AGARICUS BLAZEI MURRILL—A NEW GOURMET AND MEDICINAL MUSHROOM FROM BRAZIL

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According to Paul Stamets, the well-known American mushroom grower, we soon shall see a brand new cultivated mushroom species on the markets on both sides of the Atlantic. It is called *Agaricus blazei* Murrill, an agaric that is already popular in Brazil, in Japan and in China. Moreover, it is likely to conquer the United States under the name of 'Almond Portobello'. This robust mushroom resembles The Prince (*Agaricus augustus*), and it is also an excellent edible mushroom. Indeed, *A. blazei* not only has an agreeable almond flavour, but also a texture that is much better than that of other edible agarics. In addition, *A. blazei* is already well-known for its medicinal properties, because both its mycelium and fruitbodies contain up to 12 per cent of beta glucans, immuno-potentiating polysaccharides which also inhibit the growth of malignant tumors.

Some history

In 1945 the American mycologist W.A. Murrill discovered an unknown representative of the genus *Agaricus* on the lawn of his friend R.W. Blaze, who lived in Gainsville, Florida. In honour of his friend, he described the new species as *Agaricus blazei* in a rather obscure scientific journal. For years, this new mushroom—which is unknown in Europe and far from common in North America—remains in the dark until it is rediscovered in the 1960s by Japanese coffee growers working in Brazil. It is told that one of them, the scientist Takatoshi Furumoto is intrigued by the observation that the inhabitants of the Piedade/Ibiuna district suffer far less from geriatric afflictions than the rest of the Brazilean population. When investigating the causes of this phenomenon, he discovers that the Piedade people regularly consume a kind of mushroom that is unknown elsewhere.

The story is probably a latter date fabrication to render the healing powers of this mushroom more plausible. In reality, the inhabitants of Piedade have never eaten this mushroom, which is, today, not even common in their area. Furumoto was rather captivated by its excellent organoleptic properties which reminded him of the famous Matsutake, a delicious edible but rare mushroom in Japan. He therefore sent samples of the Brazilean mushroom to several Japanese universities, and he also consulted the well-known Belgian agaricologist, Dr Paul Heinemann, who identified the species as *A. blazei* Murrill. Subsequently, after 10 years of sustained efforts, Japanese mycologists managed to cultivate the mushroom. Initially, they called it 'Kawariharatake', which corresponds more or less with its habitus, until the day that a child, delighted by the elegant stature of these agarics, exclaimed: 'they look like real princesses!'. From that day, the Japanese call them 'Princess mushrooms' or 'Himematsutake'.

A literature search reveals that the medicinal properties of this mushroom have mainly been studied by Japanese pharmacologists. Not surprisingly, it is also Japanese companies who have marketed *A. blazei*-based medicinal drugs.

Description and taxonomic position

One will look in vain for *A. blazei* in European and American field guides. Heinemann gives the following description: **Cap** 5–11 cm broad, first convex, then plane in age, surface pale brown to brown with fine scales. Margin inrolled when young. **Stalk** 6–13 cm long, 1–2cm thick, cylindrical, hollow, white, but yellowing when crushed. **Veil** membranous whitish to brownish with brownish particles on underside. **Gills** very close, free, whitish becoming brownish, then chocolate-brown. **Flesh** firm, white, turning yellow-orange when cut. Odour sweet, of almonds. Spore print chocolate brown.

The photos (Figs 1–3) show the robust cultivated form. The carpophores are reminiscent of those of The Prince (*A. augustus*), and they share indeed its excellent taste and flavour, and its yellowish bruising flesh. There are, however, notable differences, especially at the mycelium stage. Certain mycologists rather compare *A. blazei* to *A. subrufescens*, a species that only stains very slightly yellowish, but which also has a pronounced almondy flavour. This 'Almond Mushroom' also prefers a high temperature, and is therefore common in the East coast States of America. It is interesting to note that about 100 years ago this mushroom was cultivated in California, where it soon lost against the competition of the good old white Button mushroom. Other specialists maintain that the agaric cultivated in Brazil is not identical with *A. blazei* as it was originally described by Murrill. They rather see a close relationship with *A. silvaticus*, in spite of the fact that this is a red bruising species! To render to Caesar what belongs to Caesar, one is inclined to re-baptize the mushroom and call it *Agaricus brasiliensis.*

Cultivation

Since *A. blazei* likes warmth and light, it is an excellent mushroom to cultivate outdoors. Indeed, from about 20 years ago the Brazileans have cultivated the mushroom in the hot season using bagasse, a waste product from sugar cane manufacture, as a convenient substratum. After composting, this bagasse, enriched with 1,5–2% nitrogen (as urea, manure or ammonium nitrate), provides a good yield, but it is also possible to grow the mushroom on pasteurised horse dung. The American specialist Paul Stamets also obtains good results when using enriched sawdust: 5 pounds of this substratum yield 1 lb of mushrooms! When the mycelium has wholly invaded the composted substratum, fruitbody formation is induced by covering it with a thin layer of casing soil. The growth of the mushrooms requires a temperature of 25–27°C and a relative humidity of 75–85%. The flushes occur three times with 2–3 week intervals. *Agaricus blazei* may grow as single fruitbodies, but it more often forms clusters. Clearly, the cultivation method has a marked influence on the aspect and composition of the mushrooms. In general, composted bagasse and horse manure will yield fruitbodies with darker coloured caps than those obtained from cultures on sawdust. The best time to harvest the mushroom is when the gills are still covered by the partial veil. In this condition they can be sold as first quality, but to ensure their long shelf life they should be rapidly stored at a temperature of 3–4°C.

