

A Case of Mistaken Identity?  
What is the true identity of

# Java moss and other aquarium mosses

sold in Singapore shops?

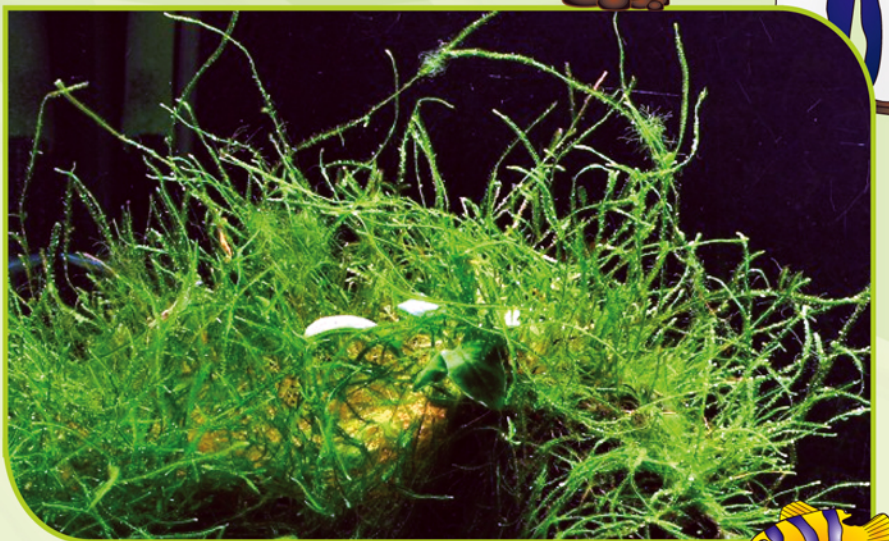
B.C. Tan, Loh Kwek Leong, Gan Cheong Weei

Photographers C. King Hshiau Horng & Choy Heng Wah

There is a lot more interest these days in growing mosses in aquariums and fish tanks. The trend can be seen in the increasing sales of various kinds of aquarium mosses in commercial shops. For many years, aquarium hobbyists and aquatic plant growers have puzzled over the correct identity of the common aquatic moss called 'Java Moss'. A recent survey made in Singapore shops and a check of internet forums set up by aquatic plant enthusiasts have shown that several species of mosses have been incorrectly identified as Java Moss.

Other than the real Java Moss, whose scientific name has generally been accepted to be *Vesicularia dubyana*, the genera and species of other popular aquarium mosses these days, like Christmas Moss, Erect Moss, Singapore Moss and Taiwan Moss remain unclear.

This identity problem of aquarium mosses is complicated further when the plants are grown emersed, that is, above water. Grown emersed, the plants change their leaf and overall shape and become unrecognisable from their submersed (underwater) form. Consequently, there is a need to identify these aquarium mosses correctly. In this article we report on the results of our study of several of these mosses.



Java Moss growing in an aquarium

The Java Moss has been identified many years ago by Prof. Zen Iwatsuki at the Hattori Botanical Laboratory in Japan as a species of *Taxiphyllum* - *T. barbieri* (Card. & Coppey) Iwats. (Iwatsuki 1982). The name is based on a comparison of the Java Moss grown in Japan and the herbarium specimen of *Taxiphyllum barbieri* from Vietnam. Because of the lack of moss specimens with spore structures (fruiting specimens), this identification of Java Moss has to be accepted with reservation.

In spite of the correct identification as *T. barbieri*, Java Moss has been persistently misquoted as *Vesicularia dubyana* in a number of aquatic plant books. Recently, Java Moss plants have also been exchanged among aquarium hobbyists in Singapore and Japan under a different common name, 'Willow Moss'. The Willow Moss, which has a scientific name of *Fontinalis antipyretica*, is a large aquatic moss found in fast flowing rivers in temperate and cold countries, but not in the tropics.

Indeed, the Java Moss has a characteristic branching pattern with long primary stem and somewhat distantly arranged long and short branches (see picture). The flattened leaves are arranged on two sides of the stem and branches. The leaf shape is oval-oblong with a short apex and with two clearly developed short costae. Its leaf cells are narrowly oblong. This type of leaf cell areolation is not found in the *Vesicularia* species. Additional distinctions between *Taxiphyllum* and *Vesicularia* in terms of their stem anatomy and shape of 'primordial leaf' or pseudoparaphyllia have been pointed out by Iwatsuki (1970, 1982). Thus, the Java Moss is not a species of *Vesicularia*.

