ENTOLOMA (Fr.) KUMMER IN THE MALAY PENINSULA

by

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A recent monograph by the Swiss mycologist E. Horak (1980) deals with those pink-spored toadstools assigned to *Entoloma* (Fr.) Kummer which have been found in south-east Asia and Australasia. That is from India to New Zealand, and he records the astonishing number of 220 species. It is a fundamental work in which the author supplies full taxonomic details and for which he has studied all the type-specimens that could be discovered. He himself has explored particularly the agaric flora of New Guinea and New Zealand, whence he has described a large number of new species. He has also studied the collections which I made from 1929 to 1944 in the Malay Peninsula, as well as those made on later expeditions to Borneo and the Solomon Islands. The Peninsula supplies 55 species and Borneo 34, most of them new; yet they have merely 13 in common. This is the first time that such a work on *Entoloma* has been available and it should give a great stimulus to the professional and the amateur, for there is still very much to be learnt.

The book is well written in plain English, well printed, and astonishingly light in weight for its 352 pages. The keys to identification are straightforward with number references to the descriptions where critical remarks are given on allied species. For most, line-drawings of the fruit-bodies and of microscopical details accompany the descriptions, and there are eight colour-plates for 31 Malayan species. I note that the figure of *E. limosum* (Plate 6b) should be *E. lineum,* as on p. 216.

Entoloma is now used in a wide sense and becomes an easy genus to recognise. The fruit-bodies lack ring and volva; the gills are never free as in *Pluteus;* and the pink spores, revealed by the pink gills or pink powder at the top of the stem, are characteristically angular. Little toadstools, formerly classified with some uncertainty as *Leptonia* and *Nolanea,* even with *Claudopus* and *Clitopilus,* are now dispersed among the larger ones of *Entoloma* s. str. according to their affinity. The fruit-bodies may be white, grey, yellow, brown, or blue — some intensely blue — though rarely red. The colouring is specific and, with the exception of the white species which appear as albinos, distinctive of alliances. A few have striking colour-changes on bruising.

Actually this substantial work is but a beginning. Some species are widespread in both temperate and tropical countries, even cosmopolitan. Others are known with wide gaps in their distribution; for instance there are species from Singapore and the Solomon Islands without intermediate record. Many are described from single gatherings. Some are common and appear regularly every

fungus season, often in the same place in the forest, while others are sporadic or rare though, in such cases, they may be wide-spread but reluctant to fruit. Among the species of the Malay Peninsula there are four which were collected by H.N. Ridley and described by G. Massee but have not been found again. These four species are: *E. bicolor* (Mass) Horak, described as *Leptonia* from Singapore, *E. curtipes* (Mass) Horak, described as *Clitopilus,* from Singapore, *E. longipes* (Mass) Horak, described as *Inocybe,* from Singapore and *E. tricolor* (Mass) Horak, described as *Leptonia,* from Penang. Collecting has been largely a matter of luck. The *Entoloma*-flora of the eastern tropics is by no means fully known. It is likely that the specific totals from the Peninsula and from Borneo are nearer to 100 than to 50 and that most of these they will have in common.

Because in this field-work, concentrated on collecting and describing, one is apt to disregard the biology of the species, I contribute a few notes on the growth and seasonal appearance of the fruit-bodies. My impression is that the fruit-bodies do not become fly-blown or beetle-ridden and, thus, they last longer in the tropical forests than those of many other agarics. Some appear early in the agaric season along with *Amanita, Russula,* and *Boletus,* but others are tardy, and some sporadic (Corner 1935). In its great abundance of tropical species, none of which appear to be mycorrhizal, *Entoloma* displays the myriad of micro-habitats available in the tropical humus. One such I found to be in the soil under the *bertam* palm (*Eugeissona*).

GROWTH OF FRUIT-BODIES

Entoloma flavidum (Massee) Corner et Horak

This fungus is fairly common in the forest of the Malay Peninsula but it has not been found elsewhere. It fruits rather late in the agaric season, generally with *Hygrophorus firmus* B. et Br. about a month or two after the beginning. In October-November 1934, I watched the development of two clusters of fruit-bodies in the Gardens' Jungle, Singapore. As usual with more or less caespitose fruit-bodies, many primordia begin; most abort at some early stage; and few come to maturity. Five of those which I marked matured and spored. The largest developed a pileus 6 cm wide with stem 6.4 cm long, but the smallest had a pileus merely 1.9 cm wide with stem 2.7 cm long. The largest specimen that I ever found had the pileus 10 cm wide with the stem 10 cm long.

