Morphological 
and Biological Studies on *Torula compliacensis*

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A description is given of the imperfect fungus *Torula compliacensis* Richon, with special regards to its cultural characters. The investigation demonstrated six different stages of the fungus, and its taxonomic position is accordingly discussed.

The material studied was found on a roof of asbestos-cement on a liqueur-factory at Dalby, Sjælland, June, 1959. The fungus appeared as widespread, black, soot-like coatings on the roof. Closer inspections showed that the top side of the roof was covered with confluent colonies, giving it a pulverulent, black appearance, on the underside were scattered spots of poorly developed colonies with indefinite margins.

Microscopically the fungus consists of dark brown, globose, or barrel-shaped, one-celled chlamydospores, 6–8 μ diam., singly, in pairs, or in short chains, with 1–2 large oil drops, walls thick and verrucose, supplied with rows of warts, Fig. 1. Neither true hyphae nor conidiophores present.

The species seems not previously recorded outside the Cognac-district in France and similar places in Belgium, where it appears on moist roofs and walls of cognac-distilleries, etc.

Cultures were obtained on various media. Even after one year's desiccation, germination of the chlamydospores took place without moistening, when spread on maltagar. Agars with sherry, alcohol, or prune-juice added gave no noticeable difference in germination, nor in growth. The fungus was kept in test-tubes and petri-dishes at 14°C in artificial light turned off at night. The microscopical examination was carried out directly on the agar-plates, after placing a cover-slip over a not too vigorously growing section of the colony.

The morphology in culture was found to be extremely variable. The germination takes place after a week. The cell-walls of the chlamydospores burst, and hyphae are growing out, Fig. 1. They increase in length with
c. 10 μm a day, and become septated with rather long segments. Apex of the hypha is filled with small oil-drops or grains, and a faint striation is visible. Gradually the hyphae become richly branched, the cells in acropetal succession rounded, the striation more distinct, and a black, round colony is formed, with hyphae radiating in all directions. After a fortnight the cells in the middle of the colony become globose, with verrucose walls, and the chains are falling apart. The chlamydompores here developed are almost similar to those from the roof. After c. three weeks the colony will normally be covered with mucilage, giving it a shiny appearance. On perforating chlamydompores and greenish-yellow mucus stream out.

When propagating these chlamydompores on agar-plates their dark, fragile outer wall normally bursts, and after two days the endospore germinates by budding, a spore-germination type also met with in certain yeast-species. (Jørgensen 1945: 224, Guillermond 1912: 24) (Fig. 2). After a week each chlamydompore is surrounded by a colony of hyaline blastospores, finally enveloped in opaque mucilage. When examining the agar-plates 2–3 months later lots of chlamydompores, singly or in short chains, were found and the colonies appeared dull and black. The original mucilage-cultures were left, too, for three months, and now showed that the mucus was practically dried up. The colonies were dull and black with a velvety surface, due to long chains of chlamydompores.
A few of the cultures differed from the description given above in developing a hyphal stage with dark blackish-violaceous aerial mycelium, as well as dark submerged mycelium, both consisting of septate, slightly branched hyphae, 2-5 μ diam. and with oil-drops, Fig. 3a. These hyphae were spread on agar-plates. After three days the hyphal fragments germinate with thin, hyaline, distantly septated hyphae, which in acropetal succession were transformed into hyaline oidea (arthrospores), Fig. 3b. After a week the colony has the same submerged mycelium as in the above mentioned hyphal stage, but differs in developing a cottony, aerial mycelium. In older parts of the colony the submerged oidea form dark, smooth chlamydospores filled with oil-drops. The chlamydospores are septated (1-3 septa or muriforme), Fig. 3c. Upon drying up, the chains fall apart into a pulverulent mass. When spread these chlamydospores repeat the germination of the hyphal fragments and the following mycelial differentiation.

When summing up the following stages are found:

1. Chlamydospores, one-celled, dry, dark, verrucose, globose or barrel-shaped. Fig. 1.
2. Chlamydospores, one-celled, mucous, dark, verrucose, globose. Fig. 2.
3. Blastospores, mucous, hyaline to dark, smooth, sphaerical. Fig. 2.
4. Aerial and submerged mycelium of sterile, septated, dark hyphae. Fig. 3a.
5. Arthrospores, hyaline, globose to barrel-shaped. Fig. 3b.
6. Chlamydospores, multiseptate, dry, dark, smooth. Fig. 3c.

It is interesting to note that a fungus which on natural substrate is a typical Torula, in traditional concept, during continued cultivations on artificial media passes through several different stages. However, this
phenomenon is not abnormal. SKINNER et al. (1947, chap. 11) discuss variation in lower fungi, and indicate an ideal series of changes on long-continued cultivations, including yeast-stages as well as stages with submerged and sterile aerial mycelium, etc. The development of the so-called “black yeasts”, including Torula spp. (SKINNER et al. 1947: 112, NICOT 1957) resembles to some extent the here described development of Torula compniacensis, though they differ in some details.

It is very important for the identification to know the variation of a fungus. After traditional classifications (SACCARDI 1884, VUILLEMIN 1910) Torula compniacensis may be referred to different form-genera within Fungi Imperfecti. It seems, though, correct to choose the stage found on natural substrate as basic for the nomenclatorial placing. HUGHES (1953) uses the characters of conidiophore and conidium development to establish a system of Hyphomycetes divided into eight sections. Torula compniacensis seems to belong in his section I B, characterized by a wide mycelium and conidia developing in acroetal succession as buddings on simple or branched conidiophores. Also other Torula-species, f. inst. Torula ramosa FUCKEL, are placed here, though by HUGHES referred to Oidium. The type, Torula herbarum LINK ex FR. is, however, placed in the section VI, characterized by solitary conidia produced from minute pores in the conidiophore-walls. Later, TUBAKI (1958) modifies HUGHES’ system and is here inclined to transfer Torula herbarum to section I.

According to ROUMEGUÈRE (1881) Torula compniacensis was first mentioned by the French pharmacist M. BAUDOIN in the middle of the last century: this mysterious soot-like production is limited to the district of Cognac, and ... “la ville semble couverte d’un crêpe”. It was later studied by ROUMEGUÈRE and DURRIEU, and placed within the Torulaceae under the name Xenodochus baudoini, but unfortunately they did not publish any description nor did they preserve the material. Further, according to ROUMEGUÈRE (1881), RICHON & PETIT published an investigation of the fungus in “Brebissonia”. They assumed, too, that it belonged to Torulaceae and proposed the name Torula compniacensis after the Latin name of the Cognac village. On account of the verrucose chlamydospores it is very closely related to T. conglutinata CORDA which occurs on branches and stems, and ROUMEGUÈRE and SACCARDI (loc. cit.) consider it as a variety of T. conglutinata. Later, in Fungi Gallici exsiccati, Cent. XVII, no. 1695, ROUMEGUÈRE gives it specific rank.

The Danish find of Torula compniacensis was sent to Dr. S. J. HUGHES, Ottawa, who after a comparison with the type in ROUMEGUÈRE’s Fungi
Gallici exsiccata confirmed the identification, but suggested it to be transferred to the genus *Taeniolella* Hughes (Hughes 1960, in litt.), a genus including a.o. species previously referred to *Torula* (Hughes 1958).
Literature


JORGENSEN, A., 1945: Gæringsoorganismerne. 15. ed. by A. HANSEN — København.


