarposoma

- Cordyceps acicularis* Rav. ex Berk., in Journ. Linn. Soc. 1: 158, pl. 1 (1857). Type locality (Abbr.: T.L.)
 USA.
- C. alba* Y. Kobayasi et D. Shimizu**, in BNSM, Ser. B, 8(4): 114, f.5, 14E (1982). T.L. Japan.
- C. ampullacea* Y.K. et D.S., in BNSM, Ser. B, 8(4): 112, f.2, 14B (1982). T.L. Japan.
- C. atropuncta* Koval, in Botanicheskii Materiali 14: 158, f.1 (1961). T.L. USSR.
- C. blattae* Petch, in TBMS 10: 35, pl.1 f.8, 14 (1924). T.L. Ceylon.
- C. coccidiicola* Y.K. et D.S., in BNSM, Ser. B, 4(2): 57, f. 15, 20 A (1978). T.L. Japan.
- C. koreana* Y. Kobayasi, in BNSM, Ser. B, 7(1): 8 (1981). T.L. Korea.
- C. pallidiolivacea* Y.K. et D.S., in BNSM, Ser. B, 8(4): 113, f. 4, 14D (1982). T.L. Japan.
- C. pseudoatrovirens* Y.K. et D.S., in BNSM, Ser. B, 8(4): 111, f. 1, 14A (1982). T.L. Japan.
- C. rhizoidea* v. Höhnelt, in Stzb. K. Ak. Wiss. Wien 11(1): 307, f. 10 (1909). T.L. Java.
- C. rosea* Y.K. et D.S., in BNSM, Ser. B, 8(4): 112, f. 3, 14C (1982). T.L. Japan.
- C. sherringii* Masee, in Ann. Bot. 5: 510, f. 4 (1890). T.L. India.
- C. shimaensis* Y.K. et D.S., in BNSM, Ser. B, 7(1): 10, f. 10, D.13 (1981). T.L. Japan.

* Abbreviations are used for the following journals:

BNSM: Bulletin of National Science Museum, Tokyo.

SRBD: Science Reports of Tokyo Bunrika Daigaku.

TBMS: Transactions of the British Mycological Society.

** Abbreviation: Y.K. et D.S.

C. termitophila Y.K. et D.S., in BNSM, Ser. B, 4(2): 56, f. 11 (right), 14, 20 D, E (1976). T.L. Japan.

Neocarposoma

C. nigripoda Y.K. et D.S., in BNSM, Ser. B, 8(4): 116, f. 8 (1982). T.L. Japan.

Capitatae

C. atrovirens Y.K. et D.S., in BNSM, Ser. B, 4(2): 52, f. 9, 18 B (1978). T.L. Japan.

C. brittlebankii McLennan et Cookson, in Proc. Roy. Soc. Vict. 38: 74, pl. 5, f. 5, 6, pl. 6, f. 4-5 (1926).
T.L. Australia.

