responsibility of the City Corporation. Both the logging and sale contracts proceeded satisfactorily.

The compartment of 7.8 acres yielded 685,018 board feet log scale, equivalent to 87,820 board feet per acre. In addition 209 cords or 26 cords per acre, of firewood were cut from the tops, branches and shattered logs.

The sale of logs yielded £8,049 and the payments to the logging and cartage contractor required £2,227 of this sum, leaving a gross profit of £5,822. Working expenses were light, amounting to less than £100, mainly for the maintenance of the main access road. It is expected that this sum will be recouped from the sale of the 209 cords of firewood, as a price of at least 30/- per cord on the ground is expected when tenders for its purchase are called. Some further expenses will be incurred in burning the area prior to replanting, for as yet there is no indication of natural regeneration, although all the cones were left on the ground. The net yield, therefore, amounts to approximately £746 per acre, but unfortunately no planting or maintenance costs over the 33 year rotation have been recorded.

This phenomenal return has been obtained only because of the suburban site, the excellent quality of the stand, and the high prices ruling for sawn timber at the present time. However it indicates the advantage of proximity to the market when considering the establishment of exotic forests. Unfortunately, the majority of the Dunedin City Corporation forest areas are not as close to Dunedin, nor of the same high quality as this stand. It is of interest that a further series of small compartments and windbreaks now being clear felled is bringing in an even higher return for sawn logs—24/- per hundred board feet (Goss log scale)—and a reduction of 4d. per hundred board feet has been obtained under the new logging contract. The minimum top diameter has also been reduced from six to five inches inside bark.

M. R. SKIPWORTH.

THE UMBRELLA PINE—*Sciadopitys verticillata.*

The Umbrella Pine is restricted in natural habitat to Japan where it is found in the Kiso River Valley, on Mt. Koya in the Wakayama Province and as an occasional widely scattered tree in the mountains of Shikoku. Nowhere has it been planted artificially as a timber tree but specimens can be seen in gardens throughout the world.

Found extensively on Mt. Koya from which it gets its Japanese name Koyamaki, the Umbrella Pine is a most important tree in this locality. Over the whole National Forest it forms 32% of the total number of trees, but there are places where it occurs in small pure colonies. The chief associated species is Hinoki (*Chamaecyparis obtusa*). In the grounds of the temples and shrines of Mt. Koya, the

Umbrella Pine is protected and cultivated, and its foliage is used for placing on tombs and as souvenirs of the area. It is recognised as the emblem of the mountain.

Mt. Koya is flat-topped with an average altitude of 2,500 feet, a rainfall of 78 inches a year and an average temperature of 50°F. The Umbrella Pine grows best on the higher slopes where the drainage is good, but it does not demand a good soil. Its root system is shallow and spreading and damage from typhoons has, as a result, been rather extensive.

In the mixed and pure stands of Umbrella Pine regeneration is very good. The species is very shade tolerant and the seeds germinate freely, but seedling growth is slow for the first 6 years. Because of the dense foliage, undergrowth is suppressed, giving room for the tolerant seedlings to grow. Fertile cones are not produced until the tree is about 40 years old; thereafter seed production is fairly abundant.

Some trees have attained the height of 100 feet with a D.B.H. of 3 feet. Very often there are multiple leaders which are always liable to wind damage. Branches are large and often break off leaving snags a foot long. Where the branch joins the trunk, there is a swelling preventing natural pruning. The branches slope down and out from the trunk but turn up at the tips giving a rather characteristic appearance. Buttressing is not pronounced but may occur a little at the base of the trunk. The bark is grey, smooth, thin, longitudinally fissured and fibrous. Since time immemorial, the bark has been used for caulking in boat building and, to a lesser extent, as a roofing material. Many trees show signs of white rot due to damage caused when the bark was being removed. Recent regulations have prohibited such a practice on growing trees.

The timber is white, soft and easily worked with a close straight grain and fragrant smell. Because of its power to withstand water, it is keenly sought after for making buckets, barrels, coffins, tubs and baths. All the temples on Mt. Koya stand on piles of Umbrella Pine.

The following is a table compiled from an experimental plot (0.7 acres) on Mt. Koya.

Species	Original Stocking		Stock removed in 1919		Stock left		Annual Annual Increment to 1935
	No.	Vol. cu. ft.	No.	Vol. cu. ft.	No.	Vol. cu. ft.	
Chamaecyparis obtusa	24	3774	19	2755	5	1019	2%
Sciadopitys verticillata	180	6221	91	2230	89	3991	1.5%
Pinus densiflora	7	1198	7	1198	—	—	
Tsuga sieboldii	2	219	2	219	—	—	
Total	213	11412	119	6402	94	5010	

In 1934 the plot was remeasured and showed an annual increment over all species of 274 cu. ft. on trees down to 8 cm. D.B.H.

The Umbrella Pine is being preserved as much as possible in its natural habitat but no attempt is being made to extend its area by planting.

References.

1. Wilson, H. E. "The Conifers and Taxads of Japan," Oxford, 1916.
2. Dallimore & Jackson. "A Handbook of Coniferae," London, 1931.
3. Bulletins of the Natural Resources Section, S.C.A.P., Tokyo.
4. Translated Data from the Japanese National Forest Bureau.

A. W. GRAYBURN.

SILICA IN BEECH TIMBERS.

Difficulties in sawing some of the New Zealand beech timbers are frequently reported.

The species concerned are *Nothofagus truncata* (hard beech) *N. solanderi* (black beech) and *N. cliffortioides* (mountain beech). Drawing an analogy from teak, which blunts saws in a comparable way, it was assumed that high silica content was a probable explanation. Analyses of a small number of beech samples were made by the Dominion Laboratory to determine total ash contents and percentages of silica in the ash. The figures for these and some overseas woods are :

No. of Sample	Species and Locality	Total Ash (based on oven-dry weight of wood). per cent.	Silica in Ash per cent.	Silica in Dry Wood per cent.
1.	*N. fusca* (small tree) Karioi, Central N.I.	0.43	7.55	0.03
2.	*N. cliffortioides* (small tree) Karioi, Central N.I.	0.91	43.30	0.39
3.	*N. fusca* (split post) Mamaku, Rotorua	0.16	9.74	0.02
4.	*N. truncata* (split post) Mamaku, Rotorua	0.34	49.50	0.17
5.	*N. cliffortioides* (sawn timber) Lillburn Valley, Southland	1.11	44.60	0.50
6.	*N. cliffortioides* (sawn timber) Lillburn Valley, Southland	0.88	12.14	0.11
	Overseas woods from "Wood Chemistry," by L. E. Wise			
	Betula alba	0.21	0.85	0.002
	Fraxinus americana	0.43	7.05	0.03
	Quercus alba	0.37	3.20	0.01
	Tectona grandis	1.3 to 3.1	25.00	0.33 to 0.77