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CONTENTS:

	Page
Further Notes on an Artificial Scree in a New Zealand Garden; By J. Scott Thomson and G. Simpson.	1
Horticulture in South China	13
Institute Notes	14
Unique Spring Show	15

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No. 1.

FURTHER NOTES ON AN ARTIFICIAL SCREE IN A NEW ZEALAND GARDEN.

(By J. Scott Thomson and G. Simpson.)

"All gardeners are boastful, whoever they are; in the garden of the most modest and self-effacing of men, so soon as its owner is assured one is a kindred spirit, he will drag his visitor a willing captive, to behold his most treasured plant, and will wait for him to remark how well it looks, and how **clever** is the owner to grow it so magnificently." "Oh!" he will reply, "you should have seen it a few days ago, it is nearly over now!" ("Experiments in My Moraine." Will Ingwersen).

Four years have elapsed since the writers contributed to this Journal an article entitled "An Artificial Scree in a New Zealand Garden" and consequently additional information has now been gleaned concerning the growth and treatment of indigenous species suitable for growing under scree conditions.

It was stated in the first article that "enough (rare and difficult species) have now been successfully established to warrant an extraordinary degree of optimism regarding the remainder" and time has shown little reason why that statement should be altered, although unfortunately there still remain some rare species which are not yet represented in cultivation.

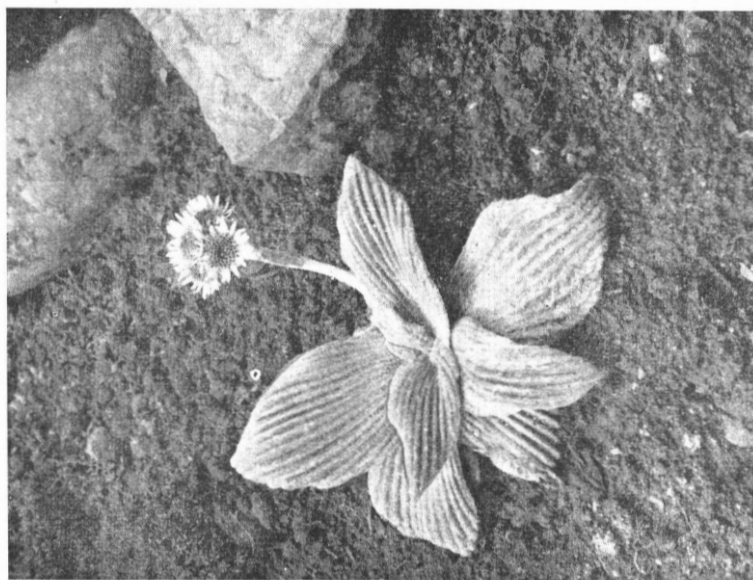
SOME "DIFFICULT" SPECIES.

To show at a glance the degree of success attained by adopting scree conditions in the cultivation of difficult New Zealand plants, the following table has been drawn up. The first column lists those species which Cockayne or Aston have mentioned in their publications as being difficult or very difficult to grow; in the second and third columns are set out the opinions of Cockayne and Aston regarding the degree of difficulty they experienced or expected in attempting to grow the species mentioned in the list; in the last are summarised the writers' remarks on the behaviour of these species when grown under scree conditions. It must be remembered in the first place that the opinions of these two authorities were based, after a wide and varied experience, on plant-cultivation under ordinary garden conditions and secondly, that the list does not include by any means all the difficult or very difficult New Zealand species; there are many more recalcitrants.

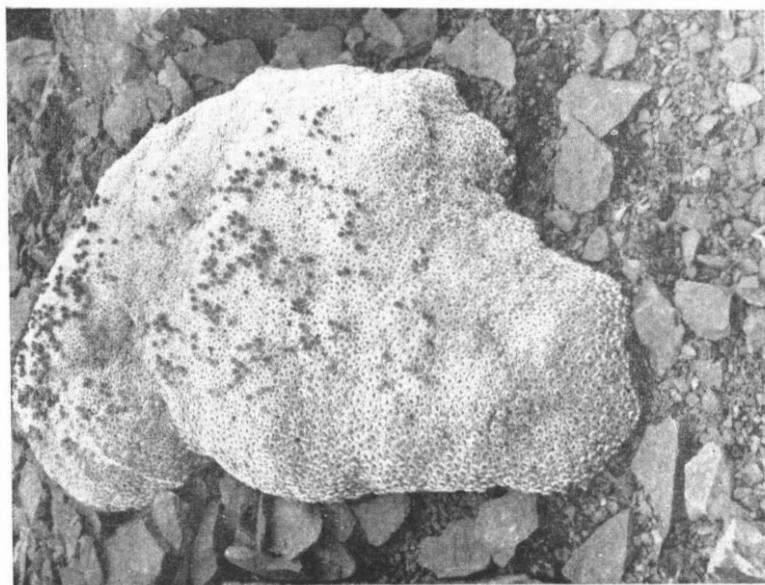
TABLE A.

