Studies on the Geoglossaceae of Japan. III. The Genus *Cudonia*.

By

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The genus *Cudonia* was established by FRIES in 1849, based upon *Leotia circinans*, and he gave its diagnosis as “*Discus carnosus, peltatus, laevis, margine revolutus.*” Since that time, about ten species were recorded by various authors. Among them, six species have been reported from Japan by A. YASUDA, C. G. LLOYD and the present writer.

Cudonia FRIES, Summa Veg. Scand. 348, 1849.

Ascophores pileate, stipitate, erect, fleshy-leathery, terrestrial. Pileus covered by hymenium on the upper convex surface, sterile beneath; margin acute, incurved toward the stipe. Asci clavate, inoperculate, 8-spored. Spores hyaline, clavate-filiform, multiseptate, multiseriate or fasciculate. Paraphyses present.

Type species: *Leotia circinans* PERS. ex FR.

The writer proposes here to divide the present genus into two sections, *Eucudonia* and *Pachycudonia*.

Sect. **Eucudonia** IMAI, sect. nov.

Pileus depresso-convexus, substratoformis, helvelloideus vel irregulariter formis, subtenuis vel tenuis.

1. **Cudonia circinans** FR. Summa Veg. Scand. 348, 1849—FUCK. Symb. Myc. 332, 1869—SACC. Syll. Fung. 8: 50, 1889—SCHROET. Pilze Schles. 2: 21, 1893; in ENGLER & PR. Nat. Pflanzenfam. 1¹: 167, 1894—MASS. Brit. Fung. Fl. 4: 473, 1895—REHM, Die Pilze, 3: 1169, 1896—HONE, Minn. Bot. Stud. 3: 318, pl. 3, f. 3, pl. 5, f. 9–12, 1904—DURAND, Ann. Myc. 6: 458, pl. 11, f. 103, pl. 21, f. 214–215, 1908—YASUDA, Bot. Mag. (Tokyo), 29: (60), 1915—LLOYD, Geoglossaceae, 17, f. 800, 1916—BRES. Icon. Myc. 24: pl. 1188, 1932—HARA, Journ. Jap. Bot. 8: (477), with fig., 1933—(LLOYD, Letter, No. 51, p. 4, 1914—SHIRAI, List Jap. Fung. ed. 2, 187, 1917; ibid. ed. 3, 110, 1927—Ito & IMAI, Proceed. Jap. Assoc. Adv. Sci. 7: 148, 1932).

Leotia circinans PERS. Comm. Fung. Clav. 31, 1797; Syn. Fung. 612, 1801; Myc. Eur. 1: 198, 1822.

Leotia circinans FR. Syst. Myc. 2: 27, 1823.

Vibrissea circinans HAZSL. M. T. Acad. ért. A. Termés. Kor. 11: (9), 1881 (sec. DURAND)—MASS. Ann. Bot. 11: 261, 1897.

Ascophores gregarious, subcaespitose or solitary, pileate, stipitate, 3–6 cm. high, fleshy, becoming leathery and brittle in drying; pileus depresso-convex, irregularly pileate or nearly saddle shaped, rather inflated, up to 1.5 cm. or more in diam., rather thin, margin acute, incurved, undulate or even, usually attached but not united to the stipe, even or wrinkled, often depressed at the center, yellowish, brownish or rosy-cream-buff; stipe 3–5 cm. long, attenuated upward, rarely enlarged at the base, darker than the hymenium especially at the base, often longitudinally striate especially at the upper part; asci clavate, narrowed at the apex, not blue with iodine, attenuated downward, 8-spored, $80\text{--}130 \times 7.5\text{--}10\mu$; spores clavate-filiform, broadest above the middle or at the distal end, fasciculate, hyaline, $30\text{--}50 \times 2\text{--}2.5\mu$; paraphyses filiform, hyaline, strongly curved or circinate above, branched, tips not or only slightly thickened.

Hab. on humus among fallen leaves or decayed wood in woods, usually under coniferous trees. Autumn. South Saghalien (Mt. Kashipo). Hokkaidô (Ishikari, Iburi). Honshû (Rikuzen, Kôzuke).