C. clavulata (Schw.) Ellis et Ev., in North Am. Pyrenomyc. p. 61, pl. 15, f. 11-13 (1892). T.L. USA.

C. smithii Mains, in J. Elisha Mitchell Sci. Soc. 55(1): 127, pl. 19, C, D. (1939). T.L. USA.

Laterales

C. asyuensis Y.K. et D.S., in BNSM, Ser. B, 6(4): 138, f. 17, 23 AB (1980). T.L. Japan.

C. baumanniana P. Henn., in Engl. Bot. Jahrb. 23: 539, pl. 14, f. 5a-d (1897). T.L. Togo.

C. clavata Y.K. et D.S., in BNSM, Ser. B, 6(4): 140, f. 19, 22A, 23C (1980). T.L. Japan.

C. corallomyces Möller, Phyc. u. Ascom. p. 2187, pl. 6, f. 85, 86 (1909). T.L. Brazil.

C. ferruginosa Y.K. et D.S., in BNSM, Ser. B, 6(4): 139, f. 18 (1980). T.L. Japan.

C. inconspicua Moureau, in Lejeunea, no. 14, 4, pl. 1, f. 1a-d (1962). T.L. Congo.

C. interrupta v. Höhnelt, in Stzb. K. Akad. Wiss. Wien 118(1): 303, f. 8 (1909). T.L. Java.

C. pentatomi Koval, in Nov. Sist. Niz. Rast. (1964): 166, fig. (1964). T.L. USSR.

C. purpureostromata Y.K. et D.S., in BNSM, Ser. B, 6(4): 136, f. 16, 22B (1980). T.L. Japan.

C. ramosopulvinata Y.K. et D.S., in BNSM, Ser. B, 9(1): 2 (1983). T.L. Japan.

C. unilateralis (Tul.) Sacc., Syll. Fung. 2: 570 (1883). T.L. Brazil.

C. unilateralis var. *clavata* Y. Kobayasi, in SRBD 5: 78, f. on p. 79, 81 (1941). T.L. Japan.

C. variabilis Petch, in TBMS 21: 42 (1937). T.L. USA.

Sparsae

C. agriota Kawam., Icon. Jap. Fungi 8: 837, f. 821 (1959). T.L. Japan.

C. alboperitheciata, in BNSM, Ser. B, 8(3): 84 (1982). T.L. Japan.

C. aurantia Y.K. et D.S., in BNSM, Ser. B, 6(4): 125, f. 2, 20B (1980). T.L. Japan.

C. aurea Moureau, in Mem. Inst. Royal Colonial Belge 7(5): 21, pl. 1, 3, 4, f. 7 (1949). T.L. Congo.

C. carabidicola Y.K. et D.S., in BNSM, Ser. B, 6(3): 85, f. 11, 21C (1980). T.L. Japan.

C. chichibuensis Y.K. et D.S., in BNSM, Ser. B, 6(3): 87, f. 13, 18 (1980). T.L. Japan.

C. coccidioperitheciata Y.K. et D.S., in BNSM, Ser. B, 8(3): 79 (1982). T.L. Japan.

C. crinalis Ellis ex Lloyd, Myc. Writ. 6: 912, pl. 142, f. 1619 (1920). T.L. USA.

C. ctenocephala Syd., in Engler, Bot. Jahrb. 57(3): 323, f. E on p. 322 (1922). T.L. New Guinea.

C. cuboidea Y.K. et D.S., in BNSM, Ser. B, 6(4): 131, f. 9, 10 (1980). T.L. Japan.

C. elongatoperitheciata Y.K. et D.S., in BNSM, Ser. B, 6(4): 126, f. 3, 20C (1980). T.L. Japan.

C. engleriana P. Henn., in Engler, Bot. Jahrb. 23: 538, pl. 14, f. 3 (1897). T.L. Cameroon.

C. falcata Berk., in Hooker Journ. Bot. 6: 211, pl. 8, f. 2 (1854). T.L. India.

C. falcatooides Y.K. et D.S., in BNSM, Ser. B, 6(3): 91, f. 17, 18 (1980). T.L. Japan.

C. filiformis Moureau, in Mem. Inst. Royal. Col. Belge 7(5): 14, pl. 1, figs (1948). T.L. Congo.

C. furcata McLennan et Cookson, in Proc. Roy. Soc. Victoria 35: 157, pl. 10, f. 1-5 (1923). T.L. Australia

C. geniculata Y.K. et D.S., in BNSM, Ser. B, 6(3): 85, f. 10 (1980). T.L. Japan.

C. grylli Teng, in Sinensia 7: 811, f. 8 (1936). T.L. China.

C. henleyae Massee, in Ann. Bot. 8: 119, et 9: 28, pl. 1, f. 1-12 (1895). T.L. Australia.

- C. hiugensis* Y.K. et D.S., in BNSM, Ser. B, 9(1): 3 (1983). T.L. Japan.
- C. hokkaidoensis* Y. Kobayasi, in SRBD 5: 91, fig. on p. 89 (1941). T.L. Japan.
- C. inegoensis* Y. Kobayasi, in BNSM 6(3): 292, f. 2, pl. 39, f. E, F (1963). T.L. Japan.
- C. iriomoteana* Y.K. et D.S., in BNSM 8(3): 82 (1982). T.L. Japan.
- C. konnoana* Y.K. et D.S., in BNSM 6(3): 84, f. 9, 21B (1980). T.L. Japan.
- C. kusanagiensis* Y.K. et D.S., in BNSM, Ser. B, 9(1): 7 (1983). T.L. Japan.
- C. lateritia* Dingley, in Trans. Roy. Soc. New Zealand 81(3): 337, f. 2 (3, 5) (1953). T.L. New Zealand.
- C. macularis* Mains, in Paper Mich. Acad. Sci. 25: 82 (1940). T.L. USA.
- C. memorabilis* (Cesati) Sacc., *Michelia* 1: 321 (1879). T.L. Italy.
- C. michiganensis* Mains, in Proc. Am. Phil. Soc. 74(4): 266, pl. 1, f. A-E (1934). T.L. USA.
- C. minuta* Y. Kobayasi, in BNSM 6(7): 294, f. 3, pl. 40, f. A, C (1963). T.L. Japan.
- C. minutissima* T.K. et D.S., in BNSM 6(3): 79, f. 1. 19A (1980). T.L. Japan.
- C. nanatakiensis* Y.K. et D.S., in BNSM, Ser. B, 9(1): 9 (1983). T.L. Japan.
- C. norvegica* Olsen Soff, in Kristiania Vedenskapsselskapetr. Skript 1 Mat. Nat. Kl. (1911), no. 2, p. 29, pl. 1-4 (1911). T.L. Norway.
- C. novae-zealandiae* Dingley, in Trans. Roy. Soc. New Zealand 81(3): 337, f. 2 (1, 2, 7A) (1953). T.L. New Zealand.
- C. odyneri* Quel., in 14th. Suppl. Champ. Jura et Vosges p. 10, pl. 12, f. 28 (1885). T.L. France.
- C. ogurasanensis* Y.K. et D.S., in BNSM, Ser. B, 8(3): 80 (1982). T.L. Japan.
- C. osuzumontana* Y.K. et D.S., in BNSM, Ser. B, 6(3): 77, f. 2 (1980). T.L. Japan.
- C. ovoideoperitheciata* Y.K. et D.S., in BNSM, Ser. B, 8(3): 83 (1982). T.L. Japan.
- C. paludosa* Mains, in Papers Mich. Acad. Sci. 25: 83 (1940). T.L. USA.
- C. parvula* Mains, in Bull. Torrey Bot. Club 86(1): 46, f. 1-3 (1959). T.L. Venezuela.
- C. petchii* Mains, in Bull. Torrey Bot. Cl. 86(1): 47, f. 5-7 (1951). T.L. Trinidad.
- C. polyarthra* Möller, *Phycom. et Ascomy.* p. 213, pl. 6, f. 83 (1901). T.L. Brazil.
- C. polycephala* Y.K. et D.S., in BNSM, Ser. B, 9(1): 1 (1983). T.L. Japan.
- C. prolifica* Y. Kobayasi, in BNSM 6(3): 289, f. 1, pl. 39, f. A, B (1963). T.L. Japan.
- C. prolifica* Y. Kobayasi f. *terminalis* Y.K., in BNSM 6(3): 292, pl. 39, f. C, D (1963). T.L. Japan.
- C. pruinosa* Petch, in TBMS 10: 58, pl. 1, f. 1 (1829). T.L. Ceylon.
- C. ramosostipitata* Y.K. et D.S., in BNSM, Ser. B, 9(1): 6 (1983). T.L. Japan.
- C. ravenelii* Berk. et Curt., in Journ. Linn. Soc. 1: 159, pl. 1 (1857). T.L. USA.
- C. riverae* Pacioni, in G. Bot. Ital. 112(5-6): 395 (1979). T.L. Italy.
- C. roseostromata* Y.K. et D.S., in BNSM, Ser. B, 9(1): 10 (1983). T.L. Japan.
- C. rubricapitata* Y.K. et D.S., in BNSM, Ser. B, 9(1): 9 (1983). T.L. Japan.
- C. rubripunctata* Moureau, in Mem. Inst. Royal Colonial Belge 7(5): 26, pl. 1, 3, 4, f. 10 (1949). T.L. Congo.
- C. ryogamiensis* Y.K. et D.S., in BNSM, Ser. B, 9(1): 4 (1983). T.L. Japan.
- C. sakishimensis* Y.K. et D.S., in BNSM, Ser. B, 9(1): 6 (1983). T.L. Japan.
- C. sinensis* (Berk.) Sacc., *Michelia* 1: 320 (1878). T.L. China.
- C. superficialis* (Peck) Sacc., *Syll. Fung.* 2: 574 (1883). T.L. USA.
- C. superficialis* f. *crustacea* Y.K. et D.S., in BNSM, Ser. B, 6(3): 82, f. 7, 22B (1980). T.L. Japan.
- C. takaomontana* Y. Kobayasi, in SRBD 5: 108, fig. on p. 106 (1941). T.L. Japan.
- C. thaxteri* Mains, in Journ. Elisha Mitchell Sc. Soc. 55(1): 120 (1939). T.L. USA.

- C. truncata* Moureau, in Mem. Inst. Royal Colonial Belge 7(5): 19, pl. 1, 3, 4, f. 6 (1949). T.L. Congo.
- C. tuberculata* (Lebert) Maire emend. Petch, in TBMS 16: 217 (1932). T.L. USA.
- C. uchiyamae* Y.K. et D.S., in BNSM, Ser. B, 6(4): 125, f. 1, 20A (1980). T.L. Japan.
- C. uleana* P. Henn., in Hedwigia 43: 248, pl. 4, f. 5 (1904). T.L. Peru.
- C. variegata* Moureau, in Mem. Inst. Royal Colonial Belge 7(5): 30, pl. 1, 3, 5, fig. 12 (1940). T.L. Congo.
- C. venezuelensis* Mains, in Mycologia 39(5): 543, f. 3, A, B (1947). T.L. Venezuela.
- C. yahagiana* Y.K. et D.S., in BNSM, Ser. B, 6(3): 88, f. 14, 19C (1980). T.L. Japan.
- Clavicipiticola**
- C. clavicipiticola* Tokunaga et Imai, in Trans. Sapporo Nat. Hist. Soc. 14(2): 104, cum fig. (1939). T.L. Japan.
- C. clavicipitis* Oertegren, in Svensk Bot. Tidskr. 10: 53, 55 cum icones (1916). T.L. Sweden.
- C. sclerotium* Y. Kobayasi, in Trans. mycol. Soc. Japan 23: 361 (1982). T.L. France.
- Racemella** Subsect. *Confertae*
- C. dovei* Rodway, in Paper Proc. Roy. Soc. Tasmania 1898-1899, pl. 101 cum icon. (1900). T.L. Tasmania.
- C. hauturu* Dingley, in Trans. Royal Soc. New Zealand, 81(3): 334, f. 4, 6 (1953). T.L. New Zealand.
- C. kirkii* Cunningham, in TBMS 8: 72, f. 1-3 (1922). T.L. New Zealand.
- C. locustiphila* P. Henn., in Hedwigia 43: 247, pl. 4, f. 3 (1904). T.L. Peru.
- C. robertsii* (Hooke.) Gray, in Notices Insect Fungi, p. 6, pl. 2, f. 3, 4 (1858). T.L. New Zealand.
- C. tarapotensis* Henn., in Hedwigia 43: 246, pl. 4, f. 1 (1904). T.L. Peru.
- C. taylori* (Berk.) Sacc., *Michelia* 1: 320 (1879). T.L. Australia.
- Cystocarpon**
- C. menesteridis* Muell. et Berk., in Gard. Chron. 2(10): 791, f. 1, 2 (1878). T.L. Australia.
- C. nipponica* Y. Kobayasi, in Bull. Biogeogr. Soc. Japan 9: 151, f. 1-4A, 5, pl. 1, f. A-D (1939). T.L. Japan.
- C. obliqua* Y. Kobayasi, in SRBD 5: 177, fig. on p. 178 (1941). T.L. Japan.
- Pseudoimmersae**
- C. aspera* Pat., in Journ. Bot. 7: 344 (1893). T.L. Tibet.
- C. deflectens* Penz. et Sacc., in Malpigia 11: 522 (1897). Y.T.L. Java.
- C. doiana* Y. Kobayasi, in BNSM 7(4): 124, f. 2 (1981). T.L. Colombia.
- C. erotyli* Petch, in TBMS 21: 40 (1937). T.L. Trinidad.
- C. flavobrunnescens* P. Henn., in Warburg, *Monsunia* 1: 164 (1900). T.L. Java.
- C. kyushuensis* Kawamura, *Icon. Jap. Fungi* 8: 841, f. 823 (1935). T.L. Japan.
- C. langloisii* Ellis et Ev., in N. Am. Pyrenomyc., p. 62 (1892). T.L. USA.
- C. michaelisii* Henn., in Hedwigia 41: 169 (1902). T.L. Surinam.
- C. militaris* (Vuill) Fr., *Summa Veg. Scand.*, p. 381 (1849). T.L. Europe.
- C. militaris* f. *albino* Y. Kobayasi, in BNSM 4(2): 58, f. 3D (1978).
- C. militaris* f. *sphaerocephala* (Schw.) Fr., *Syst. Myc.* 2: 323 (1822).
- C. norwegica* Sopp, in *Kristiania Vidensk. Skrift 1 Mat.-Nat. Kl.*, no. 2, pp. 29-37, et 49-50, pl. 1-4 (1911). T.L. Norway.
- C. scarabaeicola* Y.K. et D.S., in BNSM 2(4): 137, f. 9, 29 (1976). T.L. New Guinea.
- C. singeri* Mains, in Bull. Torrey Bot. Club 81(5): 499, f. 11-14 (1954). T.L. Argentine.

G. translucens Petch, in TBMS 10: 37, pl. 1, f. 15 (1924). T.L. Ceylon.

G. typhulaeformis Berk. et Cooke, in Grevillea 12: 78 (1883). T.L. Java.

Cystocarpon-Entomogena—Pseudoparenchymatous walled group

G. ainictos Möller, Phycom. u. Ascom., p. 226, pl. 7: 105 (1901). T.L. Brazil.

G. amazonica P. Henn., in Hedwigia 43: 247 (1904). T.L. Brazil.

G. amazonica var. *neoamazonica* Y. Kobayasi et Hama, in Journ. Jap. Bot. 57: 17, f. 1–2 (1982), et 57(1): 17, f. 1, 2 (1982). T.L. Japan.