	Cockayne	Aston	Behaviour in scree.
Gentiana	"all most difficult"	"The despair of all cultivators"	Easily grown.
Pygmaea	"difficult"		Most are still growing steadily after 6 years. Flowers regularly.
Drapetes Lyallii	'difficult'		Easily grown. Steadily increasing in size. 6 years in scree.
Haastia recurva	"extremely difficult"		One plant tried; not successful.
Raoulia eximea	'perhaps impossible in the open'	"does not know of any attempt that has been successful"	Easily grown if given the right conditions.
Raoulia Buchanani	"	" " "	Easily grown, steadily increasing. Flowers regularly. 6 years in scree
Raoulia bryoides	"	" " "	Easily grown. Steadily increasing. Flowers regularly. 6 years in scree
Raoulia mammillaris	"	" " "	One plant tried; not successful.
Raoulia Goyeni	"	" " "	Has been in scree for one year only. Increasing.
Raoulia Loganii	"	" " "	Easily grown. Steadily increasing. 3 years in scree.
Raoulia rubra	"	" " "	Easily grown. Steadily increasing. Flowers regularly. 6 years in scree
Leucogenes grandiceps	"rarely flowers after the first season"		Flowered every year for last 6 years.

	Cockayne	Aston	Behaviour in Scree.
Myosotis	"some difficult"		Easily grown.
Phyllachne	"unsatisfactory"		Easily grown. Steadily increasing in size. Flowers regularly. 6 years in scree.
Donatia	"unsatisfactory"		Easily grown. Steadily increasing in size. Flowers regularly. 6 years in scree.
Raoulia Hectori	"not easy to grow"		Grew steadily for 5 years and then died.
Celmisia vernicosa	"very difficult"	Apparently does not know of any attempt that has been successful.	Steadily increasing. 6 years in scree. Flowers regularly.
Cotula atrata	"may be impossible"		Easily grown. 6 years in scree. Now dying out.
Ranunculus chordorhizos	"		Easily grown. Flowers regularly.
Ranunculus Haastii	"	Apparently does not know of any successful attempt.	Two plants tried. Not successful.
Ranunculus Buchanani		" " "	Not difficult if given right conditions.
Ranunculus Sinclairii		" " "	Easily grown. Seeds in scree.
Pleurophyllum		" " "	Plants unprocurable.
Helichrysum coralloides		" " "	Easily grown. Steadily increasing. 6 years in scree. Flowers regularly.
Haastia pulvinaris	"perhaps impossible in the open"		Easily grown if given right conditions.



Pleurophyllum speciosum.



Ranunculus Buchananii.

Of the three non-successful species listed in Table A, *Haastia recurva* is probably a genuine recalcitrant, but more plants will have to be tried in the light of experience before any definite pronouncement can be made; the same remarks apply to *Ranunculus Haastii*, the two specimens of which survived and flowered each for two years only in cultivation. *Raoulia mammillaris*, represented by only one specimen in the scree, died in its first winter, but no difficulty is expected with this species when further specimens can be collected.

As mistakes in cultural treatment are bound to be made, failures such as those mentioned above are inevitable; in addition, we have little knowledge regarding the normal length of life of many of our plants when growing in their natural habitats, and disappointments will ensue when short-lived species have been laboriously collected and planted, only to die within a season or two.

The unexpected loss of three specimens of *Pygmaea pulvinaris* which grew, flowered and flourished for periods of three, four and five years respectively and then suddenly died, was the reason for the gardener consulting the "Manual" in an endeavour to obtain some authoritative view concerning the size that mature plants of this species should attain.

The following table gives (1) Cheeseman's view regarding the size this species will attain when growing in its native habitat, (2) the size of the plants when planted in the scree, (3) the size reached before some of the plants died in the scree, and (4) the dimensions reached by others which are still alive.

Species	Dimensions according to Cheeseman.	Dimensions when planted.	Dimensions reached before plants died.	Dimensions of plants still living in scree.
<i>Pygmaea pulvinaris</i>	diam. 1in.—3in.	1in. x 1½in.	3in. x 3½in.	
" "	"	1¾in. x 2in.	3in. x 4¾in.	
" "	"	1½in. x 1¾in.	4¼in. x 4½in.	
" "	"	2½in. x 3¼in.		4¾in. x 5½in.
" "	"	3¾in. x 4in.		5½in. x 6¼in.
" "	"	2½in. x 2½in.		6¼in. x 5¾in.
" "	"	2in. x 2in.		6¼in. x 6¾in.

