the survey of the southern coasts of South America, including Tierra del Fuego. A letter from the commander, Captain Fitzroy, offering him the post of honorary naturalist gave him real cause for excitement. Henslow had recommended him to the captain as an able naturalist and a suitable companion: Charles was always a great favorite with his associates, a happy trait for a long sea voyage.

He was only 22 when, in December, 1831, the Beagle sailed from Plymouth. Fitzroy stayed three weeks at the Cape Verde Islands, and Charles in a letter to his father told him of the delights of strolling under coconut palms, through banana thickets, coffee plantations and viewing the beautiful wild flowers. Two months after leaving England they reached Brazil. While Fitzroy was engaged in surveying, Darwin was able to explore for short distances inland. At Rio de Janeiro he was thrilled to see a tropical forest in "all its sublime grandeur".

Two years were spent in charting the southern coasts of America, and after visiting various islands in the Pacific a course was set for New Zealand. High winds were encountered, and now, in a calm after the storm, the Beagle sailed into the Bay of Islands on December 21, 1835, anchoring opposite the missionaries' homes at Paihia. Darwin, still suffering from sea-sickness, was by this time feeling depressed and homesick, and except for his estimation of the kauri as "noble trees" records little in his diary of the New Zealand flora. After a walk on the near hills he stated that the country was "very impracticable. All the hills are thickly covered with tall fern, together with a low bush which grows like a cypress." But the stay in New Zealand was very short, only nine days. On December 30 the Beagle sailed out of the Bay of Islands and on October 2 of the following year touched the shores of England once more.

Darwin lived in London for six years after his return, married his cousin, Emma Wedgwood, and then bought a property of 18 acres and a three-story brick house at Down, in Kent, 16 miles from London. It was fortunate that his father was wealthy and generous, for Darwin had not yet begun to earn his living by his pen. With the inspiration and knowledge gained through travel he began his life work in earnest: The solving of many problems in natural science. He corresponded with naturalists whom he had contacted during his long voyage and received plants from them. Joseph Hooker, though eight years his junior, was soon an intimate friend. Hooker relates how they often "trudged through the garden, where there was always some experiment to visit."

Darwin farmed part of his property and utilized the rest for gardens, experimental plots and greenhouses. He was the first to discover that sundews and the many plants that belong to the Droseraceae actually trapped insects and were partly nourished by the nitrogen absorbed through their leaves and pitchers. A glance through his "Insectivorous Plants" makes one realize what meticulous pains he took in his experiments. His wife, writing to a friend, said, "Charles is treating Drosera (the sundew plant) just like a living creature and I suppose he hopes to end in proving it to be an animal." (For illustrations of New Zealand Droseras see N.Z. Gardener, March, 1957.)

Orchids also gained Darwin's special interest. Here, too, were plants that were closely associated with insects, in which marvellous devices had been evolved to gain cross pollination. He stated that "these contrivances have for their main object the fertilization of each flower by the pollen of another flower", and in a letter to a friend he said: "I never was more interested in any subject in my life."

Many varieties of English orchids grew near Down. His favorite walk was to this "Orchid Bank". After careful observation of the British orchids he devoted his attention to exotic species. A neighbour lent him the free use of his hot-house, and here Darwin was able to grow many plants that Hooker sent him from Kew, as well as specimens from orchid fanciers who were now interested in his work and experiments. One of these was a lovely orchid from Madagascar with "large six-rayed flowers like stars formed of

snow-white wax . . . and a whip-like green nectary of astonishing length". Some of these nectaries were more than 10 inches long with only the lower inch filled with nectar. Darwin could only surmise that there were certain large moths in its native habitat that were able to reach this sweet juice and so pollinate the flowers. Later one with a very long coiled proboscis was discovered in Madagascar.

On the opposite side of the world the orchids of a new field were arousing interest. A green orchid, first discovered by Joseph Banks in 1769 and named *Pterostylis banksii* by Robert Brown, was rediscovered in 1826 by Allan Cunningham, who described it as "remarkable for the noble size of the flower at the top of a foliaceous stem a foot high". Thomas Cheeseman, in 1862, procured a copy of Darwin's "Fertilization of Orchids" that had just been published. He noticed that no mention was made of Pterostylis, that was plentiful in bush areas about Auckland. He noted the clever device by which this flower gains cross-pollination and sent an account of his observations to Hooker, who passed the letter on to Darwin. In a later edition of the book Darwin gave a full account of the tricky device, and stated that he had taken it "from the admirable description given by Mr. Cheeseman".