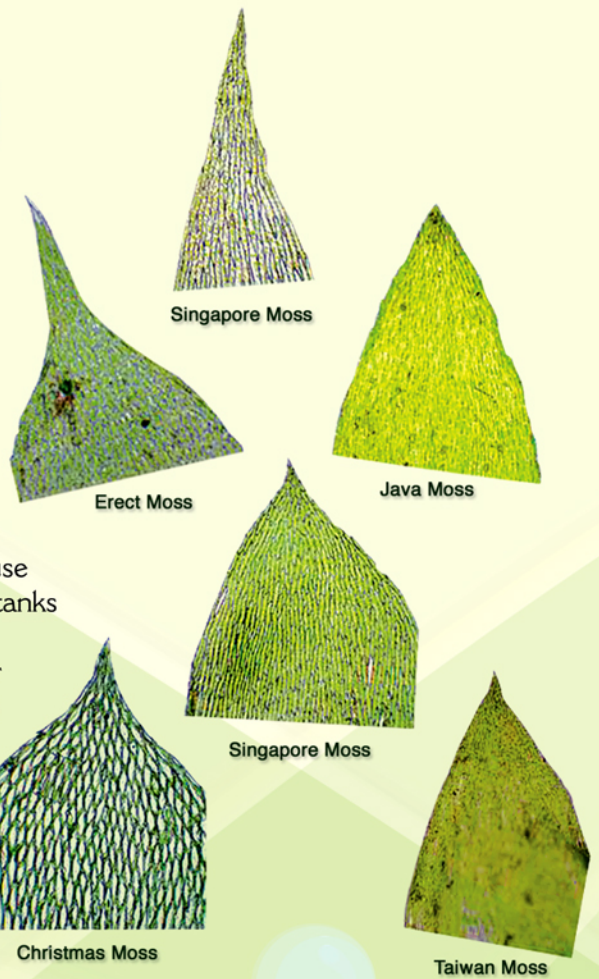
Differences in the leaf tips (apices) of the five species of aquarium mosses



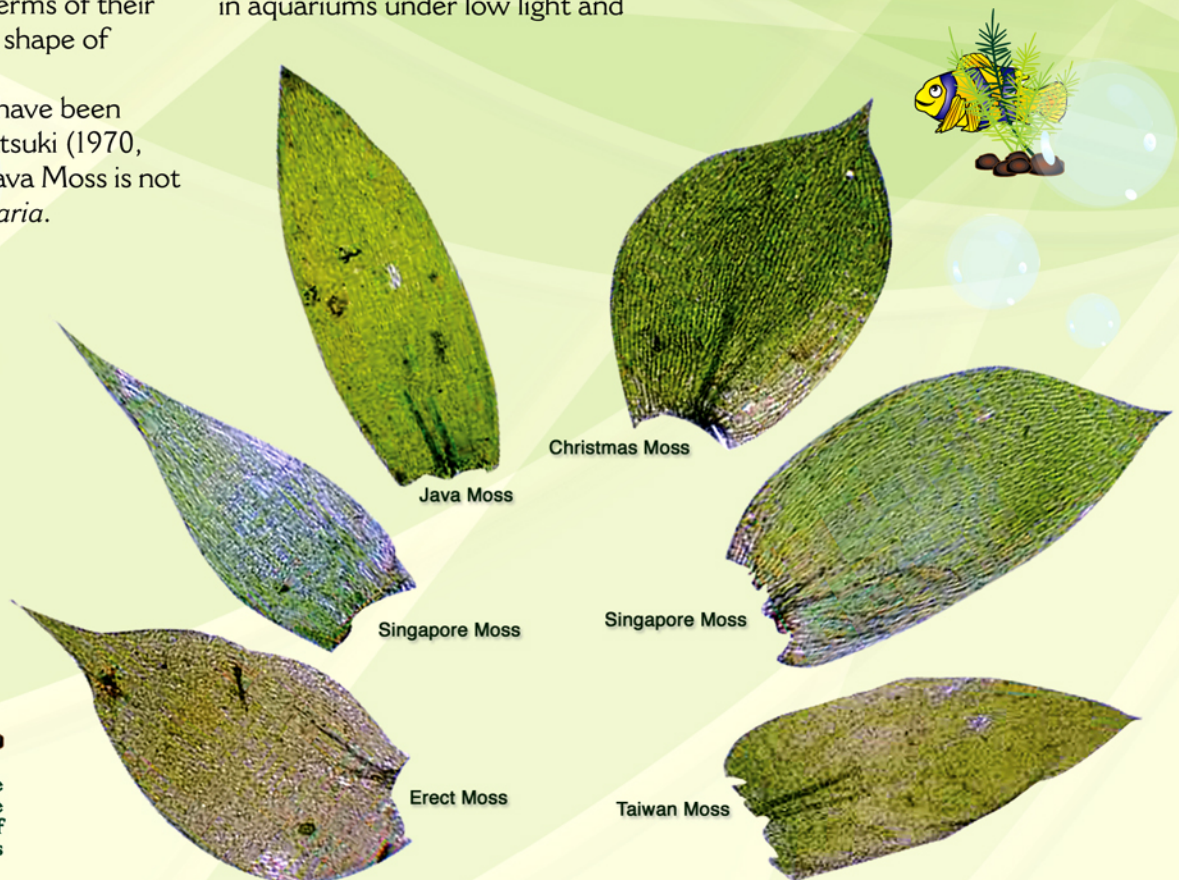
One reason why Java Moss has become one of the most common mosses grown in aquariums is that the plants provide good hiding places for small fish. Hobbyists who breed fish use Java Moss in their breeding tanks because many species of tropical fish love to lay their eggs on their fronds. In the tanks, they are often grown tied to driftwood or rocks. Grown in a bunch, the plants curl upwards and look like a head of hair that has been messed up by strong winds.