If Cheeseman's figures are taken as being even approximately correct, the astonishing fact emerges that *P. pulvinaris* grows better in the scree than it does in the wilds, but field observations show that Cheeseman has somewhat understated the size which this species may attain. Nevertheless, if size is any criterion, the *Pygmaeas* that died in the scree had not died prematurely, but had lived to a good old age.

CUSHION-PLANTS.

The following tables record the growth-rates of cushion-plants which have grown in the scree over periods ranging from 3 to 6 years.

Growth-rates of Cushion-plants which have been 6 years in scree.

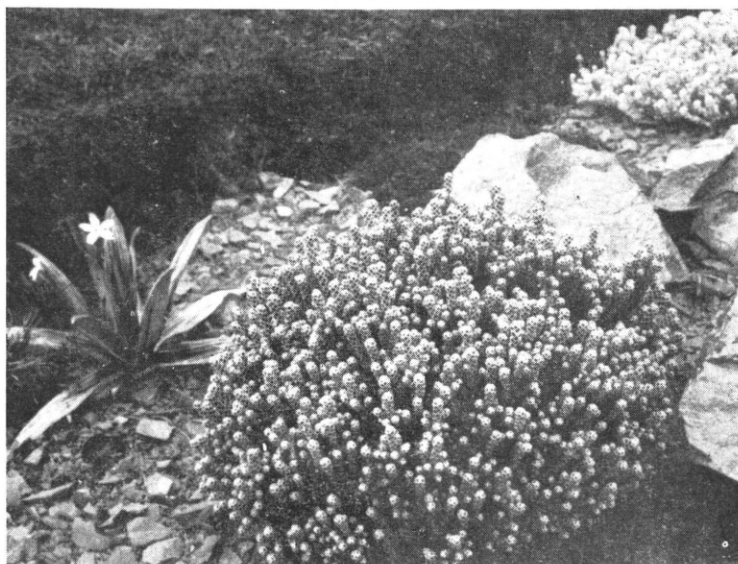
Scree No.	Species	Diameters when planted in scree.	Diameters after 6 years' growth in scree.	Approx. area when planted.	Approx. area after 6 years' growth in scree.
		cms.	cms.	sq. cms.	sq. cms.
1.	<i>Celmisia argentea</i>	31.8 x 24.1	45. x 42.	600.	1484.
D1.	<i>Donatia novae-zealandiae</i>	29.2 x 30.5	41. x 40.	700.	1288.
D2.	" "	18.4 x 15.9	27. x 26.	228.	552.
201.	<i>Drapetes Lyallii</i>	10.2 x 17.8	21. x 36.	142.	593.
P2.44.	<i>Phyllachne Colensoi</i>	7.6 x 7.6	18. x 18.	45.	254.
P4.44.	" "	5.7 x 5.7	20. x 21.	25.	330.
200.	<i>Phyllachne rubra</i>	19.7 x 25.4	23. x 28.5	387.	515.
M1.15.	<i>Pygmaea ciliolata</i>	9.5 x 12.1	15. x 19.	90.	224.
59.1.	<i>Pygmaea pulvinaris</i>	5.7 x 5.7	15.5 x 14.5	25.	176.
M2.11	" "	8.3 x 6.4	13. x 11.	41.	112.
M3.11	" "	5.1 x 5.1	16. x 17.	20.	213.
M4.161.	<i>Pygmaea Thomsoni</i>	9.5 x 10.2	14. x 16.	76.	176.
B3.129.	<i>Raoulia bryoides</i>	5.7 x 5.7	7. x 8.	25.	44.
R.13.	<i>Raoulia Buchanani</i>	12.1 x 10.2	18. x 19.	97.	269.
R.14.	" "	7.6 x 5.1	15. x 12.	30.	141.
R.15.	" "	12.7 x 8.3	20. x 14.	83.	220.
R.16.	" "	11.4 x 8.3	18. x 15.	74.	212.
R.18.	" "	8.9 x 10.2	12. x 13.	71.	122.
R.19.	" "	4.5 x 4.5	11. x 11.	16.	95.
R.20.	" "	8.9 x 5.1	14. x 10.	35.	110.
R.23.	" "	17.1 x 29.2	23. x 39.	392.	704.
R.8.	<i>Raoulia eximia</i>	2.6 x 5.1	7. x 4.5	10.	24.
R.29.	" "	1. x 1.	7. x 9.	0.8	50.
150.	<i>Raoulia rubra</i>	2.6 x 3.8	8. x 9.5	8.	60.

Growth-rates of Cushion-plants which have been five years in scree.

