The Contribution of China to European Gardens.

BY

WILLIAM WRIGHT SMITH.

(This paper was read at the Fifth International Botanical Congress held at Cambridge, August 1930.)

The short paper which I am submitting to you is concerned chiefly with the effect on Horticulture in the gardens of Northern Europe and especially in the gardens of these islands due to the introduction during recent years of plants native to China and the areas immediately adjoining. The last thirty years have added an enormous number of species to European cultivation and the chief source of supply has been the western provinces of China and the neighbouring alpine areas of Tibet and Burma. Rich as were the contributions to Horticulture made by the explorations of the nineteenth century, no similar period of time can rival the results which have but lately been accomplished. Both as botanists and horticulturists we can congratulate ourselves that we have lived in so interesting a time. It seems to me to have been the most fruitful period which Horticulture at any rate has experienced and it may quite well prove to be superior to anything which may come after us. I am viewing the problem purely from the angle of Horticulture in these islands—from what can be grown with reasonable success out-of-doors in Great Britain. Most of the temperate regions of the world have already been ransacked by the plant-collector and it is becoming difficult to find any new area likely to yield more than a handful of new plants suitable for cultivation in Northern Europe. How fortunate, then, is this generation in making first-hand acquaintance with what is certainly the richest temperate and alpine flora in the world! Sufficient is known of the area to support this claim, but much of it is still unexplored. I do not believe that there is any temperate region in the world better deserving of further exploration than this part of Asia.

How rich is it? The genera are in the main the genera of Northern Asia and Northern Europe. But there is a very much higher degree

[Notes, R.B.G., Edin., No. LXXIX, October 1931.]

of specific diversity. The Himalaya, the Alps of Europe and the Rocky Mountains are prolific in species. It would appear that these Chinese and Tibetan Alps are three to four times richer than the Himalayas. Take a few instances: as regards Primula, Rhododendron, Gentiana, the species in this area total from three to five times the number to be found throughout the Himalaya. Nor is this simply a question of the *number* of species. Most large genera can usually be subdivided into fairly definite sections, each section indicating a distinct line of development. If we take these sections as a basis for estimate—and in my opinion a sounder basis than simply number of species—the results usually tend to emphasize both the richness and the diversity of this remarkable flora.

What may be the reasons for this diversity? The more obvious ones are the central position in the large land-mass of Asia, the consequent association with the floras of the neighbouring countries, its great geographical and geological diversity, the degree to which the alpine areas especially are broken up by great river systems, the isolation of areas caused by the natural barriers of very deep valleys which are sometimes arid sometimes filled with a dense tropical or subtropical vegetation, and the usually very adequate rainfall. When we contrast these conditions with those prevailing in the Himalaya, the advantage is markedly in favour of the Chinese Alps.

Now my intention is to try to give some estimate of the effect on Horticulture of these new introductions—some measure of their extent. I shall confine myself to an analysis of the plants more or less hardy in the British Isles. Our gardens have levied contributions from all over the world. It would be difficult to say offhand which have been the most productive countries. As the easiest means of coming to a general conclusion as to the chief sources of our hardy garden plants I have made use of certain of the recently revised Kew Hand-lists—Hand-list of Trees and Shrubs, Hand-lists of Herbaceous Plants and of Rock-Garden Plants (combined), and Hand-list of Hardy Monocotyledons. The species enumerated there give a fairly complete record of such species as have been more or less acclimatised in this country. No such enumeration is complete, for Kew adds to her adopted children every day of the week, but still the lists are quite adequate for an estimate of the relative contributions of each geographical area.

The regions chosen are as follows:—

1. N. Asia.
2. East China and Japan.
3. West China.
4. Himalaya.
5. Indo-Malaya.
6. West Asia (Orient).

7. North America (Canada and United States).
8. Mexico, Central, and North of S. America.
9. South of South America.
10. North Africa.
11. South Africa.
12. Australia and Tasmania.
13. New Zealand.
14. North Europe and Alps.
15. South Europe.