Development was gradual. From a size of pileus/stem of 1.0/2.0 cm, the largest fruit-body took 13 days to reach full size; the smallest took 4 days. The five fruit-bodies then lasted and spored for a further 6–11 days; eventually they collapsed without becoming fly-blown. On plotting graphically the daily measurements, made about 8 a.m., and extending the curve backwards, I concluded that the primordia took 6–7 days to reach the stage with the pileus 1.0 cm wide. The total life of the fruit-body would, therefore, be about 28 days, which accords with the delayed appearance of the species in the agaric season. Most rapid growth occurred when the pileus extended from 2 cm to 5 cm wide in some 5 days, roughly the 10th to the 15th day in the life of the average fruit-body

Entoloma burkillae Massee

This striking fungus with intensely blue pileus and stem is common in Malayan forests and is known also from Borneo and New Guinea. It sometimes fruits earlier in the agaric season than *E. flavidum* but sporadic fruit-bodies may be found a month or two later; as with *E. flavidum*, it does not become fly-blown. I studied the growth of a single fruit-body in November 1934 in the Gardens' Jungle. The primordium which I found had the pileus 1.9 cm wide with a total height of 2.4 cm. In 4 days it reached full size with pileus 6.5 cm wide and total height of 5 cm. It lasted sporing for another 4 days. Other fully grown fruit-bodies, which I observed at other times lasted for 7–10 days. The largest that I found had the pileus 10 cm wide.

Entoloma sercellum (Fr.) Kummer

This fungus, for which I take the responsibility of identification, used to be common in the lawns of the Singapore Botanic Gardens. Either I failed to make dried specimens or they have been lost; hence this wide-spread species is not recorded by Horak for the Malay Peninsula. I could detect no difference from *E. sericellum* which was well known to me in England, but I append the description of the Singapore fungus.

From 9–26 April 1930, when the heavy rains had begun about 7 March (Corner 1935), I watched the development of 23 fruit-bodies. A few of these I was able to trace from primordia with the pileus 1–2 mm wide and a total height of 2–4 mm. From this size the fruit-bodies took about 5 days to become fully grown; the mature pileus varied 5–23 mm wide and the total height 12–30 mm. The fruit-bodies then lasted a further 2–4 days before beginning to collapse, mostly in the late afternoon. Generally the larger fruit-bodies had the longer life. If 2 days (48 hours) are given to the primordium to develop the pileus 1–2 mm wide, then the average fruit-body takes about 7 days to reach full size, when it persists for 3 days. The maximum period of growth occurred from the 4th to the 6th day when the pileus grew from 4–5 mm wide to 12–20 mm and the stem lengthened from about 10 mm long to about 25 mm Where two to three primordia developed close together, though not caespitose, only one survived to maturity.

E. sericellum in Singapore:—

Pileus 8–23 mm wide, convex, *very soon umbilicate,* not flattening, undulate, minutely scurfy, inclining to fibrillose at the margin and squamulose in the centre, *white then pale straw-colour,* finally dingy isabelline or dingy buff, dry, *not straite*: margin incurved at first, persistently inflexed. *Stem* 15–30 x 1.5–2.5 mm, cylindric, often compressed or twisted or thickened upwards, hollow, waxy-soft, cartilaginous, smooth or slightly fibrillose, apex pruinose, *watery white,* base white villous. *Gills* adnate or sinuate with or without a short decurrent tooth, varying subdecurrent, subdistant, sometimes connected by veins, *waxy-soft,* 18–26 primaries 2–3 mm wide, 2–3 ranks, *white then pinkish. Flesh* 1–1.5 mm thick in the centre of the pileus, *waxy-soft,* white, Smell waxy.

On lawns in the Singapore Botanic Gardens.

Spore 10–13 x 6.5–9.5 μ, angular ellipsoid, 1–3 guttate, pink. Basidia 35–55 x 10–12 μ, with 3–4 sterigmata 4–5 μ long. Cheilocystidia 25–50 x 7–15 μ, clavate to ventricose, possibly merely sterile basidia, but some longer cystidia –80 μ more or less decumbent. Surface of the pileus in the centre with a pile of hyphal ends projecting more or less perpendicularly, the end-cells 28–150 x 10–25 μ, cylindric, subclavate or subventricose, often with 1–3 subterminal cells strongly inflated, more or less decumbent over the limb.

Entoloma discophorum Corner et Horak

This fungus comes up quickly after the rains have begun.

Entoloma stylophorum (B. et Br.) Sacc.

The appearance of this fungus in the agaric season may be as early as with *E. discophorum* or tardy as with *E. flavidum*. It is a common species in the Peninsula and often has caespitose fruit-bodies. The pileus and stem vary pale yellowish to pale pinkish and, in the mountains, there is what I took to be a variety with fuliginous violaceous pileus but my specimens seem to have been lost; it used to be common by the walks on Fraser's Hill.

REFERENCES

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