Scree No.	Species	Diameters when planted in scree.	Diameters after 5 years' growth in scree.	Approx. area when planted.	Approx. area after 5 years' growth in scree.
		cms.	cms.	sq. cms.	sq. cms.
199.	<i>Anisotome imbricata</i>	14. x 14.	22.5 x 26.	153.	460.
1.	<i>Oreobolus pectinatus</i>	7.6 x 5.1	19. x 17.	30.	254.
P. 9.	<i>Pygmaea pulvinaris</i>	3.2 x 2.6	7.5 x 8.5	6.	50.
P.10.	" "	2.6 x 2.6	8. x 7.	5.	44.
P. 7.	" "	3.8 x 5.1	7.3 x 7.5	15.	43.
R.12.	<i>Raoulia Buchanani</i>	10.8 x 12.1	14.5 x 15.8	102.	180.
R. 6.	<i>Raoulia eximia</i>	12.1 x 10.2	16.5 x 13.	97.	168.
23.1.	<i>Raoulia Hectorsi</i>	7.6 x 5.1	19. x 17.5	30.	261.
8.1.	" " var.	6.4 x 7.6	17. x 18.5	38.	245.



Donatia novae-zelandiae.



Helichrysum coralloides.

Growth-rates of Cushion-plants which have been 4 years
in scree.

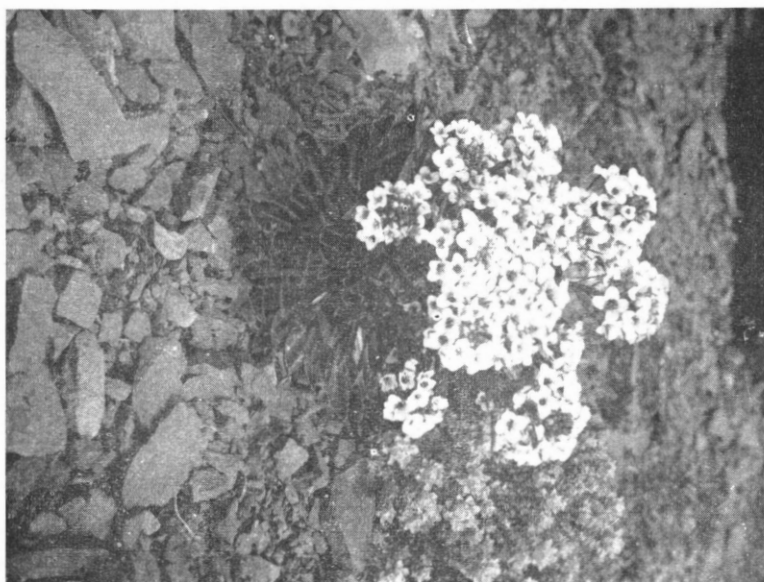
Scree No.	Species	Diameters when planted in scree.	Diameters after 4 years' growth in scree.	Approx. area when planted.	Approx. area after 4 years' growth in scree.
		cms.	cms.	sq. cms.	sq. cms.
157.	<i>Phyllachne clavigera</i>	10.2 x 10.2	15.5 x 16.	81.	194.
P8.44.	<i>Phyllachne Colensoi</i>	3.8 x 3.8	10.5 x 10.5	11.	86.
59.2.	<i>Pygmaea pulvinaris</i>	4.5 x 3.2	11.5 x 11.	11.	100.
59.3	" "	4.5 x 5.1	12. x 9.5	18.	89.
P.6.	" "	3.8 x 3.8	5. x 6.8	11.	26.
P.8.	" "	3.8 x 3.1	5.8 x 4.	9.	18.
B.4.	<i>Raoulia bryoides</i>	6.3 x 5.7	10. x 10.	28.	78.
B.5.	" "	5.1 x 5.1	8. x 8.	20.	50.
R.11.	<i>Raoulia eximia</i>	14. x 16.5	21.7 x 22.6	181.	385.
23.2.	<i>Raoulia Hectorsi</i>	5.1 x 2.6	13. x 13.	11.	132.
8.2.	" " var.	4.5 x 3.8	9.5 x 10.	13.	74.

Growth-rates of Cushion-plants which have been 3 years
in scree.