Jap. name. *Hotei-take* (YASUDA).

Distr. Europe, North America, Japan.

2. ***Cudonia helvelloides*** S. ITO et IMAI, in IMAI, Trans. Sapporo Nat. Hist. Soc. 13: 183, pl. 7, f. 32–35, 1934.

Cudonia japonica (non YASUDA) ITO et IMAI, Proceed. Jap. Assoc. Adv. Sci. 7: 148, 1932, pro parte.

Ascophores usually densely caespitose, or sometimes gregarious, pileate, stipitate, 2.5–7 cm. high; pileus thin, at first depresso-convex, then helvelloid, or saddle shaped, 1–2 cm. broad, at first pale-yellow, then pale isabellin, slightly depressed at the center, slightly furrowed, under surface radiately wrinkled, at first white and short tomentose, then becoming pale avellaneous and less tomentose, margin acute, usually free; stipe 2.5–7 cm. long, 2–6 mm. thick, terete or compressed, slightly thickened downward, subconcolorous, white-powdery-flocculose when young; asci clavate, apex slightly narrowed, not blue with iodine, $85\text{--}140 \times 7.5\text{--}10\mu$, 8-spored; spores clavate-filiform or subfiliform, hyaline, smooth, $32.5\text{--}60 \times 1.5\text{--}2\mu$; paraphyses filiform, branched, curved or circinate at the apices.

Hab. on humus among the fallen leaves in woods. Autumn. South Saghalien (Horo). Hokkaidô (Ishikari).

Jap. name. *Kura-take* (nov.).

Distr. Endemic.

3. **Cudonia japonica** YASUDA, Bot. Mag. (Tokyo), **29**: 69 & (192), 1915—LLOYD, Geoglossaceae, 17, f. 801–802, 1916—TROT. in SACC. Syll. Fung. **24**: 1157, 1928—(SHIRAI, List Jap. Fung. ed. 2, 185, 1917; *ibid.* ed. 3, 111, 1927—Ito & IMAI, Proceed. Jap. Assoc. Adv. Sci. **7**: 148, 1932).

Ascophores subcaespitose or gregarious, pileate, stipitate, fleshy, 2.5–7 cm. high; pileus thin, saddle shaped, triangular or irregularly convex, margin strongly inrolled at places, 1–3.5 cm. broad, yellowish, yellow, ochraceous or brown, uneven; under surface white, uneven, white flocculose, sterile, with radial wrinkles; stipe 2.5–6.5 cm. long, 2–9 mm. thick, cylindrical, often compressed, subconcolorous or darker, furfuraceous, longitudinally furrowed above; asci clavate, apex narrowed, not blue with iodine, 8-spored, $110\text{--}176 \times 10\text{--}15\mu$; spores clavate-filiform or cylindrical-clavate, hyaline, broadest at the distal above end, smooth, $65\text{--}85 \times 2.5\text{--}3.5\mu$; paraphyses filiform, branched, almost not thickened but curved at the apices.

Hab. on humus among fallen leaves in woods. Autumn. Honshû (Rikuzen).

Jap. name. *Gongen-take* (YASUDA).

Distr. Endemic.

Above description was emended by the writer, who examined the type and the cotype specimens preserved in YASUDA's Herbarium at Sendai, as well as freshy specimens collected himself at the type locality, "Gongen-mori", near Sendai.

Sect. **Pachycudonia** IMAI, sect. nov.

Pileus convexo-hemiglobosus vel depresso-convexus, crassus.

4. **Cudonia constrictospora** S. Ito et IMAI, in IMAI, Trans. Sapporo Nat. Hist. Soc. **13**: 183, pl. 7, f. 28–31, 1934.

Ascophores gregarious or subcaespitose, pileate, stipitate, fleshy, 1.5–5 cm. high; pileus pileate, subglobose or hemiglobose, often slightly depressed at the center, up to 1.2 cm. in diam., thick, wrinkled, yellowish, brownish or cream-buff, margin acute, incurved, undulate or even, usually attached but not united to the stipe; stipe 1.5–4.5 cm. long, attenuated upward, usually strongly enlarged or bulbous at the base, 1.5–4 mm. thick above, up to 1 cm. or more thick at the base, subconcolorous; asci clavate, attenuated downward as very long tail, narrowed at the apex, not blue with iodine, $60\text{--}110 \times 5\text{--}7.5\mu$, 8-spored; spores slightly clavate-filiform but constricted at the middle, fasciculate, hyaline, $20\text{--}27.5 \times 2\mu$; paraphyses filiform, very slender, hyaline, branched, tips not thickened but curved or circinate.

