

The Wardian Case: How an Accidental Discovery Facilitated the Shipment of Plants Around the World

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It's interesting to note some facts about the invention of the Wardian Case, and how its accidental invention led to the revolution of plant shipment and nursery trade around the globe. The Wardian Case was accidentally discovered by a medical doctor, Dr. Nathaniel Bagshaw Ward (1771 - 1868) in East London. Dr. Ward was also a naturalist and amateur gardener with a special interest in growing ferns. One day in 1829 he placed some damp soil and dried leaves inside a bottle with the pupa of a sphinx moth. He sealed the bottle, and when he inspected it a few days later, he discovered that some grass and ferns had sprouted from the soil. Although his moth never hatched, Dr. Ward became interested in studying how plants exist in glass containers for long periods of time without watering. He removed the pupa from the bottle and observed the bottle in his study. He took notes on the growth of the fern spores and grass, watching how water condensed on the glass during the day, and then ran down the sides into the leaf mold used to cover the pupa in the cooler evening. Thus, he created a mini ecosystem. About three years later the lid on the bottle rusted, letting rain water run in killing the ferns and grasses.

Another observation that Dr. Ward made was that his ferns grew well in the glass cases he had built, much better than when planted in his garden. This was at the peak time of the Industrial Revolution in England, when factory pollution in the air harmed his garden ferns. Dr. Ward concluded that plants could flourish in London if they could be protected from the city's polluted air by growing in miniature greenhouses. He commissioned a carpenter to build a small greenhouse type structure, held in a wooded frame with handles making it easier for lifting and carrying. Ward called these enclosures "fern cases", later renamed Wardian Cases. In 1842 he published a book with the results of his observations, "On the Growth of Plants in Closely Glazed Cases".

What Ward created was essentially a terrarium. As a doctor in East London, Ward saw health problems of poor nutrition among his poor patients and he hoped his Wardian Cases might be a way for many to grow vegetables in polluted cities. He also saw another more commercial use as a solution to problems of transporting plants by sea.

At the time of Ward's discovery, it was almost impossible to successfully ship plants long distances. On shipboard, the plants, usually placed in the hold, died from lack of sunlight and fresh water, and few made it to their destinations alive. Dr. Ward experimented by sending two Wardian Cases with ferns to Sydney Australia. The

plants arrived in good condition, and some even had lush growth that occurred during their journey. On a return journey from Australia, the two boxes were shipped back to London with new plants from Australia. The plants endured extreme changes in temperatures on an eight month journey around Cape Horn and over rough seas. The plants traveled up the Thames, arriving in good condition. The collection included a rare Coral fern that grew from a spore on the journey and had never before been seen in London..

Following this successful experimental journey, Ward and his friends continued to send plants around the world in glass cases. In 1835 Ward sent cases of ornamental plants to the head gardener for the Pasha of Egypt, and coffee plants were later sent. A friend and nurseryman, George Loddiges sent over 500 cases of plants to many ports around the world, and it was Loddiges' nursery that established the Wardian Cases as the best way to transport live plants successfully. By the 1870's shipment of plants around the globe became possible because of the Wardian Case.

Use of the Wardian Case didn't only change our garden landscapes with shipments of ornamental plants from China, they have also been credited with helping to break the geographic monopolies in the production of important agricultural products. Robert Fortune, a Scotsman, shipped to British India 20,000 *Camellia senensis* plants smuggled out of Shanghai, China to begin the tea plantations of Assam, a state in northeastern India, thus breaking the Chinese monopoly on tea.

Botanists also found there was opportunity in taking cash crops from one country to another by using Wardian Cases to help export *Cinchona* trees from Bolivia to Java and India. The bark of the *Cinchona officinalis* tree which produces quinine, was made more readily available for the treatment of malaria. This was instrumental in the expansion of the British Empire to areas where malaria was rife. In fact, some historians argue that without quinine, European colonialism would have been impossible in Africa, and costlier elsewhere in the tropics.

Another crop, Rubber plantations were developed in Ceylon (Sri Lanka) and the British territories in Malaya. After imported Rubber plant seeds from Brazil were germinated in the heated glass houses of Kew, (The Royal Botanic Gardens of London,) the germinated seedlings were successfully sent to Ceylon in Wardian Cases. William Hooker, the first director of the Royal Botanic Gardens said that during a period of fifteen years at Kew, Wardian Cases were responsible for him increasing the number of plants collected to over 6 times more than in the previous century. Over time, the Wardian Cases were further developed with improved features such as cross battens to separate and hold plants, and ventilation holes covered with perforated zinc to better keep out rodents. Kew continued to use Wardian Cases for shipping plants up until 1962.

Dr. Ward never patented his Wardian Case, and despite the case's popularity he never made much money from his invention. However, his passion for ferns never left him, and when he retired from his medical practice to a home in Clapton, he achieved his dream with a fernery in a large, closed greenhouse with around 25,000 specimens. In a magazine article written in 1851 his herbarium was described as a "representation of a tropical rain forest" on a much smaller scale.

Recommended reading: if you would like to learn more about the Wardian Case you might enjoy Luke Keogh's book titled: "Wardian Case: How a Simple Box Moved Plants and Changed the World."

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