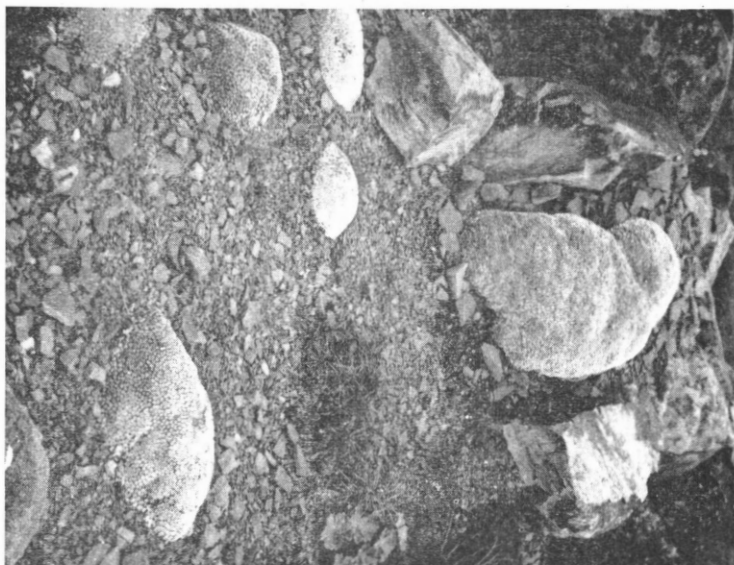
Scree No.	Species	Diameters when planted in scree.	Diameters after 3 years' growth in scree.	Approx. area when planted.	Approx. area after 3 years' growth in scree.
		cms.	cms.	sq. cms.	sq. cms.
2.	<i>Celmisia argentea</i>	20.3 x 12.7	25.4 x 17.8	201.	355.
3.	" "	12.7 x 5.1	17.8 x 8.9	51.	124.
	<i>Dracophyllum muscoides</i>	14. x 22.9	18. x 30.	251.	425.
H.4.	<i>Haastia pulvinaris</i>	4. x 4.1	9. x 9.	12.	63.
H.5.	" "	3. x 3.	7. x 5.5	7.	30.
2.	<i>Hectorella caespitosa</i>	8.3 x 14.6	15.2 x 25.4	95.	303.
3.	" "	19.7 x 16.5	25.4 x 22.9	256.	457.
	<i>Oreobolus pumilio</i>	8.3 x 4.5	11.4 x 12.7	29.	113.
2.	<i>Oreobolus pectinatus</i>	15.2 x 15.2	26. x 23.5	182.	480.
203.	<i>Phyllachne clavigera</i>	15.9 x 15.9	17.8 x 18.4	198.	257.
Pl.44.	<i>Phyllachne Colensoi</i>	17.1 x 14.	24.1 x 21.	188.	398.
170.	" "	2.9 x 5.1	7.6 x 6.4	11.	38.
R21.	<i>Raoulia Buchanani</i>	7.6 x 5.7	10.2 x 7.6	34.	61.
R57.	<i>Raoulia eximia</i>	15.2 x 10.2	15.9 x 12.7	122.	158.
	<i>Raoulia Loganii</i>	3.1 x 7.	7.5 x 11.	17.	64.
3.	<i>Raoulia rubra</i>	3.5 x 3.1	7. x 4.	8.	22.
5.	" "	2.5 x 1.8	6. x 4.	3.	18.

Note: The above measurements are in centimetres and sq. centimetres. 1 inch=2.54 cms. 1 square inch=6.45 sq. cms.

Nasturtium laesiligua.



Ranunculus Buchananii.



NOTES ON *Haastia pulvinaris*.

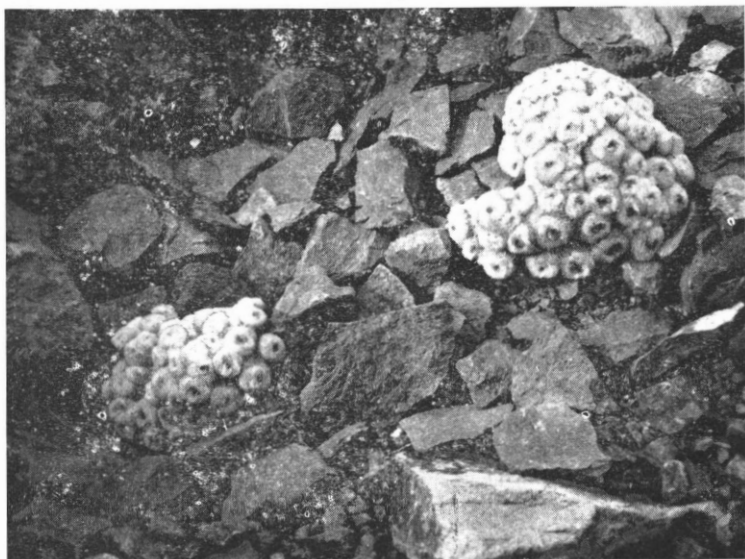
One of the most desirable species for cultivation in a scree is undoubtedly that giant "vegetable-sheep" *Haastia pulvinaris* which Cheeseman calls "one of the most remarkable plants known." Trouble in establishing this plant was expected, so a number of small cushions were collected from the Marlborough mountains and these were duly planted in what at the time were considered suitable positions in the scree. During the autumn the plants seemed quite happy, but later on, when winter-humid conditions prevailed, one by one they assumed a sickly hue and eventually damped off and died. (To digress for a moment, never believe any authority who states that there is little difference between the appearance of a dead and a living "vegetable-sheep.") Just in time to save two small portions of the one remaining survivor, it was realized that this species could not tolerate continuous damp conditions and that, in its mountain fastnesses, it was protected from excessive moisture in the winter by a covering of snow and ice.