G. arachnogenae Y.K. et D.S., in BNSM 2(4): 144, f. 21, 24 (1976). T.L. New Guinea.

G. atrobrunnea Penz. et Sacc., in Malpighia 11: 522 (1877). T.L. Java.

G. bulolensis Y.K. et D.S., in BNSM 2(4): 142, f. 15, 17 (1976). T.L. New Guinea.

G. entomorrhiza (Dickson) Fr., Summa Veg. Scand., p. 381 (1849). T.L. Germany.

G. exasperata Vital, in Ann. Soc. Biol. Pernambuco 14(1, 2): 65, f. 1 (1956). T.L. Brazil.

G. formosana Y.K. et D.S., in BNSM 7(4): 113 (1981). T.L. Formosa.

G. gunnii (Berk.) Berk., in Hook, Flora Tasmania 2: 278 (1859). T.L. Tasmania.

G. haukesii (Gray) Cooke, in Grevillea 19: 76 (1891). T.L. Tasmania.

G. hepialidicola Y.K. et D.S., in BNSM, Ser. B, 9(1): 11 (1983). T.L. Japan.

G. hesleri Mains, in Journ. Elisha Mitchell. Sc. Soc. 55(1): 125, pl. 19A, B (1939). T.L. USA.

G. imagamiana Y.K. et D.S., in BNSM, Ser. B, 9(1): 1 (1983). T.L. Japan.

G. lacroixii Hariot et Pat., in Bull. Soc. Myc. Fr. 20: 62 cum icon. (1904). T.L. Japan.

G. leucocephala Moureau, in Lejeunea 14: 7, pl. 1, f. 2A–C (1962). T.L. Congo.

G. lignicola Masee, in Bull. Misc. Inform. Roy. Gard. Kew (1899): 173. T.L. Malaysia.

G. longissima Y. Kobayasi, in BNSM 6(7): 33, f. 9, pl. 41, f. A, C (1963). T.L. Japan.

G. mantidaecola Y.K. et D.S., in BNSM, Ser. B, 9(1): 12 (1983). T.L. Japan.

G. monticola Mains, in Mycologia 32(3): 310, f. 1, A, B (1940). T.L. USA.

G. myrmecogena Y.K. et D.S., in BNSM 4(2): 55, f. 13, 18C (1978). T.L. Japan.

G. neogryllotalpae Y. Kobayasi, in BNSM 2(4): 143, f. 19, 20 (1976). T.L. Japan.

G. neovolukiana Y. Kobayasi, in SRBD 5: 109, f. on p. 170 (1941). T.L. Japan.

G. nigra Y.K. et D.S., in BNSM, Ser. B, 9(1): 13 (1983). T.L. Japan.

G. olivacea Rick, ex Lloyd, Myc. Writ. 7: 1118, pl. 199, fig. 2125 (1922). T.L. Brazil.

G. ootakiensis Y.K. et D.S., in BNSM, Ser. B, 9(1): 15 (1983). T.L. Japan.

G. paradoxa Y. Kobayasi, in Sc. Rept. Tokyo B.D. 5: 137, f. on pl. 138 (1941). T.L. Japan.

G. ryogamimontana Y.K., in BNSM, 6 (3): 303, f. 11, pl. 41, f. F–G (1963). T.L. Japan.

G. sphaerocapitata Y. Kobayasi, in BNSM 2(4): 143, f. 18, 30 (1976). T.L. Japan.

G. stylophora Berk. et Br., in Journ. Linn. Soc. 1: 158 (1857). T.L. USA.

G. velutipes Masee, in Ann. Bot. 9(33): 21 (1895). T.L. South Africa.

G. yakushimensis Y. Kobayasi, in BNSM 6(7): 302, f. 10, pl. 41, f. D–E (1965). T.L. Japan.

Hyphal walled group

G. cylindrica Petch, in TBMS 21: 46 (1937). T.L. Trinidad.

G. sinclairii Y. Kobayasi, in Journ. Jap. Bot. 24(1–12): 176, f. 1 (1949). T.L. Japan.

Palisade walled group

G. albocitrina Koval, in Nov. Sist. niz. Rast. 11: 209 (1974). T.L. USSR.

G. alpicola Y. Kobayasi, in BNSM 2(4): 138, f. 6, 10 (1976). T.L. New Guinea.

G. annullata Y.K. et D.S., in BNSM 8(3): 91 (1982). T.L. Japan.

- C. bicolor* Y. Kobayasi, in Journ. Jap. Bot. 54(9): 258, f. 2 (1979). T.L. Madagascar.
- C. citrea* Penz. et Sacc., in Malpighia 11: 523 (1897). T.L. Java.
- C. coccidiocapitata*, in BNSM 8(3): 91 (1982). T.L. Japan.
- C. coccinea* Penz. et Sacc., in Malpighia 11: 524 (1897). T.L. Java.
- C. elongata* Petch, in TBMS 21: 47 (1937). T.L. USA.
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- C. gracilioides* Y. Kobayasi, in SRBD 5: 140, fig. on p. 142 (1941). T.L. Japan.
- C. gracilis* Duriew et Mont., in Flora Algeria Crypt. 1: 449, pl. 25, f. 2 (1846). T.L. Algeria.
- C. heteropoda* Y. Kobayasi, in Bull. Biogeogr. Soc. Japan 9: 158, f. 1D, 2-4C, 9, 10, 11 (1939). T.L. Japan.
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- C. scottiana* Olliff, in Agr. Gaz. New South Wales 6: 407, pl. 1 (1895). T.L. Australia.
- C. sobolifera* (Hill.) Berk. et Br., in Journ. Linn. Soc. 14: 110 (1895). T.L. Martinique.
- C. sobolifera* var. *takaoensis* Y. Kobayasi, in Bull. Biogeogr. Soc. Japan 7(1): 165 (1939). T.L. Japan.
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- C. sulfurea* Y.K. et D.S., in BNSM, Ser. B, 9(1): 15 (1983). T.L. Japan.
- C. trinidadensis* Mains, in Bull. Torrey Bot. Club 86(1): 46, f. 4 (1959). T.L. Trinidad.
- C. vinosa* Moureau, in Lejeunea, Momoire no. 15, p. 28, pl. 3, f. 10, pl. 5, f. 10 (1961). T.L. Congo.
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- Unknown walled group
- C. atrobrunnea* Penz. et Sacc., in Malpighia 11: 522 (1897). T.L. Java.
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- C. chualasae* Koval et Nazarova, in Nov. Sist. niz. Rast. 6: 116, f. 2 (1969). T.L. USSR.
- C. consumpta* Cunningham, in Trans. Proc. New Zealand Inst. 53: 377, f. 3, 4, pl. 60, f. 1 (1921). T.L. New Zealand.
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- C. incarnata* Möller, Phycom. u. Ascom., p. 228, pl. 6, f. 94 (1901). T.L. Brazil.
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C. proliferans P. Henn., in *Hedwigia* 43: 248, pl. 4, fig. 6 (1904). T.L. Brazil.
C. puiggari Speg., in *Fungi Fueg. no. 304*, in *Bol. Acad. Nacional. Cord.* (1888). T.L. Brazil.
C. rhizomorpha Möller, *Phycom. u. Ascom.*, p. 231, pl. 7, f. 104 (1901). T.L. Brazil.
C. rubra Möller, *Phycom. u. Ascom.* p. 223, pl. 7, f. 102, 103 (1901). T.L. Brazil.
C. subcorticicola P. Henn., in *Hedwigia* 41: 11 (1902). T.L. Brazil.
C. subunilateralis P. Henn., in *Hedwigia* 41: 168 (1902). T.L. Surinam.
C. velutipes Massee, in *Ann. Bot.* 9(33): 21 (1895). T.L. South Africa.
C. volkiana Möller, *Phycom. u. Ascom.*, p. 233, pl. 7, f. 98, 99B, C (1901). T.L. Brazil.
C. vorobjovii Koval et Nazarova, in *Nov. Sist. niz. Rast.* 6: 108, f. 1 (1969). T.L. USSR.

Sphaeroid or discoid group

- C. atropuncta* Koval, in *Bot. Mater.* 14: 158, f. 1 (1961). T.L. USSR.
C. coronilla v. Höhnelt, in *Stzb. K. Akad. Wiss. Wien*, 118(1): 306, f. 9 (1909). T.L. Brazil.
C. discoideocapitata Y.K. et D.S., in *BNSM* 8(3): 85 (1982). T.L. Japan.
C. facis Y.K. et D.S., in *Trans. mycol. Soc. Japan* 23: 361 (1982). T.L. Japan.
C. lloydii Fawcett, in *Am. Nat. Hist.* 18: 316 cum icon. (1886). T.L. Granada.
C. nelumboides Y.K. et D.S., in *Kew Bull.* 31(3): 557, f. 1A, 2 (1976). T.L. Japan.
C. pseudonelumboides Y.K. et D.S., in *BNSM* 8(3): 80 (1982). T.L. Japan.
C. sphaerocapitata Y. Kobayasi, in *BNSM* 2(4): 143, f. 18, 30 (1976). T.L. Formosa.
C. subsessilis Petch, in *TBMS* 21: 39 (1937). T.L. USA.

Group with apical appendage

- C. appendiculata* Y.K. et D.S., in *BNSM, Ser. B*, 9(1): 6 (1983). T.L. Japan.
C. atrobrunnea Penz. et Sacc., in *Malpighia* 11: 522 (1897). T.L. Java.
C. barnesii Thwaites ex Berk. et Br., in *Journ. Bot. Linn. Soc.* 14: 110 (1875). T.L. Ceylon.
C. elateridicola Y.K. et D.S., in *BNSM, Ser. B*, 9(1): 4 (1983). T.L. Japan.
C. elongatostromata Y.K. et D.S. in *BNSM, Ser. B*, 9(1): 12 (1983). T.L. Japan.
C. fleisheri Penz. et Sacc., in *Malpighia* 15: 230 (1901). T.L. Java.
C. geotrupis Teng, in *Sinensia* 4: 293, f. 21 (1934). T.L. China.
C. klenei Pat., in *Bull. Soc. Myc. France* 24: 11, f. 3 (1908). T.L. Brazil.
C. melolonthae var. *rickii* (Lloyd) Mains, in *Mycologia* 50: 198 (1958). T.L. Nicaragua.
C. melolonthae (Tul.) Sacc., in *Michelia* 1: 320 (1879). T.L. USA.
C. ochraceostromata Y. Kobayasi, in *BNSM*, 6(4): 132, f. 8 (1980). T.L. Japan.
C. pilifera Y.K. et D.S., in *BNSM* 7(4): 126, f. 4 (1981). T.L. Japan.
C. rubiginosoperitheciata Y.K. et D.S., in *BNSM, Ser. B*, 9(1): 4 (1983). T.L. Japan.
C. rubiginosostipitata Y.K. et D.S., in *BNSM, Ser. B*, 9(1): 3 (1983). T.L. Japan.
C. rickii Lloyd, *Myc. Writ.* 6: 914, pl. 143, f. 1628-30 (1920). T.L. Brazil.
C. ridleyi Massee, in *Bull. Miscell. Inf. Royal Gard. Kew*, p. 173 (1899). T.L. Malaysia.
C. stylophora Berk. et Br., in *Journ. Linn. Soc.* 1: 158 (1957). T.L. USA.

Special species

- C. dipterigena* Berk. et Br., in *Linnean Soc. Journ. Bot.* 11: 111 (1871). T.L. Ceylon.

Mycogenae

- C. aphodii* Machieson, in *TBMS*, 32(2): 113, pl. 12-14, f. 1-10 (1949). T.L. Australia.