These areas are fairly wide as many of the plants concerned have an extended geographical distribution. Nor has it been always possible to draw hard and fast lines between the various areas. In cases where the plant comes from more than one region, preference has been given to that region which is the more likely to have supplied it. Plants of garden origin, chiefly hybrids, have also been allowed for.

We will deal with the trees and shrubs first. The number under consideration is 3,887. The following tabular statement gives the number of species allocated to each geographical area and also in a parallel column the corresponding percentage of the total:—

Geographical Area.	Number of species.	Percentage of total.
Asia N.	136	3.49
E. China and Japan	589	15.15
W. China	713	18.34
Himalaya	228	5.86
Indo-Malaya	25	.64
W. Asia	144	3.70
America N.	890	22.89
Mexico, C. and N.S. America ...	26	.66
S.S. America	81	2.08
Africa N.	31	.79
Africa S.	7	.18
Australia and Tasmania	27	.69
New Zealand	107	2.75
Europe N. and Alps	317	8.15
Europe S.	243	6.25
Garden origin	323	8.30
Total	3,887	99.92

OBSERVATIONS.

(1) The very high contribution of China and Japan—33.49 per cent. of the total—is noteworthy.

(2) A surprisingly large percentage is attributed to West China—the most recent area to be explored. This is in itself an index of the

remarkable richness of the region in trees and shrubs. Rhododendron has of course contributed largely to the total for the area, but even with allowance for that factor the figure is high.

(3) A prominent place is taken by North America, even when allowance is made for a surprising number of species of Crataegus.

If we take these figures and estimate the contribution of each continental area the results are as follows :—

Continent.	Percentage.
Asia	47.18
N. America	22.89
S. and C. America, Mexico, W. Indies	2.74
Africa	.97
Australia and New Zealand	3.44
Europe	14.40

If we eliminate plants of garden origin the percentages will be higher :—

Continent.	Percentage.
Asia	51.43
N. America	24.97
S. and C. America, Mexico, W. Indies	3.00
Africa	1.06
Australia and New Zealand	3.75
Europe	15.71

An analysis of the hardy herbaceous Dicotyledons gives the following results :—

Geographical Area.	Number of species.	Percentage of total.
Asia N.	211	3.74
E. China and Japan	158	2.80
W. China	205	3.63
Himalaya	304	5.39
Indo-Malaya	34	.60
W. Asia	458	8.13
America N.	863	15.32
Mexico, C. and N.S. America ...	123	2.18
S.S. America	123	2.18
Africa N.	68	1.21
Africa S.	55	.97
Australia and Tasmania	26	.46
New Zealand	89	1.58
Europe N. and Alps	1,432	25.42
Europe S.	1,401	24.87
Garden origin	83	1.47
Total	5,633	99.95

The above table presents certain marked contrasts to the one of the trees and shrubs. It is, however, remarkably in accord with the table for the hardy Monocotyledons :—

Geographical Area.	Number of species.	Percentage of total.
Asia N.	67	4.66
E. China and Japan	76	5.29
W. China	26	1.81
Himalaya	33	2.21
Indo-Malaya	12	.83
W. Asia	187	13.03
America N.	238	16.58
Mexico, C. and N.S. America ...	24	1.67
S.S. America	24	1.67
Africa N.	25	1.74
Africa S.	40	2.78
Australia and Tasmania	1	.06
New Zealand	8	.55
Europe N. and Alps	325	22.64
Europe S.	325	22.64
Garden origin	24	1.67
Total	1,435	99.83

I have therefore combined the herbaceous Dicotyledons with the Monocotyledons :—

Geographical Area.	Number of species.	Percentage of total.
Asia N.	278	3.93
E. China and Japan	234	3.31
W. China	231	3.26
Himalaya	337	4.76
Indo-Malaya	46	.65
W. Asia	645	9.12
America N.	1,101	15.57
Mexico, C. and N.S. America ...	147	2.07
S.S. America	147	2.07
Africa N.	93	1.31
Africa S.	95	1.34
Australia and Tasmania	27	.38
New Zealand	97	1.37
Europe N. and Alps	1,757	24.85
Europe S.	1,726	24.41
Garden origin	107	1.51
Total	7,068	99.91

OBSERVATIONS.