Hasty action was then taken and the two small surviving pieces were separated and replanted on a slope in order to accelerate drainage from the leaf-rosettes—all had previously been planted on the more or less level portion of the scree—and the craven precaution of erecting a small glass roof over the plants during the worst of the winter was adopted. Both pieces reacted magically, have never looked back since, and have more than quadrupled their original area in a period of three years. Later on, when risks can be taken, courage will partially reassert itself and one only of the glass panes will be removed. During that fateful winter, whenever the atmosphere happened to be charged with moisture and though little precipitation was visible, it was frequently noticed that the densely-woolly leaves of the *Haastia* were soon studded with minute drops of water and the rosettes assumed a saturated and bedraggled state long before moisture made its appearance on the majority of other species present. Furthermore, the plants retained the moisture for a longer period. It would appear then that this multitude of fine leaf-hairs, not only prevents excessive transpiration, but makes available to the plant every possible drop of moisture in times of drought. This, of course, is a great advantage when one remembers that this species occurs only in the dry mountain areas of the South Island; but, conversely, this same multitude of fine leaf-hairs would ensure its "liquidation" if transplanted to wetter climes.

Can it be that this apparently insignificant feature is the factor limiting the occurrence of *Haastia pulvinaris* to the dry mountains of South Island? If forms of *Haastia pulvinaris* possessing fewer leaf-hairs could be found growing in our wet mountains, then some degree of support would be afforded to the foregoing suggestion; but, alas, no *Haastia pulvinaris*, hairless or otherwise,

grace such stations. Nevertheless, there is another species of *Haastia*, *H. Sinclairii*, which flourishes on the ranges, wet or dry, right throughout South Island, and field observations show that the plants inhabiting the dry areas possess leaves thickly covered with fine hairs, while those from wet parts have leaves undoubtedly less shaggy. Further support is given when the "vegetable-sheep" *Raoulias* are considered; occurring in the dry mountains are *R. eximia*, *R. mammillaris* and *R. bryoides*, all possessing a superabundance of leaf-hairs, and in those areas subjected to a heavier rainfall are found the less hairy-leaved species *R. Buchananii*, *R. Goyeni* and *R. rubra*. The distribution of those small cushion-plants, the *Pygmaeas*, suggests that *P. pulvinaris*—the most woolly of the three—is found under drier conditions than are the less woolly-leaved *P. Thomsoni* and *P. ciliolata*.

Summing up, it would appear that while the excessive leaf-hairiness of certain species permits, or at least assists, the plants to survive under dry conditions, the possession of this peculiarity prohibits their occurrence in wetter stations. This matter of excessive leaf-hairiness or lack of same has a direct bearing on the treatment which should be applied to certain plants. The experience with *Haastia pulvinaris* at once suggested that a few mysterious deaths amongst other denizens of the scree may have been due to an unfortunate combination of a profusion of both hairs and moisture. It certainly would be safer to plant all hirsute individuals on a slope.



Haastia pulvinaris.

AGGRESSIVE SPECIES.

As mentioned in our last paper, there are some New Zealand species which run riot—either by seeding or by vegetative growth—in the serec. The following are a few which rapidly spread vegetatively:—*Ourisia macrocarpa*, *O. macrophylla*, *Myosotis macrantha*, *M. decora*, *Drapetes Dieffenbachii*, some of the mat-forming or trailing *Hebes*, the mat-forming *Raoulia*s, certain forms of *Helichrysum bellidioides* and last but not least *Geranium Traversii*. Amongst those whose seedlings quickly become a nuisance are *Wahlenbergia Matthewsii*, all *Epilobium*s—from one plant of *E. Matthewsii*, for example, over 700 seedlings were picked out of the serec from a single season's seeding—*Geranium Traversii*, *Cardamine bilobata*, *Geum parviflorum*, *G. leiospermum*, *Plantago Masonae*, some forms of *Ranunculus Monroi*, *Hebe Lyallii*, *H. Bidwillii*, and apparently all forms of *Anisotome aromatica*.

A vigilant watch should be kept to prevent such aggressors from encroaching upon or over-growing *Raoulia* cushions, as these are very susceptible to shade; indeed all the cushion-plants seem to need unlimited light. A drooping *Ranunculus Lyallii* leaf, which rested for a time on a *Raouli eximia* cushion, killed the portion it covered, and a specimen of *Raoulia Buchanani* met the same fate when partially and lightly covered by vigorous growth of *Leucogenes grandiceps*. On the other hand, of course, some species demand shade and will not flourish unless this is supplied.