- C. arbuscula* Teng, in *Sinensia* 7: 812, f. 9 (1936). T.L. China.
- C. bicephala* Berk., in *Hook. Journ. Bot.* 8: 278 (1856). T.L. South America.
- C. brasiliensis* P. Henn., in *Hedwigia* 36: 221 (1897). T.L. Brazil.
- C. canadensis* Ell. et Ev., in *Bull. Torrey Bot. Cl.* 25: 501 (1898). T.L. Canada.
- C. capitata* (Fr.) Link, in *Handbook* 3: 347 (1833). T.L. Europe.
- C. changpaishanensis* Y.K. et D.S., in *BNSM* 7(1): 12, f. 14 (1981). T.L. China.
- C. cicadicola* Teng, in *Sinensia* 7: 812, f. 9 (1936). T.L. China.
- C. cinnabarina* Petch, in *Ann. Crypt. Exot.* 6: 230 (1933). T.L. Madagascar.
- C. cotopaxiana* Y. Kobayasi, in *BNSM* 7(4): 126, f. 2 (1981). T.L. Ecuador.
- C. delicatostipitata* Y. Kobayasi, in *BNSM* 5(2): 79, f. 1-4D, pl. 6, 8, f. I-J (1960). T.L. Japan.
- C. fracta* Mains, in *Bull. Torrey Bot. Club* 84(4): 250, f. 11 (1957). T.L. USA.
- C. indigotica* Y.K. et D.S., in *BNSM* 4(2): 53, f. 10, 19D (1978). T.L. Java.
- C. intermedia* f. *michinokuensis* Y.K. et D.S., in *BNSM*, Ser. B, 8(4): 116, f. 9, 15C (1982). T.L. Japan.
- C. intermedia* Imai, in *Proc. Imp. Acad. Tokyo* 10(10): 677, f. 1-6 (1934). T.L. Japan.
- C. irangiensis* Moureau, in *Lejeunea* 15: 33, pl. 3, f. 12, pl. 5, f. 12 (1961). T.L. Congo.
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- C. jezoensis* Imai, in *Trans. Sapporo Nat. Hist. Soc.* 11: 33 (1929). T.L. Japan.
- C. lachnopoda* Penz. et Sacc., in *Malpighia* 11: 521 (1897). T.L. Java.
- C. lutea* Moureau in *Mem. Inst. Royal Colonial Belge* 7(5): 41, pl. 2, 3, 5, f. 18 (1949). T.L. Congo.
- C. martialis* Speg., *Fungi Puiggarini* no. 305, in *Biol. Acad. Nac. Cordova* 11 (1889). T.L. Brazil.
- C. minazukiensis* Y.K. et D.S., in *BNSM*, Ser. B, 8(4): 117, f. 10, 16A (1982). T.L. Japan.
- C. miniata* Moureau, in *Lejeunia* 15: 22, pl. 2, f. 7, pl. 5, f. 7 (1961). T.L. Congo.
- C. miomoteana* Y.K. et D.S., in *BNSM*, Ser. B, 8(4): 118, f. 11, 16B (1982). T.L. Japan.
- C. novoguineensis* Y.K. et D.S., in *BNSM*, Ser. B, 2(4): 148, f. 26 (1976). T.L. New Guinea.
- C. odonatae* Y. Kobayasi, in *BNSM* 7(1): 6, f. 7A, B8 (1981). T.L. New Guinea.
- C. ophioglossoides* (Fr.) Link, in *Handbook*, 3: 347 (1957). T.L. Europe.
- C. ophioglossoides* f. *alba* Y.K., in *Trans. mycol. Soc. Japan* 7: 350 (1966).
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- C. owariensis* Y. Kobayasi, in *Bull. Biogeogr. Soc. Japan* 9: 166 (1939). T.L. Japan.
- C. ramosa* Teng, in *Sinensia* 7(6): 810, f. 7 (1936). T.L. China.
- C. rouxi* Candoussau, in *Mycotaxon* 4(2): 544 (1976). T.L. France.
- C. subflavida* Mains, in *Bull. Torrey Bot. Club*, 86(1): 47 (1959). T.L. Venezuela.
- C. tenuispora* Mains, in *Bull. Torrey Bot. Club* 81(4): 247, f. 4 (1957). T.L. USA.
- C. valliformis* Mains, in *Bull. Torrey Bot. Club* 84(4): 250 (1957). T.L. USA.
- C. valvatostipitata* Y.K. et D.S., in *BNSM* 5(2): 81, F. i-F5, pl. 6, 9M, N (1960). T.L. Japan.
- Marasmioidae
- C. nutans* Pat., in *Bull. Soc. Myc. Fr.* 3: 127, pl. 1, f. 5 (1887). T.L. Japan.
- Neocordyceps
- C. atropuncta* Koval, in *Botan. Mater.* 14: 158, f. 1 (1961). T.L. USSR.
- C. curcurionum* (Tul.) Sacc., *Michelia* 1: 320 (1879). T.L. Peru.
- C. edvoegeorgiae* Koval, in *Botanicheskii Materiari* 14: 160, f. 2 (1961). T.L. USSR.
- C. forquignoi* Quéll., in *Suppl. Champ. Jura et Vosges* p. 6, pl. 21, f. 18 (1887). T.L. France.

C. myrmecophila Cesati, in Bot. Zeit. 4: 877 (1846). T.L. Italy.

C. sphecocephal (Kl.) Sacc., Michelia 1: 321 (1879). T.L. Central America.

C. sphecocephala f. *oxycephala* (Penz. et Sacc.) Y. Kobayasi, T.L. Java.

C. thyrsoides Möller, Phyc. u. Ascom., p. 221, pl. 6, f. 90, 91 (1901). T.L. Brazil.

C. tricorni Yasuda ex Lloyd, in Myc. Writ. 4: Let. 60, p. 14 (1915). T.L. Japan.

Torrubiella Boud., in Rev. Myc. 7: 227 (1885).

Stroma destitute. Growing mainly on Arachnidae and Coccidae, rarely on other insects. Mycelial mat formed on host bodies.

Perithecia separated into nine fundamental types, superficial, gregarious on mycelial mat. Secondary ascospores fusiform or truncated cylindric. Type species: *Torrubiella aranicida* Boud.

Key to the species of *Torrubiella*

(Fig. 2)

Secondary spores fusiform

Perithecia white, 850–900 μm long, type I. On spider *T. ellipsoidea*

Perithecia white, 770–800 μm long, type A. On spider *T. neofusiformis*

Perithecia yellow, 770 μm long, type L. On Rhyncotae *T. fusiformis*

Secondary spores cylindric, truncated. Growing on spider

Perithecia dark umber, 400–470 μm long, type C. Anamorph: *Cephalosporium araneorum*
T. alba

Perithecia white, 400–550 μm long *A. alboglobosa*

Perithecia yellow, 500 μm long. Anamorph: *Cylindrophora araneorum*
T. albolanatma

Perithecia ochraceous or ochraceous orange, 650–700 μm long, type D. Anamorph:

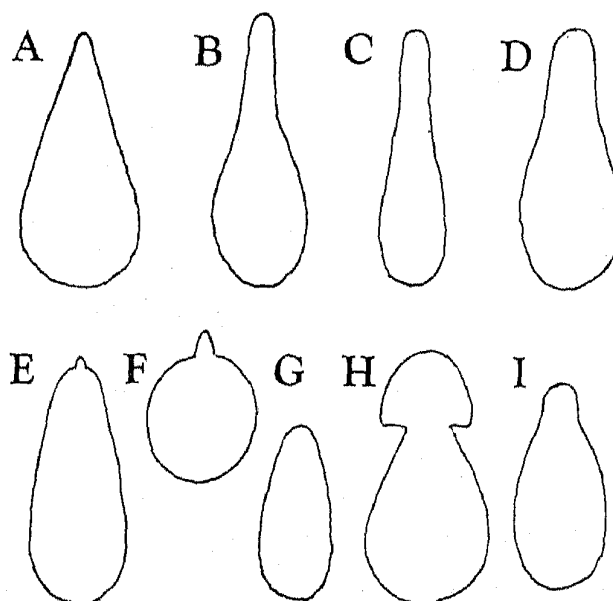


Fig. 2. Fundamental types of perithecia of *Torrubiella* by Petch, modified by Kobayasi.

- Hirsutella cuneispora*
 Perithecia 550–1,200 μm long, yellow, type E
 Perithecia white, 550–1,200 μm long
 Perithecia yellow, 900–1,200 μm long
 Perithecia pale red, 500 μm long, type G
 Perithecia orange-yellow, 720–730 μm long, type H
 Perithecia pale rosy cinereous, 800–930 μm long
 Perithecia whitish, 620–730 μm long, type H
 Perithecia dark umber, 400–470 μm long, type H. Anamorph: *Hirsutella arachnophila*
 Perithecia yellow green, 500 μm long. Anamorph +
 Perithecia 450–630 μm long
 Perithecia yellow, 1,000–1,100 μm long, type A
 Perithecia pale cream-yellow, 450–700 μm long, type I
 Perithecia ochraceous, 670–800 μm long
 Perithecia orange red, 300–400 μm long. Anamorph: *Paecilomyces longipes*
 Perithecia whitish or pale yellowish, 700–800 μm long, type G. Anamorph:
Gibellula araneorum
 Perithecia purple, 670–750 μm long, type I
 Perithecia citron yellow, 600–700 μm long. type G. Anamorph: *Gibellula arachnophila*
 f. *leiopus*
 Perithecia pale fuscous, 1,100–1,200 μm long, type B
 Perithecia white, 530–700 μm long, type I
 Perithecia white, 300–350 μm long
 Perithecia white, 230–280 μm long
 Perithecia white, 220–430 μm long, type G
 Perithecia pale cinereous, 800–830 μm long, type H
 Perithecia white, 430–600 μm long, type G
 Perithecia pale creamy, 550–600 μm long, type I
 Perithecia 700–730 μm long
 Perithecia rosy, 570–650 μm long, type A
 Perithecia ochraceous, 570–630 μm long
 Perithecia 1,000 μm long, type E
 On scale insect (Hemiptera)
 Perithecia brown, 500 μm long
 Perithecia ochraceous or purplish ochraceous, 600–700 μm long
 Perithecia reddish brown or dark chestnut brown. Anamorph: *Hirsutella confragosa*
- T. aranicida*
T. arachnophila
T. arachnophila f. *alba*
T. arachnophila var. *pulchra*
T. ryogamimontana
T. aurantia
T. corniformis
T. farinacea
T. flava
T. flavoviridis
T. formosana
T. globosa
T. globosoides
T. globosostipitata
T. gonylepticida
T. gibellulae
T. inegoensis
T. leiopus
T. longissima
T. mammillata
T. minuta
T. minutissima
T. miyagiana
T. oblonga
T. ooaniensis
T. pallida
T. rokkiana
T. rosea
T. ryukyuensis
T. tomentosa
T. brunnea
T. brunneola
T. confragosa