Another reason why Java Moss is common is because it is the easiest to grow of all aquatic mosses. It will thrive even when left floating in aquariums under low light and

tropical room temperature (28 - 30°C) while other mosses will be stunted or wilt under such conditions.

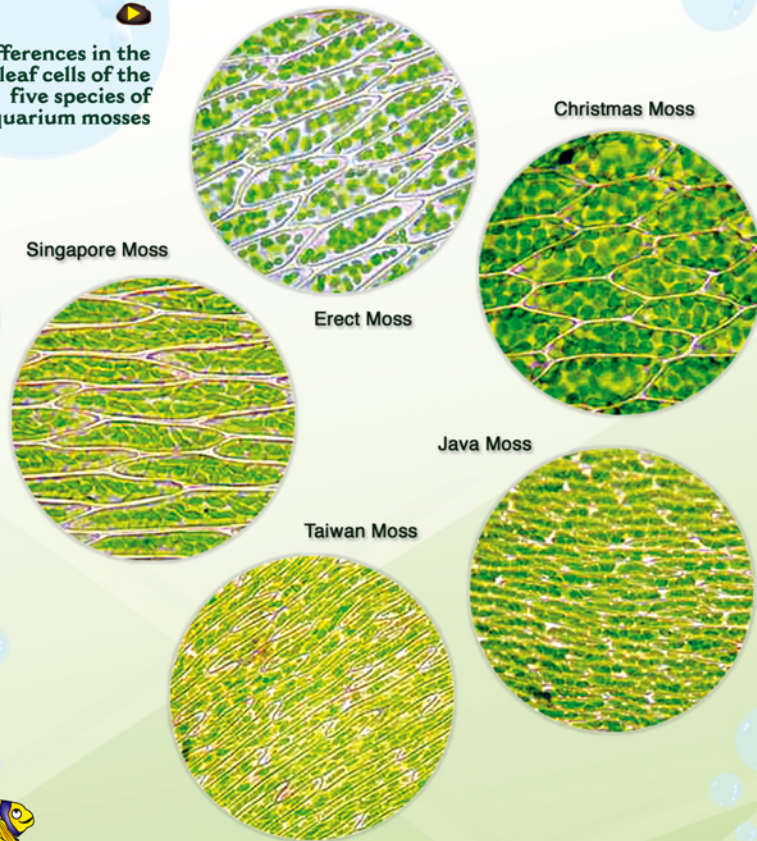


Differences in the leaf shapes of the five species of aquarium mosses





Differences in the leaf cells of the five species of aquarium mosses



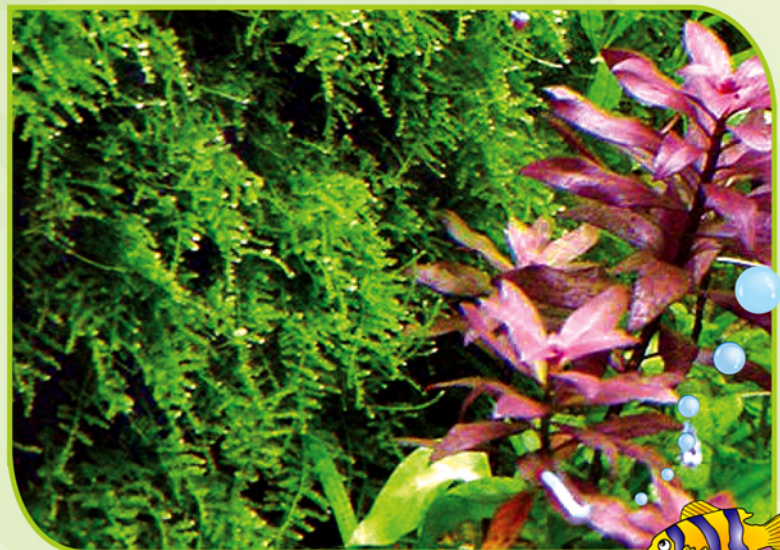
A rising star among the aquarium mosses is the Christmas Moss. The plant got its name from its fronds that hang down and overlap each other like those of a Christmas tree. Many hobbyists grow them as a moss wall, a sort of backdrop for a fish tank. Grown submersed, the moss can exhibit long triangular fronds. In emersed conditions, however, the moss loses its triangular shape entirely.