In conclusion, it should be stressed that knowledge of the plant's natural environment is essential when endeavouring to fulfil its wants in the serec.

HORTICULTURE IN SOUTH CHINA.

The following extracts are taken from an address given at the June monthly meeting of the Northland Horticultural Society, Wellington, by Dr. Lai-Yung Li, Botany Division, Scientific and Industrial Research Department, Wellington:—

The speaker's own definition of horticulture is worthy of record:—"It was a great day when primitive man first scratched the soil, and gathering a few seeds or plants in the wild, planted and cultivated them near his home. Later, he built a wall around his garden to protect the most precious of these plant treasures, and henceforth we had gardening within the enclosure called Horticulture.

Horticulture is an important agent in civilization. The love of plants and their intensive culture attach men and women to their homes and make them more stable citizens."

Lychee was stated to be one of the royal fruits, although only known here in the dried form, resembling nuts. Here are the rules of the Lychee Club, which flourished during the Ming Dynasty between the fourteenth and the seventeenth centuries:—

"We will meet when the weather is fine.
 For a tent we will use the heavy shade.
 For a bath we will use the cold fountain.
 For a covering we will use clothing that the breezes blow through.
 For illumination we will use the cool moonlight.
 To mix with the Lychee we will use dark blue wine.
 For relief from overeating we will use cool syrup.
 To verify statements concerning the Lychee we will use the old records.
 To record our business we will use new poems."

In the eleventh century, a famous writer, Su, Tung-Po, who was banished for speaking disrespectfully of the Emperor, wrote:—

"Beneath these green mountains where Spring rules the year
 Where Myrica and Loquat in season appear
 And feasting on Lychee—three hundred a day
 I shouldn't mind staying for ever and aye."

INSTITUTE NOTES.

PERSONAL:—At the May Meeting of the Executive Council, Mr. C. W. Corner, Superintendent of Parks and Reserves, Napier, advised that he would have liked to be present to congratulate the new President, Mr. Hope B. Gibbons, on his election. His horticultural knowledge and enthusiasm would serve the Institute well at a time when such qualities are most needed. Mr. Corner also had every confidence in the Institute's ability to carry on steadily despite the difficulties of war conditions.

The address at the Annual Meeting of the Wellington Beautifying Society was delivered by Mr. Dugald C. MacKenzie, N.D.H. (N.Z.), who dealt interestingly with "Vegetation in the Middle East."

CONGRATULATIONS have been conveyed to Dr. H. H. Allan, Wellington, on the award, by the Royal Society of New Zealand, of the Hector Memorial Medal and Award for botanical researches.

ARBOR DAY:—At the June Meeting of the Executive, the President mentioned that, upon invitation from the Wellington City Council, he had attended a recent meeting to arrange for an official Arbor Day celebration, and that this was to be held at the Central Park, Wellington, on the 5th August. Although this will be the local official celebration, the President hopes that all interested, throughout the Dominion, will signify the importance of tree-life to the community by planting also in all available areas and not necessarily on the official day.

DISTRICT COUNCILS:—Taranaki—Mr. G. H. Huthnance, Hon. Secretary, is now in camp, and Mr. J. C. McDowall, President, will carry on Institute affairs in the meantime.

Canterbury—Mr. J. N. McLeod, Hon. Secretary, has forwarded advice of membership, finance and educational matters.

Otago has reported that practically all male students have been called up and that the main activity at present is in assisting the W.W.S.A. Land Army in vegetable growing.

Southland—The Annual Report from the Acting Hon. Secretary, Mr. K. I. Robertson, dealt with membership, maintenance of broadcasting service by himself and educational matters. Mention was also made of a grant of £3 3s. towards beautification of the Fortrose Highway. Congratulations have been extended on the Council's activities.

CONDOLENCE:—It was reported at the April meeting that sympathy had been conveyed to Mrs. J. J. Reich, Wellington, on the death of her husband, who had been a member for many years and a noted gardener and exhibitor, specializing in Sweet Peas.