- Perithecia pale yellow, 270–330 μm long *T. iriomoteana*
- Perithecia yellow, 350 μm long *T. lecanii*
- Perithecia flesh red, 400–800 μm long, type C *T. luteo-rostrata*
- Perithecia reddish or reddish brown, 1,000 μm long, type A *T. rubra*
- Perithecia pale yellow or brown yellow, 750 μm long. Anamorph *T. sublintea*
- Perithecia yellow, 500–600 μm long, type B *T. superficialis*
- Perithecia pale umber, 650–900 μm long, type C *T. tenuis*
- On *Cordyceps*
- Perithecia honey-yellow, 300–400 μm long, type E. Secondary spores cuboid *T. cordyceps*
- On other insects
- Perithecia white, 500 μm long, on Diptera. Anamorph: *Cylindrophora*
T. albotomentosa
- Perithecia yellow or reddish yellow, 750 μm long, type F. On Hemiptera *T. barda*
- Perithecia amber-coloured, 500 μm long. On Orthoptera *T. blattae*
- Perithecia rose-fleshy coloured, 600–1,200 μm long. On Formica *T. carnata*
- Perithecia dark brown, 720–800 μm long, type A. Anamorph: *Verticillium hemi-pterigenum*. On leafhopper *T. hemipterigena*
- Perithecia pale yellow, 350–650 μm , type G. On Lepidoptera *T. ochracea*
- Perithecia white, 600 μm long, on Diptera. Anamorph: *Gonatorrhodiella*-like *T. paxillata*
- Perithecia ochraceous or purplish ochraceous, 600–710 μm long. On Hemiptera *T. pusillae*
- Perithecia brown, 450–600 μm long. On Opelionoidea *T. pulvinata*
- Perithecia brown green, 600–700 μm long. On bug *T. rhynchotocola*
- Perithecia pallid, 500 μm long. Anamorph+. On moth *T. rostrata*
- Perithecia yellow or orange yellow, 160–180 μm long. On silk worm *T. sericicola*

List of species of *Torrubiella*

Secondary spores fusiformed

- T. ellipsoidea* Y.K. et D.S., in BNSM, Ser. B, 8(2): 50, f. 7A, 8 (1982). T.L. Japan.
- T. fusiformis* Y.K. et D.S., in BNSM, Ser. B, 7(4): 117, f. 3, 8C (1981) et BNSM 8 (2): 50 (1982). T.L. Formosa.

T. neofusiformis Y.K. et D.S., in BNSM, Ser. B, 8(2): 51, f. 7B, 9, 10A (1982). T.L. Japan.

Secondary spores truncated

On spider

T. alba Petch, in TBMS 16: 224 (1932). T.L. Ceylon.

T. alboglobosa Y.K. et D.S., in BNSM, Ser. B, 8(2): 63, f. 29B, 31 (1982). T.L. Japan.

T. albolanata Petch, in TBMS 287: 84 (1944). T.L. England.

T. arachnophila f. *alba* Y.K. et D.S., in Kew Bull. 31(3): 561, f. 4, 5 (1976). T.L. Japan.

T. arachnophila (Johnston) Mains, in Mycologia 42: 316 (1950). T.L. USA.

T. arachnophila var. *pulchra* Mains, in Mycologia 42(2): 316, f. 1-6 (1950). T.L. USA.

T. aranica Boud., in Rev. Mycol. 7: 226, pl. 56, f. 4 (1885). T.L. France.

T. aurantia Y.K. et D.S., in BNSM, Ser. B, 8(2): 67, f. 25A, 36 (1982). T.L. Japan.

T. corniformis Y.K. et D.S., in BNSM, Ser. B, 8(2): 59, f. 23A, 24, 40A (1982). T.L. Japan.

T. farinacea Y.K. et D.S., in BNSM, Ser. B, 8(2): 68, f. 38A, 39 (1982). T.L. Japan.

T. flava Petch, in TBMS 9(1, 2): 127, pl. 2, f. 9 (1923). T.L. Ceylon.

T. flavoviridis (Möller) Y. Kobayasi, in BNSM, Ser. B, 8(2): 59 (1982). T.L. Brazil.

T. formosana Y.K. et D.S., in BNSM, Ser. B, 8(2): 53, f. 10b, 13 (1982). T.L. Formosa.

T. gibellulae Petch, in Ann. Myc. 30: 386-393 (1932). T.L. Ceylon.

T. globosa Y.K. et D.S., in BNSM, Ser. B, 8(2): 45, f. 1F (1982). T.L. Japan.

T. globosoides Y.K. et D.S., in BNSM, Ser. B, 8(2): 51, f. 11, 12A (1982). T.L. Japan.

T. gonylepticida (Möller) Petch, in TBMS 21: 50 (1937). T.L. Brazil.

T. inegoensis Y.K. et D.S., in BNSM, Ser. B, 8(2): 56, f. 16b, 18 (1982). T.L. Japan.

T. leiopus (Mains) Y.K. et D.S., in Kew Bull. 31(3): 564, f. 6, 7 (1976). T.L. USA.

T. longissima Y.K. et D.S., in BNSM, Ser. B, 8(2): 69, f. 38b, 41 (1982). T.L. Japan.

T. mammillata Y.K. et D.S., in BNSM, Ser. B, 8(2): 54, f. 12B, 15 (1982). T.L. Japan.

T. minuta Y.K. et D.S., in BNSM, Ser. B, 8(2): 62, f. 29A, 30 (1982). T.L. Japan.

T. minutissima Y.K. et D.S., in BNSM, Ser. B, 8(2): 57, f. 19A, 20 (1982). T.L. Japan.

T. miyagiana Y.K. et D.S., in BNSM, Ser. B, 8(2): 58, f. 19B, 21 (1982). T.L. Japan.

T. oblonga Y.K. et D.S., in BNSM, Ser. B, 8(2): 68^c f. 38A, B, 39 (1982). T.L. Japan.

T. ooaniensis Y.K. et D.S., in BNSM, Ser. B, 8(2): 58, f. 19C, 22 (1982). T.L. Japan.

T. pallida Y.K. et D.S., in BNSM, Ser. B, 8(2): 65, f. 32A, 33 (1982). T.L. Japan.

T. rokkiana Y.K. et D.S., in BNSM, Ser. B, 8(2): 53, f. 10C, 14 (1982). T.L. Japan.

T. rosea Y.K. et D.S., in BNSM, Ser. B, 8(2): 61, f. 26A, 27 (1982). T.L. Japan.

T. ryogamimontana Y.K. et D.S., in BNSM, Ser. B, 8(2): 66, f. 32b, 34 (1982). T.L. Japan.

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T. brunnea v. Keissel, in Ann. Myc. 7: 292 (1909). T.L. Samoa.

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T. confragosa Mains, in Mycologia 41(3): 305, f. 1C (1949). T.L. Brazil.

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T. lecanii Johnston, in Mem. Soc. Cubana Hist. Nat. 3: 80 (1918). T.L. Cuba.

T. luteorostrata Zimmermann, in Centralbl. f. Bact. 7: 872 (1901). T.L. Java.

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T. sublintea Petch, in Ann. Peradeniya 7: 324 (1922). T.L. Chile.

T. superficialis Y.K. et D.S., in BNSM, Ser. B, 8(2): 74, f. 47, 48 (1982). T.L. Japan.

T. tenuis Petch, in Ann. Peradeniya 7: 323 (1922). T.L. Ceylon.

On Cordyceps

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T. blattae Petch, in TBMS 25: 258 (1942). T.L. Mauritius.

T. carnata Moureau, in Mem. Inst. Royal Colonial Belge 7(5): 10, pl. 1, 4, f. 1 (1949). T.L. Congo.

T. hemipterigena Petch, in TBMS 16: 236 (1932). T.L. Ceylon.

T. liberiana Mains, in Mycologia 41(3): 306, f. 2A (1949). T.L. Liberia.

T. ochracea Pat., in Bull. Soc. Myc. France 22: 58 (1906). T.L. Tahiti.

T. paxillata Petch, in TBMS 21: 49 (1937). T.L. USA.

T. psyllae Sawada, in Bot. Mag. Tokyo 28: 275 (1914). T.L. Formosa.

T. pulvinata Mains, in Mycologia 41(3): 303, f. 1A, B (1949). T.L. Hawaii.

T. rhynchotica (Möller) Y. Kobayasi, in Trans. mycol. Soc. Japan 23: 287 (1982). T.L. Brazil.

T. rostrata P. Henn., in Hedwigia 41: 162 (1902). T.L. Surinam.

T. sericicola v. Höhnelt, in Sitzbl. Akad. Wiss. Wien 118: 302 (1909). T.L. Java.

Appendixes

1. A list of allied genera and species to *Cordyceps* and *Torrubiella*

Podonectria cicadellidicola Y.K. et D.S., in DNSM 3(3): 95, f. 1A, B, 2 (left), 3 (1977). T.L. Japan.

Podonectria citrina Y.K. et D.S., in BNSM, Ser. B, 3(3): 97, f. 1C, 2 (right), 4 (1979). T.L. Japan.

Shimizuomyces paradoxa Y. Kobayasi, in BNSM, Ser. B, 7(1): 1, f. 1, 2 (1981). T.L. Japan.

Sphaerocordyceps palustris (Berk.) Y. Kobayasi, in BNSM, Ser. B, 7(1): 2, f. 3A (1981). T.L. USA.

Sphaerocordyceps ussuriensis (Koval) Y. Kobayasi, in BNSM, Ser. B, 7(1): 2 (1981). T.L. USSR.

Wakefieldiomyces peltata (Wakef.) Y. Kobayasi, in BNSM, Ser. B, 7(1): 2 (1981). T.L. Barbados.