The correct identity of Christmas Moss is *Vesicularia montagnei* (Bel.) Broth. It is also well known by another name, *Vesicularia dubyana* var. *abbreviata* Fleisch. The species is semi-aquatic in its natural habitat growing on shaded, wet banks and also on wet, shaded ground in forest. When grown as an aquarium plant, it develops its characteristic pinnately to subpinnately branching habit. The leaves are nearly round to broadly oval with a short acute apex and the leaf cells are wide and short in outline. The two leaf costae are very short and often inconspicuous.

As a natural species, *Vesicularia montagnei* is widespread in Asia ranging from the Himalayas, Sri Lanka, China to Malaysia, Singapore, the Philippines and Indonesia. The plant has been wrongly identified in a number of internet forums as *Cratoneuron flicinum*. The latter is an entirely different moss found in wet calcareous habitats in many temperate countries, but absent from the tropics.

Another relatively new aquarium plant which is rapidly gaining popularity, is the Erect Moss - *Vesicularia reticulata* (Dozy & Molk.) Broth. It, too, is often grown tied to driftwood. The trade name describes the upward habit of its stems growing in submersed condition (see picture on pg 11). Under optimal growth conditions, the plant branches profusely and has pointed tips at the end of its fronds. The leaves are oval to lanceolate with a long and stout acuminate apex. The leaf cells, like other species of *Vesicularia*, are wide in width, but in this species, the leaf cells are longer than those seen in Christmas Moss, but not as long and narrow as the leaf cells of Java Moss. *Vesicularia reticulata*, like *V. montagnei*, is also a widespread moss species in Asia.

The identity of another aquarium moss christened by us as Singapore Moss and now grown by many aquatic plant lovers in Singapore has also been a mystery for some years. This moss is usually sold in aquarium shops in Singapore in emersed form at a very affordable price. Grown in aquariums, the plants look like the Christmas Moss except that their fronds are shorter. The similarity in appearance between these two mosses has



Christmas Moss growing in an aquarium



Taiwan Moss growing in an aquarium

given rise to the belief among hobbyists that there are two types of Christmas Moss, one with big fronds and the other with small ones. Interestingly, this moss is the true *Vesicularia dubyana* (C. Muell.) Broth. In Singapore, it can be found growing naturally everywhere under the shades of trees and the sides of streams. Singapore Moss has an irregularly pinnate branching pattern. To a certain extent, its leaves are variable in shape, but with a short, acuminate leaf apex. Its leaf cells are like those seen in *V. reticulata* (Erect Moss).

One very recently introduced and rather pricey aquarium moss in Singapore, yet rarely available in shops, is the Taiwan Moss. As its name suggests, it is imported from Taiwan but we are not sure if it is indigenous to that island. It is a beautiful aquatic moss, which, naturally, makes it one of the most sought-after mosses by hobbyists everywhere.



Singapore Moss growing in an aquarium



Erect Moss growing in an aquarium

Grown in aquaria, the Taiwan Moss exhibits a distinct triangular shape, somewhat similar to the Christmas Moss, but more equilateral. However, unlike the Christmas Moss, which feels hard when touched, the Taiwan Moss has a soft texture and looks very delicate when grown in a bunch. The leaves of Taiwan Moss are lanceolate with two well marked costae and an acuminate apex. The leaf cells, like the ones in Java Moss, are narrowly oblong. However, a distinct difference between these two species can be observed in their leaf margins. In Taiwan Moss, only the upper leaf apex is irregularly and finely toothed. In contrast, the leaf margins of Java Moss are finely toothed nearly throughout.

The Taiwan Moss is a species of *Taxiphyllum* related to the Java Moss. It most closely resembles *Taxiphyllum alternans* (Card.) Iwats. in its leaf morphology and stem anatomy. The latter is a widespread moss species found in wet places in China, Japan, Korea and Eastern North America. Without the fruiting structures such as capsules however, the correct identification of Taiwan Moss, like the Java Moss, still remains uncertain.

#### References

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- Takaki, N., Watanabe, R., and Iwatsuki, Z. 1982. Bryophytes in aquariums for tropical fish. Proceedings of the Bryological Society of Japan 3(5): 65-68 (in Japanese).

Assoc Prof B C Tan and C King Hshiau Horng are from the Department of Biological Sciences, National University of Singapore. Loh Kwek Leong, Gan Cheong Weei and Choy Heng Wah are members of 'Killies.com' group, Singapore