Hab. on humus among fallen leaves in woods. Autumn. Hokkaidô (Ishikari). Honshû (Rikuchû, Rikuzen).

Jap. name. *Ô-hoteitake* (IMAI).

Distr. Endemic.

Little known species.

Cudonia orientalis YASUDA, in LLOYD, Geoglossaceae, 18, 1916-TROTT. in SACC. Syll. Fung. 24: 1158, 1928-(ITO & IMAI, Proceed. Jap. Assoc. Adv. Sci. 7: 148, 1932).

Hab. ?(On the ground). ?(Autumn). ?(Honshû).

Jap. name.

Distr. Endemic.

LLOYD established this new species on the specimen from the late Prof. A. YASUDA, and he described it as follows:—"Pileus 6-8 mm. in diameter, fleshy, pale brown, with incurved margin. Stipe slender, concolorous, dark blackish in drying. Spores in ascus pale straw color. Paraphyses filiform, hyaline." He also remarked that "when received this was referred to *Cudonia circinans*, but the dried specimens are a different color with dark, almost black stem. When soaked out the head is clay color, with no shade of red. I found no free spores, but in the ascus they appear to be about 50 mic. long. I am sure it is not American species, and it does not appear to be European."

Unfortunately, the type specimen was not preserved in YASUDA's Herbarium and LLOYD did not illustrate this fungus. In the present time, the writer can not review this species, but it seems to be a related one to *Cudonia helvelloides*.

Cudonia convoluta YASUDA, in LLOYD, Geoglossaceae, 18, f. 803-805, 1916; Letter, No. 63, p. 15, 1916; Myc. Notes, No. 69, p. 1188. 1923; *ibid.* No. 70, p. 1230, f. 2568-2569, 1923-TROTT. in SACC. Syll. Fung. 24: 1157, 1928.

Hab. ?(On the ground). ?(Autumn). ?(Honshû), Kyûshû (Hizen) (LLOYD).

Jap. name.

Distr. Endemic.

The original description based upon the specimen from Prof. YASUDA was given by LLOYD as follows:—"Pilei fleshy, hemispherical, inflated, convolute, 5-6 mm. in diameter. Stem 2-3 cm. long, tapering upward, striate, concolorous with pileus. Spores 25-30 mic. long, clavate-filiform. Paraphyses hyaline, filiform, not thickened at apex." He also remarked that this fungus is "intermediate between *Cudonia* and *Mitrula*, it has the texture, spores and habits of the former, and the hemispherical head of the

latter. Hence, on the usual definition of a *Cudonia*, it can not be entered in the genus, but notwithstanding, it is much closer to *Cudonia* than *Mitrula*, where one would class it from a book description. The color is pale brownish, with no hint of reddish. It grew clustered and a single cluster was sent me with the preceding species."

In the same year, he reported in his "Letter" (No. 63, p. 15), as follows:—"Note 504.—**Cudonia convoluta**. In our Geoglossaceae, we based two species, *Cudonia convoluta* and *Cudonia orientalis*, on a collection from Professor A. YASUDA, Japan (No. 209). Professor YASUDA send us another collection(380) which he assures us is the same species, and states that the previous specimens were imperfect. As I compare the three collections, it does not seem to me they are the same, but Professor YASUDA, observing the plant fresh is in the better position to know. I should consider No. 380 as an obese form of *Cudonia circinans*, and if No. 209 is the same, I think they are all forms of *Cudonia circinans*. The asci I make about the same (120 mic.) as *Cudonia circinans* and other details and color are the same."

The writer examined the YASUDA's specimen No. 380 and recognized it as a fungus resembling closely with *Cudonia constrictospora* in the macroscopic feature, but he could not to determine its systematic position owing to the dried and old specimen.