Cordycepioideus bisporus Stifler, in Mycologia 33: 85 (1941). T.L. Tanganyika.

Cordycepioideus octosporus Blackwell et Gilbertson, in Mycologia 73(2): 358, f. 1-9 (1981). T.L. Mexico.

Ophionectria lloydii Mains, in Lloydia 20(4): 226, f. 5 (1957). T.L. New Zealand.

Polycephalomyces formosus Y. Kobayasi, in SRBD 5: 245, fig. on p. 246 (1941). T.L. Japan.

Polycephalomyces paludosus Mains, in Mycologia 40: 414, f. 4B (1948). T.L. USA.

Polycephalomyces ramosus (Peck) Mains, in Mycologia 45: 414, f. 4A (1948). T.L. USA.

Akanthomyces aculeata Lebert, in Zeitschr. Wiss. Zool. 9: 447 (1858). T.L. England.

Akanthomyces coleopteri Koval, in Novitates Syst. Plant. Vasc. et non Vasc. (1976): 203, f. 1 (1977). T.L. USSR.

Akanthomyces pistillariaeformis (Pat.) Samson et Evans, in Acta Bot. Neerl. 23(1): 31, f. 7 (1974). T.L. St. Domingo.

Gibellula alata Petch, in Ann. Mycol. 30: 391, f. (1936). T.L. Ceylon.

- Gibellula arachnophila* f. *macropus* Vuill. apud Maubl., in Bull. Soc. Myc. Fr. 36: 41, pl. 4, f. 10-14 (1920).
- Gibellula arachnophila* Johnston, in Bull. Porto Rico Insular Exp. Sta. 10: 24 (1915). T.L. Porto Rico.
- Gibellula araneorum* (Schw.) H. Sydow, in Engler, Bot. Jahrb. 57: 321, f. A (1922). T.L. USA.
- Gibellula araneicola* Sawada, in Desc. Cat. Formosan Fungi 11: 231 (1959). T.L. Formosa.
- Gibellula capillaris* Morgan, in Journ. Mycol. 11: 49 (1905). T.L. USA.
- Gibellula elegans* P. Henn., in Hedwigia 41: 40 (1902). T.L. Java.
- Gibellula eximia* Höhnelt, in Engler, Bot. Exp. Südbras. (1901); Denk K., Ak. Wiss. Wien, p. 38 (1907).
T.L. Brazil.
- Gibellula formicarum* Mains, in Mycologia 41(3): 309, f. 2D, E (1949). T.L. Liberia.
- Gibellula formosana* Sawada, in Bot. Mag. Tokyo 28: 310, f. 5 (1914). T.L. Formosa.
- Gibellula haygarthii* Bijl, in Trans. Roy. Soc. S. Africa 10: 149 (1922). T.L. S. Africa.
- Gibellula leiopus* (Vuill.) Mains, in Mycologia 42: 313, 318, f. 7-14 (1950). T.L. USA.
- Gibellula phialobasia* Penz. et Sacc., Icon. Fung. Jav. p. 108, pl. 75, f. 1 (1904). T.L. Java.
- Gibellula pulchra* (Sacc.) Cavara, in All. Ist. Pavia 2-3: 347 (1894). T.L. Italy.
- Gibellula suffluta* Speare, in Phytopathology 2: 137 (1912). T.L. Hawaii.
- Gibellula tropicalis* Sawada, in Desc. Cat. Formosan Fungi 11: 231, pl. 12, f. 59-61 (1959). T.L. Formosa.
- Hirsutella asiae* Koval, in Novitates Syst. Plant. Vascul. et non Vascul. (1976): 205, f. 3 (1979). T.L. URSS.
- Hirsutella coccidiicola* Y.K. et D.S., in BNSM, Ser. B, 4(2): 59, f. 16, 20B (1978). T.L. Japan.
- Hirsutella eleutheratorum* (Nees ex S. F. Gray) Petch, in Naturalist (1932): 45, f. 1, 2. T.L. Europe.
- Hirsutella entomophila* Pat., in Rev. Mycol. 14: 69 (1892). T.L. Ecuador.
- Hirsutella formicarum* Petch, in TBMS 19: 183 (1935). T.L. British Guiana.
- Hirsutella liberiana* Mains, in Mycologia 41: 306, f. 2, B (1947). T.L. Liberia.
- Hirsutella neovolkiana* Y. Kobayasi, in SRBD 5: 221 (1941). T.L. Japan.
- Hirsutella nutans* Y. Kobayasi, in JJB 24: 177, f. 2C (1949). T.L. Japan.
- Hirsutella patouillardii* Koval, in Novit. Syst. Plant. Vascul. et non Vascul. (1976): 207, f. 5 (1977). T.L. USSR.
- Hirsutella ramosa* Mains, in Mycologia 41: 308, f. 2C (1949). T.L. USA.
- Hirsutella saussurei* (Cook) Speare, in Mycologia 12: 69, pl. 3, f. 1-5, pl. 5 f. 1 (1920). T.L. Ceylon.
- Hymenostilbe kedrovensis* Koval, in Novost. System. Nizshi. Rast. (1967): 201, f. 2. T.L. USSR.
- Hymenostilbe kobayasi* Koval, in Novi. Syst. Plant. Vasc. et non Vasc. (1976): 206, f. 4 (1977). T.L. USSR.
- Hymenostilbe odonatae* Y. Kobayasi, in SRBD 5: 223, f. on p. 222, 224 (1941). T.L. Japan.
- Hymenostilbe sphingum* (Schw.) Petch, in TBMS 16: 217 (1931). T.L. USA.
- Stilbum burmense* Mains, in Mycologia 40: 410 (1940). T.L. Burma.
- Troglobiomyces guignardii* (Maheu) Pacioni, in TBMS 74(2): 244, f. 4 (1980). T.L. France.
- Isaria atypicola* Yasuda, in Bot. Mag. Tokyo 29: 117, fig. on p. 228 (1915). T.L. Japan.
- Isaria bielowieziensis* Koval, in Novit. Syst. Plant. Vasc. et non Vasc. (1976): 204, f. 2. T.L. USSR.
- Isaria erastalida* Yasuda, in Bot. Mag. Tokyo 33: 262 (1929). T.L. Japan.
- Isaria farinosa* (Holms.) Fr., Syst. Myc. 3: 271 (1832). T.L. Europe.
- Isaria gracilioides* Y. Kobayasi, in SRBD 5: 231, fig. on p. 233 (1941). T.L. Japan.
- Isaria japonica* Yasuda, apud Lloyd, Myc. Writ. 5: 707 (1917). T.L. Japan.
- Isaria kunitachiensis* Y. Kobayasi, in SRBD 5: 231, fig. on p. 232 (1941). T.L. Japan.
- Isaria macroscyticola* Y. Kobayasi, in SRBD 5: 238, fig. on p. 239 (1941). T.L. Japan.
- Isaria nipponica* Y. Kobayasi, in SRBD 5: 240, fig. on p. 241 (1941). T.L. Japan.

- Isaria oncotympanae* Y. Kobayasi, in SRBD 5: 240, fig. on p. 241. T.L. Japan.
Isaria perexigua Y. Kobayasi, in SRBD 5: 242, fig. on p. 243 (1941). T.L. Japan.
Isaria sinclairii (Berk.) Lloyd, in Myc. Writ. 7: 1179, f. 2369 (1923). T.L. New Zealand.
Isaria stenocoli (Quél.). Y. Kobayasi, in Trans. mycol. Soc. Japan 23: 287 (1982). T.L. Japan.
Isaria takamizusanensis Y. Kobayasi, in SRBD 5: 229, fig. on p. 230 (1941). T.L. Japan.
Isaria yokohamensis Y. Kobayasi, in SRBD 5: 237, fig. on p. 232 (1941). T.L. Japan.
Paecilomyces fumosoroseus (Wize) Brown et Smith, in TBMS 40(1): 67 (1957). T.L. Europe.
Stibella larvarum Y. Kobayasi, in SRBD 5: 247, fig. on p. 246 (1942). T.L. Japan.
Synnematium graptopsaltriae Y. Kobayasi, in SRBD 5: 249 fig. on p. 248, 250 (1942). T.L. Japan.
Sporotrichum hokkaidoense Y. Kobayasi, in SRBD 5: 253 (1941). T.L. Japan.
Sporotrichum niveum Y. Kobayasi, in SRBD 5: 253, fig. on p. 254 (1941). T.L. Japan.
Metarrhizium anisopliae (Metsch.) Sor., in Schrift. Kais. Akad. Wiss. St. Petersburg 37: 58 (1888). T.L. USSR.
Spicaria araneae Sawada, in Bot. Mag. Tokyo 28: 309 (1914). T.L. Formosa.
Spicaria fumoso-rosea (Wize) Vassil., in Bolezni rastienij. 18: 113 (1929). T.L. Europe.
Spicaria prasina (Maubl.) Sawada, Desc. Cat. Formosan Fungi 1: 606 (1919). T.L. Ceylon.

2. Teleomorph-anamorph connections

<i>Cordyceps ainictos</i> Möller	<i>Hirsutella</i> sp.
<i>C. amazonica</i> Henn.	Conidia +
<i>C. aphodii</i> Machieson	<i>Hymenostilbe</i> sp. & <i>Papulaspora</i> sp.
<i>C. aurea</i> Moureau	Conidia +
<i>C. australis</i> (Speg.) Sacc.	<i>Hymenostilbe melanopoda</i> (Speg.) Petch
<i>C. barnesii</i> Thwaites	<i>Stibella barnesii</i> Masee
<i>C. clavulata</i> (Schw.) Ellis et Everh.	Conidia +
<i>C. clavulata</i> (Schw.) Ellis et Everh.	<i>Hirsutella lecanicola</i> (Jaap) Petch
<i>C. cochlidicola</i> Y.K. et D.S.	
<i>C. confragosa</i> Mains	<i>Hirsutella confragosa</i> Mains
<i>C. crinalis</i> Ellis	<i>Stibella</i> sp.
<i>C. curculionum</i> (Tul.) Sacc.	<i>Hymenostilbs melanopus</i> Mains
<i>C. cylindrica</i> Petch	<i>Isaria atypicola</i> Yasuda
<i>C. dipterigena</i> Berk. et Br.	<i>Hymenostilbe dipterigena</i> Petch
<i>C. dipterigena</i> Berk. et Br.	Synnema +
<i>C. dovei</i> Rodway	Conidia +
<i>C. elongata</i> Petch	<i>Hirsutella</i> Petch
<i>C. engleriana</i> P. Henn.	<i>Hymenostilbe</i> sp.
<i>C. entomorrhiza</i> (Dick.) Fr.	<i>Hirsutella eleutheratorum</i> (Nees) Petch
<i>C. erotyli</i> Petch	<i>Paecilomyces erotyli</i> (Petch) Y. Kobayasi
<i>C. falcatoides</i> Y.K. et D.S.	
<i>C. formicivora</i> Sacc.	Synnema +
<i>C. forquignoni</i> Quél.	<i>Hymenostilbe muscaria</i> Petch
<i>C. geniculata</i> Y.K. et D.S.	