(1) The percentage from Northern Europe is high and does not represent entirely plants of horticultural merit. It is evident that the great majority of the members of the native flora have been included in the list though many of these would scarcely be regarded as *garden* plants.

(2) Europe as a whole is responsible for nearly 50 per cent. This high figure is to some extent discounted by the factor mentioned under (1), but the quota from S. Europe is hardly affected by that factor.

(3) The contribution of S. Europe and the Orient (which may be looked upon as the contribution of the Mediterranean region) is outstanding and is certainly an index of the wealth of herbaceous genera and species for the area. As a natural area it takes for herbaceous plants in European cultivation a place similar to that of China and Japan for introduction of trees and shrubs.

(4) The contribution from N. America under all three heads is surprisingly large and the percentages—22.89, 15.32, and 16.58 approximately equal. No other area shows the same high average level of contributions.

(5) The areas which have given European gardens the greatest diversity in trees and shrubs are not those which have contributed the major part of the herbaceous types. N. America is an exception; the quota of the Himalaya is about 5 per cent. for both groups; but there is a marked contrast in the case of China and Japan with 33.49 and 6.57 per cent. for the two groups. Has less attention been given to the herbaceous flora of these regions? Or is it much less noteworthy than the ligneous flora? Or are the herbaceous members of that flora less happy as introductions?

The converse is seen in S. Europe, where the herbaceous contribution is nearly fourfold that of the trees and shrubs.

(6) I am not clear as to how far these data can be correlated with climatic conditions and especially rainfall. Abundant rainfall no doubt favours the development of temperate forests but not directly the diversity of trees and shrubs. The Chinese Alps in addition to adequate rainfall have important factors favouring specific divergences as already noted. Is this high development of the ligneous vegetation a check on the herbaceous expansion? There is no evidence that these Chinese Alps are poor in herbaceous plants—on the contrary. The probability is that its herbaceous resources have so far been but inadequately exploited. Yet Eastern China and Japan are fairly well known and the ratio as regards introduction of ligneous and herbaceous plants is as 15.15 to 3.31 in the contents of our gardens. Yet on the other hand the contributions from the Himalaya are about the same for each group.

(7) Is the lighter rainfall of the Mediterranean basin the chief factor in the wealth of herbaceous plants suitable for cultivation in these islands? And is the high average level of the N. American contributions to be accounted for by marked climatic differences in that continent?

I had better return to my main purpose. The data I have given will, I think, show how remarkable have been the results of the explorations of Western China and Tibet during the last 30 years, how greatly they have contributed to European Horticulture and how much is yet to be garnered from that region. A review after another 100 years will undoubtedly show what a predominant part Asia, and particularly China and Japan, have taken in enriching European gardens.

I add an analysis for the Coniferae. This serves also to emphasize the contribution of North America and of China and Japan.

TABLE FOR CONIFERAE.

Geographical Area.	Number of species.	Percentage of total.
Asia N.	9	3.97
E. China and Japan	54	23.89
W. China	21	9.27
Himalaya	15	6.62
Indo-Malaya	—	—
W. Asia	6	2.65
America N.	77	34.07
C. and N.S. America	9	3.97
S.S. America	6	2.65
Africa N.	2	.88
Africa S.	—	—
Australia and Tasmania	—	—
New Zealand	—	—
Europe N.	9	3.97
Europe S.	18	7.95
Total	226	99.89

ABSTRACT.

An analysis of (*a*) the hardy trees and shrubs, and (*b*) hardy herbaceous plants cultivated in Western Europe from the point of view of their countries of origin. A statistical comparison of the contributions of the chief land areas. The noteworthy position of China in this comparison.