On the LEWIS' specimens, LLOYD stated in 1923, that "There is a color and slight spore difference, however, between this collection and that we previously received." Comparing the figures of the YASUDA's specimen with of LEWIS' one, we can notice that these two specimens are not exactly identical.

Looking over the LLOYD's descriptions and figures of *Cudonia convoluta*, the writer inclines that the YASUDA's first specimen is a distinct species from the second and the LEWIS' ones. The YASUDA's second specimen is a closely resemble fungus with *C. constrictospora*. The LEWIS' specimen is a closely related fungus to *C. helvelloides*.

Finally, an analytical key to the sections and species of Japanese *Cudonia* is given as follows:—

- I. Pileus depresso-convex, nearly saddle-shaped or helvelloid in shape, somewhat thin or thin in textureSect. **Eucudonia**.
 1. Growing in gregarious, not so densely caespitose; pileus depresso-convex, rather inflated; spores $30-50 \times 2-2.5\mu$ *C. circinans*.
 2. Growing usually in densely caespitose; pileus saddle shaped or helvelloid in shape, very thin.
 - a. Spores $32.5-60 \times 1.5-2\mu$ *C. helvelloides*.

- b. Spores $65-85 \times 2.5-3.5\mu$ *C. japonica*.
 II. Pileus convexo-hemiglobose or depresso-convex, thick and obese in texture Sect. **Pachycudonia**.
 1. Spores $20-27.5 \times 2\mu$, constricted at the middle ... *C. constrictospora*.

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(To be continued.)

Über eine neue Gattung der Cytinaceae.¹⁾

Von

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Eingegangen am 7. Oktober, 1936.

Bisher waren 6 Arten der Gattung *Cytinus* bekannt: *C. Hypocistis* L., *C. sanguineus* (THUNB.) HARMS (= *C. dioicus* JUSS.), *C. capensis* MARLOTH, *C. glandulosus* JUMELLE, *C. malagasicus* JUMELLE et PERRIER und *C. Baroni* BAKER f. Erstere ist beheimatet im Mittelmeergebiet, die zweite und dritte in Südafrika und die letztgenannten 3 Arten in Madagascar.

BAKER,²⁾ der zuerst *C. Baroni* näher untersucht und diagnostiziert hatte, liess aber *C. Baroni* wegen ihres eigentümlichen Baues von den übrigen Arten getrennt in einer besonderen Untergattung *Botryocytinus* angeordnet. Aber andere spätere Forscher gaben auf diesem Unterschied wenig Acht, und HARMS³⁾ wie SOLMS-LAUBACH⁴⁾ liessen sämtliche *Cytinus*-Arten in zwei Sektionen angeordnet, und zwar in der ersten Sektion *Eucytinus* *C. Hypocistis* und *C. capensis*, in der zweiten Sektion *Hypolepis* *C. sanguineus*, *C. malagasicus*, *C. glandulosus* und *C. Baroni*.

C. Baroni, der nach der BAKERSchen ersten Beschreibung von niemandem näher untersucht wurde, war im November 1912 von PERRIER DE LA BATHIE wieder gefunden worden,⁵⁾ dessen Spezimen durch das freundlichste Wohlwollen von Herrn Prof. Dr. JUMELLE in Marseille mir in der Hände

1) Diese Schrift ist ein Teil meiner *Mitrastemon*-Forschung, die zum Teil mit finanzieller Beihilfe der Kaiserlichen Akademie durchgeführt ist. Hier nehme ich auch Gelegenheit, meinen ergebensten Dank dafür auszusprechen.

2) BAKER, E. G. 1888. On a new species of *Cytinus* from Madagascar, constituting a new section of that genus. (Jour. Linn. Soc., Bot. 24).

3) HARMS, H. 1935. Rafflesiaceae (ENGLER-PRANTLS Nat. Pfl. Fam. 2 Aufl. 16b).

4) SOLMS-LAUBACH, H. Graf zu. 1901. Rafflesiaceae (ENGLERS Das Pflanzenreich, IV, 75).

5) JUMELLE, H. 1923. Le *Cytinus* de Madagascar (Compt. Rend. Acad. Sc. Paris, 177).