- C. gracilioides* Y. Kobayasi
C. gracilis Dur. et Mont.
C. hokkaidoensis Y. Kobayasi
C. humberti Robin
C. kirkii Cunningh.
C. kysuyuensis Kawam.
C. liberiana Mains
C. macularis Mains
C. martialis Speng.
C. melolonthae (Tul.) Sacc.
C. memorabilis (Cesati) Sacc.
C. michiganensis Mains
C. militaris (L.) Fr.
C. neovolkiana Y. Kobayasi
C. nipponica Y. Kobayasi
C. norvegica O. Sopp
C. novae-zealandiae Dingley
C. nutans Pat.
C. odonatae Y. Kobayasi
C. paludosa Mains
C. parvula Mains
C. parvula Mains
C. pentatomi Koval
C. pentatomi Koval
C. polyarthra Möller
C. pulvinata Mains
C. rubra Möller
C. scarabeicola Y.K. et D.S.
C. sinclairii Y. Kobayasi
C. sinensis (Berk.) Sacc.
C. sobolifera (Hill) Berk. et Br.
C. sphecocephala (Kl.) Sacc.

C. superficialis (Berk.) Sacc.
C. stylophora Berk. et Br.
C. termitophila Y.K. et D.S.
C. thaxteri Mains
C. trinidadensis Mains
C. tuberculata (Lebert) Maire
C. tuberculata (Lebert) Maire
C. unilateralis (Tul.) Sacc.
C. variabilis Petch
C. volkiana Möller
- Isaria gracilioides* Y. Kobayasi
I. dubia Delacr.
Sporotrichum hokkaidoense Y. Kobayasi
H. saussurei (Cooke) Speare
Akanthomyces sp.
Sporotrichum formosanum Y. Kobayasi
Hirsutella liberiana Mains

Cephalosporium sp.

I. farinosa (Holms.) Fr.
Conidia produced from phialide
Cephalosporium militare Y. Kobayasi
Hirsutella neovolkiana Y. Kobayasi
I. nipponica Y. Kobayasi
Isaria sp.
Hymenostilbe sp.
Hirsutella nutans Y. Kobayasi
Hymenostilbe odonatae Y. Kobayasi
Polycephalomyces paludosus Mains
Synnema +
Synnema +

Hirsutella sp.
I. dussii Pat.
Spicaria pulvinata Mains
Cephalosporium rubra Möller
Conidia +
I. sinclairii (Berk.) Lloyd
Stachybotris sp.
Conidia & chlamydo-spores
Hymenostilbe sphecophila (Ditmar) Petch
on peridial layer of stromata

H. stylophora Mains
Conidia +
Synnema +
Synnema +
Hymenostilbe sphingum (Schw.) Petch
I. sphingum Schw.
Hirsutella formicarum Petch
Hirsutella sp.
Hirsutella volkiana Y. Kobayasi

C. yahagiana Y.K. et D.S.

Torrubiella alba Petch

T. albolanata Petch

T. albotomentosa Petch

T. arachnophila (Johnston) Mains

T. aranicida Boud.

T. confragosa Mains

T. flava Petch

T. gibellulae Petch

T. gonylepticida (Möller) Petch

T. hemipterigena Petch

T. leiopus (Mains) Y.K. et D.S.

T. liberiana Mains

T. paxillata Petch

T. rostrata P. Henn.

T. rubra Pat. et Lagh.

T. sublinta Petch

Cephalosporium araneorum Petch

Cylindrophora araneorum Petch

Cylindrophora araneorum Petch

Gibellula pulchra (Sacc.) Cavara

Hirsutella cuneispora Boud.

Hirsutella confragosa Mains

Hirsutella arachnophila Petch

Gibellula araneorum Syd.

Spicaria longipes Petch

Verticillium hemioterigenum Petch

Gibellula leiopus (Vuill.) Mains

Hirsutella liberiana Mains

Gonatorrhodiella coccorum Petch

Conidia+

Conidia+

Conidia+

3. Host-parasite relationships

The following members are enumerated as host of *Cordyceps* and its allied genera.

Orthoptera Locustidae (Batta) Gryllotalpae (Kera) Mantidae (Kamakiri) Prisomelidae (Fushimushi)

Isoptera (Shiroari)

Odonatae (Tonbo)

Hemiptera Heteroptera (Kamemushi) Homoptera Cercopidae (Awahukimushi) Cicadellidae (Yokobae) Cicadudae (Semi) Membracidae (Tsunozeimi) Aphididae (Aburamushi) Coccidae (Katakaigaramushi)

Lepidoptera

Coleoptera

Hymenoptera Formicidae (Ari) Vespidae (Ashinagabachi)

Diptera

Sclerotium of *Claviceps*

Elaphomyces

Arachnidae

On the following insects, the fungi are not yet found.

Protuda Thysamna Collembola Dermaptera Plecoptera Embioptera Psocoptera Malloptera Embioptera Psocoptera Malloptera Anopleura Ephemeroptera Thysanoptera Neuroptera Mecoptera Trichoptera Strepsoptera Apidae (Mitsubachi) Aphaniptera (Nomi)

Members of *Torrubiella* are found on Coccidae and Arachnidae. Except for *C. sphingum*, all members of *Cordyceps* on Hymenoptera are found on larvae or cocoons. Those fungi on Coleoptera are found on larvae or adult insects. The species in common to Coleoptera and Lepidoptera are not yet found. Many species of *Cordyceps* are found on larvae of Coleoptera. Those insects which are living in water or other special habitat or very short in life cycle are not suitable for host.

4. New combinations and new species

Cordyceps sphecocephala (Kl.) Sacc. f. *oxycephala* (Penz. et Sacc.) Y. Kobayasi forma nova. Basionym: *Cordyceps oxycephala* Penz. et Sacc., in *Malpighia* 11: 821 (1897).

Torrubiella rhynchotica (Möller) Y. Kobayasi comb. nov. Basionym: *Cordyceps rhynchotica* Möller, *Phycomyc. u. Ascomyc.* p. 211, pl. 6, f. 87 (1901).

Torrubiella flavoviridis (Möller) Y. Kobayasi comb. nov. Basionym: *Cordyceps flavoviridis* Möller, *Phycom. u. Ascomyc.* p. 208 (1901).

Sphaerocordyceps helopis (Quél.) Y. Kobayasi comb. nov. Basionym: *Cordyceps helopis* Quél., in *Bull. Soc. Bot. Fr.*, 26: 236 (1879).

Isaria stenocoli (Quél.) Y. Kobayasi comb. nov. Basionym: *Cordyceps stenocoli* Quél., in *Assoc. France Avanc. Sc.* 24 session, 2 pl. p. 622, pl. 6, f. 18 (1895). [Nomen anamorphosis]

Cordyceps sclerotium Y. Kobayasi, sp. nov.

Stromata binata, cylindrica, $3 \times 0.5-0.8$ mm, apice truncata, carnosa, peridio nullo, superficialiter albida, floccosa, textu e hyphis $2-3 \mu\text{m}$ crassis, pyriformis septatis composito. Perithecia superficialia, ex stipite apicaliter oriunda, gregaria, $260-360 \times 130-170 \mu\text{m}$, floccosa, albida. Asci $3-4 \mu\text{m}$ crassi, capitibus $2.5 \mu\text{m}$ in diam. Articuli ascosporarum $3-4 \times 1 \mu\text{m}$, utrinque truncati.

Hab. On sclerotium of *Claviceps*. France. Type in Herb. Jard. Plant, Paris. [Figures in *Journ. Jap. Bot.* 55(3): 24, 25 (1980).]

Cordyceps facis Y. Kobayasi et D. Shimizu, sp. nov. Fig. 3.

Stromata clavata, 7 mm alta, carnosa, peritheciis apicaliter aggregatis. Stipes albus, sine peridio, e hyphis $3-4 \mu\text{m}$ crassis compositus, $6-13$ mm crassis. Perithecia semi-immersa, ellipsoidea, $1,000-1,100 \times 250-400 \mu\text{m}$, ostiolis magnis obtusis, fuscatis. Asci $3-3.5 \mu\text{m}$ crassi, capitibus $3 \mu\text{m}$ in diam. Articuli