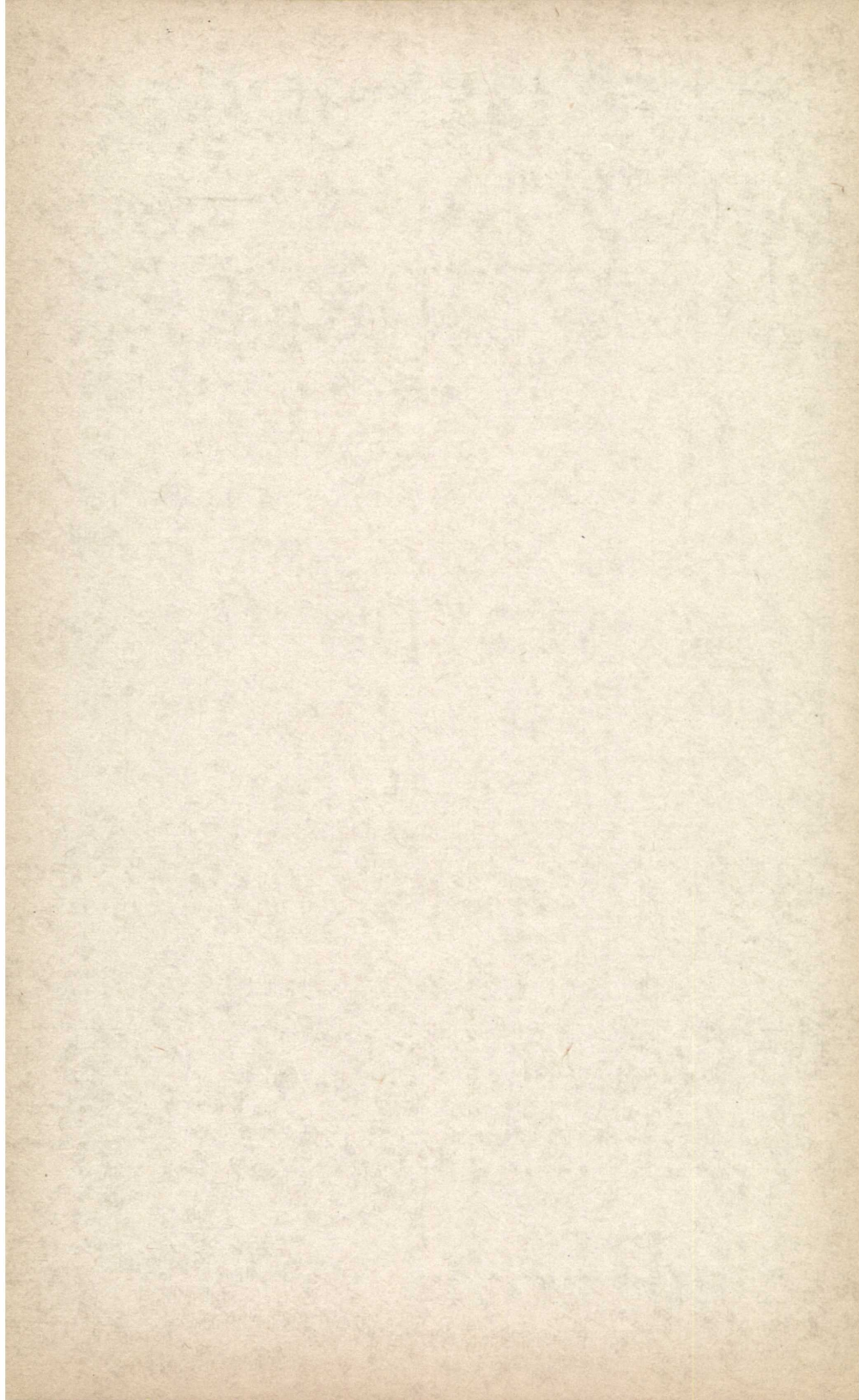
Condolence has also been conveyed to Mr. H. J. Poole and family, Lower Hutt, on their loss and, on behalf of the New Zealand Horticultural Trades' Association also, to Mr. W. P. Okey, Secretary of National Horticultural Week, 1939, New Plymouth, on the loss of his wife.

UNIQUE SPRING SHOW.

The following is an extract from a letter to her mother, Mrs. Knox Gilmer, from 48389 Private Jean Knox Gilmer, N.Z.W.W.S.A., Overseas Section, 2nd N.Z.E.F., Middle East Forces, who recently visited the Gizeh Gardens, Cairo, to see the Spring Flower Show:—"It was a long tent and the colour of the big exhibits just hit us. There were six large ones each about forty feet square, all on the ground. The first one had a border of red, white and blue Sweet Peas. Goodness only knows how many thousands there were! The centre was made up of new Cinerarias of brilliant colours with different coloured edgings. Then there were three designs, worked in Daffodils and Lilies. Another carpet of flowers was carried out with Irises, Daffodils, and Freesias, and all were most beautiful. The Sweet Peas were magnificent, and there were great bowls of these.

The Vegetable exhibits were amazing—miles better than anything we have seen in England at the best Shows.

But the odd mixtures of flowers, in and out of season, would amaze you. I will just mention a few that I can remember:—Cinerarias, Daffodils, Freesias, Irises, Pansies, Carnations, Sweet Peas, Roses, Asters, Lilies, Stocks, Delphiniums, Larkspurs, Gladiolus, Marigolds, Wallflowers, etc. What a gardeners' Paradise and how I long for you to be with me and to hear your remarks!



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