The agarics can be sold fresh, but most of the harvest is dried (Fig. 4). The best quality consists of closed veil and thick fleshed fruitbodies, cut length-wise and dried in a warm air current. The Brazileans call it Cogumelo do Sol (Sun mushroom). For the U.S.A., Stamets has proposed the common names 'The King Agaricus' or the 'Almond Portobello'. The latter name is well chosen since it capitalizes on the popularity of the giant-sized form of the ordinary Button mushroom which is called Portobello.

Nutritional qualities

The dried mushrooms retain about 7 per cent of moisture. The dry matter has the following average composition: 38 per cent protein, 40 per cent carbohydrates, 3 per cent fat, and about 7 per cent of mineral compounds including 2,5 per cent potassium, 1 per cent phosphorus and 0,1 per cent magnesium. Moreover, *A. blazei* contains nutritionally important amounts of B vitamins, niacin, and even vitamin D plus the essential elements iron, manganese, zinc and copper. Just like the other flavescent agarics, the mushroom has the regrettable tendency to concentrate certain heavy metals of which cadmium is the most dangerous. In the course of their research, the present authors observed that the amount of this toxic metal in Brazilean cultivars generally remained well below the legal limits. The same can be said about their mercury and lead content. However, some consignments of dried *A. blazei* from China were found to contain excessive amounts of cadmium, although the mercury, lead and arsenic concentrations were quite acceptable.

Figure 1 (page 31). The freshly picked fruitbodies of cultivated *A. blazei.*
Figure 2 (page 31). An abundant flush of the Cogumelo do Sol (Sun mushroom) as it is called in Brazil.
Figure 3 (page 31). Three Brazilean scientists observing *A. blazei* Murrill. From left to right: Dalva Santana (entomologist), Angela Amazonas (mycologist), who are both working at Embrapa Florestas, a Research Institute dealing with Forestry, belonging to the Ministry of Agriculture, in Colombo, Paraná, and Renato Rau, pharmacologist at the Institute for Technology of Paraná, situated in Curitiba, the Capital of Paraná State. (All taken at the mushroom farm of grower Aldinei Mussy, Guarapava, Paraná, Brazil.)

Figure 1

Figure 2

Figure 3

Exploiting the gastronomic potential

Eating this agaric is a first order gastronomic experience! Immediately after harvest, its almondy flavour may be a bit too strong, but it decreases to a most pleasant level during the following days. The colour of the fresh mushrooms turns golden yellow upon cooking, but this phenomenon disappears 1–2 days after picking. Stamets recommends cooking the sliced mushrooms simply in olive oil at high temperature, and to season with salt, soy sauce and tamari. The texture of the cooked mushrooms is far better than those of the ordinary Button mushrooms or Oysters. The gastronomic potential of *A. blazei* has not yet been sufficiently explored. This poses a challenge to the French 'Chefs de cuisine' who will undoubtedly develop a series of succulent recipes for this extraordinary mushroom.

Medicinal properties

As already mentioned, *A. blazei* contains high levels of beta glucans, immunostimulating polysaccharides which are selectively cytotoxic on tumor cells. Consequently, many companies on the Internet advertise and sell not only the dried mushroom, but also preparations containing enriched fractions of the active principles. The accompanying publicity often exaggerates their healing powers, but its beneficial action in the treatment of various forms of cancer, arteriosclerosis, diabetes and chronic hepatitis seems to have been well established by clinical research. In Japanese pharmacies one already finds a whole array of medicinal drugs based on mushrooms. The photograph shows three products which were purchased in Tokyo. The drug AGARICUS consists of a water-soluble granulate constituting undoubtedly the more or less purified beta glucan fraction (Fig. 5). Studies on the medicinal virtues of *A. blazei* are still in progress, especially in Japan, but now also in the U.S.A.

Is there a future for *A. blazei* on the European markets?

In Japan, *A. blazei* is already the centre of an industry worth 600 million US dollars annually. The mushroom is cultivated commercially in Brazil, Japan, China and Korea. Lately, Paul Stamets is growing it in Olympia, Washington, and there are also cultivators in California and Hawaii. Europe has not awakened yet to the potential of this new haut-de-gamme gourmet mushroom. In Switzerland, The Netherlands and Denmark one has just started some experimental cultures. Some information can be found on the Internet about *A. blazei*, but mainly extensive publicity about its healing properties. In fact, the only sales argument are its (often exaggerated) medicinal virtues. Its culinary appeal is almost never mentioned.

To inspire confidence, a drug should be expensive. No wonder that the price of the dried mushroom fluctuates between 50 and 100 US dollars! However, the case of the Hen-of-the-Woods (*Grifola frondosa*) demonstrates that consumption of a once rare and expensive mushroom can spread widely in a short time. About 10 years ago, this mushroom, also known as 'Maitake', was sold as an expensive medicine, but only in Japan and China. Since European and American growers have mastered its culture, it is sold—among others—at the Swiss market for about the same price as Chanterelle mushrooms. Indeed, the price of *A. blazei* could decrease rapidly, once the Chinese start to export the mushroom to Europe. In that case one would expect the mushroom growers of the Old World to extend their activities to include *A. blazei*!

Reference

Stamets, P. (2000). Call it Himematsutake or call it the Almond Portobello—It is special. *Mushroom, the Journal of Wild Mushrooming (USA)* **18(3),** 10–13.

Figure 4. The mushrooms as sold: cut length-wise and dried.

Figure 5. Japanese medicines derived from mushrooms and recommended for treatment against cancer: next to AGARICUS (containing the beta glucan fraction), one observes;'Super Maitake', a product on the basis of *Grifola frondosa*, enriched with vitamin C. The 'Mesima Pure', a most expensive drug, is manufactured from *Phellinus linteus*, a Polypore parasitizing mulberry trees.