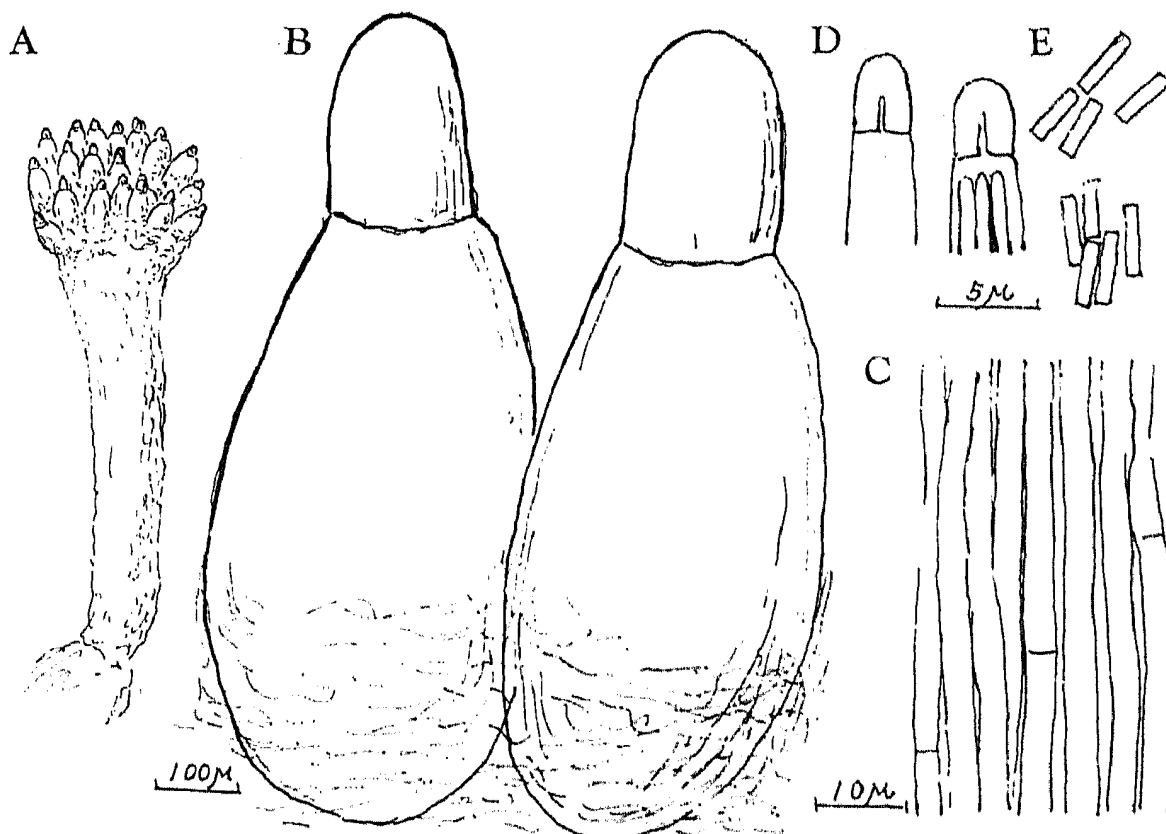


Fig. 3. *Cordyceps facis* Y. Kobayasi. A. Stroma $\times 8$ B. Perithecia C. Hyphae of stalk. D. Apical part of asci E. Secondary spores.

ascosporarum 3-4 × 1 μm, utrinque truncati.

Hab. On larve of Coleoptera. Mt. Ryogami, Chichibu, D. Shimizu—no. 322; Type in TNS.

5. A list of synonyms of *Cordyceps*

- Clavaria crassa* Maudsley = *C. gunnii* (Berk.) Sacc.
Clavaria granulosa Bull. = *C. militaris* (L.) Fr.
Clavaria larvarum Westwood = *C. robertsii* (Hook.) Gray
Clavaria parasitica Willd. = *C. ophioglossoides* (Ehrh.) Fr.
Clavaria radicata Bull. = *C. ophioglossoides* (Ehrh.) Fr.
Cordyceps aemonae Lloyd = *C. dovei* Rodway
Cordyceps aphrophorae Yasuda = *C. tricentri* Yasuda
C. asiaticus Hara et Oosumi = *C. gryllotalpae* Ellis et Seaver
C. blumenavica P. Henn. = *C. rubra* Möller
C. caespitoso-filiformis P. Henn. = *C. polyarthra* Möller
C. callidii Quél. = *C. larvicola* Quél.
C. carabi Quél. = *C. entomorrhiza* (Dicks.) Link
C. concurrens Lloyd = *C. polyarthra* Möller
C. coxii Olliff = *C. larvarum* (Westw.) Olliff
C. depokensis Koord. = *C. myrmecophila* Cesati
C. doassansii Pat. = *C. clavulata* (Schw.) Ellis et Ev.
C. formicivora Sacc. = *C. unilateralis* (Tul.) Sacc.
C. furcata Moureau = *C. gemella* Moureau
C. glaziovii P. Henn. = *C. gracilis* Dur. et Mont.
C. goniophora Speg. = *C. humberti* Robin
C. herculea Ellis et Ev. = *C. melolonthae* (Tul.) Sacc.
C. hormospora Möller = *C. palustris* Berk.
C. huberiana P. Henn. = *C. proliferans* Henn.
C. hunti Giard = *C. martialis* Speg.
C. isarioides Curtis = *C. tuberculata* (Lebert) Maire
C. militariaeformis Yak. et Kum. = *C. militaris* (L.) Fr.
C. mitrata Pat. = *C. pruinosa* Petch
C. muscicola Möller = *C. dipterigena* Berk. et Br.
C. myosuroides P. Henn. = *C. humberti* Robin
C. myrmecophila Cesati = *C. formicarum* Y. Kobayasi
C. necator Pat. et Hariot = *C. lloydii* Fawcett
C. obtusa Penz. et Sacc. = *C. barnesii* Thwaites
C. olivacea Rick = *C. brasiliensis* Henn.
C. olivaceo-virescens P. Henn. = *C. brasiliensis* Henn.
C. ouwensii v. Höhnelt = *C. dipterigena* Berk. et Br.
C. oxycephala Penz. et Sacc. = *C. sphecocephala* (Kl.) Sacc.
C. pachybasis Berk. = *C. clavulata* (Schw.) Ellis et Ev.
C. pieli Olliff = *C. gunnii* (Berk.) Sacc.
C. pistillariaeformis Berk. et Br. = *C. clavulata* (Schw.) Ellis et Ev.

- C. pistillaris* Brenckle = *C. clavulata* (Schw.) Ellis et Ev.
C. pittieri Bomm. et Rouss. = *C. melolonthae* (Tul.) Sacc.
C. selkirkii Olliff = *C. larvarum* (Westw.) Olliff.
C. sherringii Massee = *C. lloydii* Fawcett.
C. shiraiana P. Henn. = *C. sobolifera* (Hill.) Berk. et Br.
C. sphaerophila Berk. et Curt. = *C. sphecocephala* (Kl.) Sacc.
C. subdiscoidea P. Henn. = *C. lloydii* Fawcett.
C. submilitaris P. Henn. = *C. martialis* Speg.
C. subpolyarthra P. Henn. = *C. polyarthra* Möller
C. surinamensis P. Henn. = *C. dipterigena* Berk. et Br.
C. thwaitesii Lloyd = *C. dipterigena* Berk. et Br.
C. trictenae Olliff = *C. taylori* (Berk.) Sacc.
C. unemurai Imai = *C. japonica* Lloyd
C. viperina Mains = *C. variabilis* Petch
C. voelzkowii P. Henn. = *C. sobolifera* (Hill.) Berk. et Br.
Polistophthora antillarum Lebert = *C. sphecocephala* (Kl.) Sacc.
Sphaeria forbesii Berk. = *C. larvarum* (Westw.) Olliff
Sphaeria huegelii Corda = *C. robertsii* (Hook.) Gray
Sphaeria innominata Taylor = *C. taylori* (Berk.) Sacc.
Torrubia cinerea Tul. = *C. entomorrhiza* (Dicks.) Link
Torrubia coccigena Tul. = *C. dipterigena* Berk. et Br.
Torrubia gentilis Cesati = *C. sphecocephala* (Kl.) Sacc.
Torrubia sphingum Tul. = *C. tuberculata* (Lebert) Maire

6. A list of excluded species

The followings were published with insufficient descriptions to be revised or should be transferred to other genera.

- C. adpropinquans* (Cesati) Sacc.
C. albella Massee = *Penicillium albellum* Petch *C. albida* Berk. et Curt. in shed.
C. alutacea (Pers.) Link = *Podostroma alutacea* Atkinson
C. arachneicola Y. Kobayasi = Anamorphic fungus *C. argentinensis* Speg.
C. armeniaca Berk. et Curt. *C. australis* (Speg.) Sacc.
C. barbesi Massee *C. bombi* Rick
C. brevipes Mont. = *Podostroma brevipes* (Mont.) Seaver
C. caespitosa (Tul.) Sacc. = *Isaria sinclairii* *C. carolinensis* Berk. et Br.
C. cicadae (Miq.) Massee = *Isaria cicadae* Miquel *C. cusu* Pat. = *C. melolonthae* (Tul.) Sacc.
C. ditmari *C. eleutheratorum* (Nees) Migula = *Hirsutella eleutheratorum* Nees
C. fasciculata Pat. = *C. polyarthra* *C. flavella* Berk. et Curt. = *Claviceps* sp.
C. fuliginosa Cesati *C. gigantea* (Mont.) Massee = *Isaria gigantea* Mont.
C. gryllotalpae (non Kobayasi) Ellis et Seaver *C. hillii* Lloyd
C. ignota March *C. joaquiensis* P. Henn. *C. larvicola* Montagne
C. leprosa (Fr.) Migula = *Isaria leprosa* *C. mauleyi* Westw.
C. microcephala (Wallr.) Berk. = *Claviceps microcephala* (Walk.) Tul.

- C. miquelii* (Tul.) Sacc. = *Isaria cicadae* Miq. *C. muscae* P. Henn.
C. nawai Hara *C. purpurea* (Fr.) Berk. = *Claviceps purpurea* (Fr.) Tul.
C. racemosa Berk. = *Balanophora hookeriana* Hemsl.
C. reticulata Lév. = *nomen nudum*
C. setulosa Quél. = *Claviceps setulosa* (Quél.) Sacc.
C. stenocoli Quél. = Anamorphic fungus *C. typhina* Fr. = *Typhodium typhinum* Seaver

Yakushiji et Kumazawa, in Bot. Mag. Tokyo 44: 461 (1930) *Tilachlidiopsis nigra* = The present species should be rejected, because this is degenerated stromata of *Cordyceps entomorrhiza*, superparasited by the *Hirsutella*-type synnemata. The head with reduced perithecia is very rarely found.

摘 要

Cordyceps 属および *Torrubiella* 属の分類群の検索表

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Cordyceps 属の282種および *Torrubiella* 属の59種のための検索表を作成した。これに加えて、上記両属に類縁の19属の一覧表、teleomorph と anamorph の関連、宿主と寄主の関係、5つの新組合せと *Cordyceps* 属の2新種、および *Cordyceps* 属の異名の一覧表を附録としてふくめた。