At that time the geographical distribution of plants was beginning to interest botanical explorers. How was it that the same species were found sometimes in countries many hundreds of miles apart? The popular belief was that former land connections was the cause. Darwin believed that plants could spread by other means and carried out experiments by soaking seeds in sea water. After 14 days many of them germinated. Birds, too, in his opinion, were carriers not only by eating the berries but by carrying the seeds stuck to their feathers or in mud between their claws, and came to the conclusion that "occasional transport" was far more probable than "continental extensions".

Darwin died at the age of 73 and was buried in Westminster Abbey near the grave of Sir Isaac Newton. Four of his sons inherited his interest in natural science, and three of them were knighted.

Pumice Enters Horticultural Field

NEW ZEALAND PRODUCT SPEEDS UP PROPAGATION

J. W. MATTHEWS

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THE RAISING of plants from seed and cuttings is as old as gardening itself, but for centuries man has been striving to find new and more efficient methods of carrying out these methods of plant propagation.

Some seeds will germinate and develop into sturdy plants if sown in the open ground, but the more delicate types require a great deal of skill, as they must have the right degrees of moisture, temperature and aeration to germinate and grow without damping-off.

Cuttings of many plants also require special attention if they are to callus, root and grow. Lack of efficient treatment results in many failures, and often in poorly-rooted plants.

One of the oldest methods of raising "difficult" seeds, and of striking reluctant cuttings has been the use of sand, but unless just the right grade is used it is liable to become compacted with fatal results to the plants.

Other preparations such as that expanded form of mica known as vermiculite, and a type of pumice subjected to considerable heat and known as perlite, have been used with considerable success. These materials are largely used for insulating purposes, but owing to their light and open nature, have been found useful in horticulture.

The latest aid to propagation is a pure type of pumice ground to a degree which per-

mits the movement of water and air through it, but which does not dry out readily or consolidate. It is now being used extensively by a number of nurserymen who agree that it is superior to other products they have tried for the raising of seedlings or the rooting of cuttings.

Pumice is an inert material which is sterile; consequently the organisms which cause damping-off and other troublesome diseases are not present in it, and seed raised in it does not suffer from these parasites. On account of its light, loose and open nature, pumice does not consolidate when subjected to frequent waterings, which is a very important point, as many seeds will quickly rot, or even if they do germinate, the seedlings will collapse, unless the medium in which they are growing is well aerated.

Aeration, by the way, means a soil that permits air to move through it, and the gases which are secreted by the roots of all growing plants to escape into the atmosphere. When a soil is not adequately aerated, these gases accumulate, the soil becomes toxic and plants die.

Pumice absorbs and holds a limited amount of water, but never becomes soggy and water-logged, and when liquid fertilizers are added to it, a high percentage adheres to the pumice particles, thus enabling the roots of the growing plants to obtain these nutrients without undue effort.

Seedlings growing on pumice usually make rapid growth and the loose medium enables their roots to proliferate without meeting obstruction through which they have to push their way—an effort that can impose a severe strain on a small plant.

Pumice may be used for seed-sowing or rooting of cuttings in its pure form, provided reasonable precautions are taken to ensure moderate watering, shading and protection from draughts. It can also be used with excellent results for loosening up loamy or clay soils; thoroughly mixed with them, it brings about a degree of aeration which facilitates the movement of moisture and air.

Pumice has been found ideal for adding to the standard seed composts and for use in all potting soils to ensure that they will not become "sour", water-logged or compacted. It is not a plant food, but a soil conditioner, and needs to be reinforced with fertilizers if plants are to be retained in it after they have rooted.

Pumice for horticultural uses is being pioneered by Messrs. J. B. Gilberd & Sons Lts., of Wanganui, whose sandsoap has been used by many generations of New Zealanders.

Koelreuteria Formosana

PHILIP E. CHANDLER

SALMON PINK SEED PODS like clustered paper lanterns light up this tree's top for Hallowe'en, following a brief show of yellow flowers in large panicles. The shining compound golden-green leaves rarely attacked by insects of any kind, appear in late February and drop about Christmas exposing the strong yet delicate structure above handsome gray trunk and well-behaved roots that tolerate choice planting closely. A free-form umbrella usually 25'-35' and across, this member of the *Sapindaceae* from Formosa is fool proof to most Southern California locations excepting those of salt and extreme wind, and ideal shade subject for lawn, garden, terrace or streetside. Representative specimens may be seen on La Mesa Place just off 26th Street, Santa Monica, at 353 19th Street also in Santa Monica, and on the east side of Benedict Canyon just north of Sunset Boulevard in Beverly Hills.