



LION HEAD

an outstanding variety of

*The Yunnan Reticulatas*

To my good friend - Cliff Lattin  
Camellia

H. Heath

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## COVER

The Society wishes to express its sincere thanks and appreciation to SCHWABACHER-FREY CO. of San Francisco for their helpful courtesy with respect to the cover of this issue, including the color illustration of the variety LION HEAD, which we believe to be one of the most faithful reproductions of a camellia that has come to our attention.



*Courtesy B. W. S. Hollingshead, Orinda*

**SHOT SILK**  
(as grown in Northern California)

## FOREWORD

It is not often that an event occurs of such outstanding importance as to warrant devoting an entire issue of a publication of this sort to that single subject exclusively. Particularly is this true when the occurrence of the event is not strictly recent. In this case, there is the further fact that the story has already been told in part, although the telling has of necessity been piecemeal, as further stages of the drama unfolded. However, with the passing of time and the gaining of further knowledge and experience, the great importance of this happening is only now becoming fully recognized. Because of these reasons and the incidental circumstance that one or more members of this Society played a part in it, this effort is being made to tell the story in full — past, present and future insofar as we may do so under one cover.

The story of the discovery, importation under great difficulties from the Yunnan Province of China, and successful perpetuation in this country of the new *C. reticulata* hybrids, is full of romance and replete with a spirit of high venture, enterprise and dogged persistence that is both highly entertaining and exemplary. More important to us, however, is the fact that the introduction into this country of such a diversified group of varieties of this somewhat enigmatical species probably will stand as the greatest single accomplishment of its kind in our day in the camellia world.

It must follow that great credit is due each and every person who had a hand in this noteworthy undertaking, irrespective of whether his position was or was not one of prominence. However, the facts are quite clear that the guiding genius throughout was Dr. Walter E. Lammerts, the scientist in charge of research for Descanso Distributors, Inc., then of La Canada, Calif. Furthermore, it

seems obvious that this splendid conception might well have proven abortive but for the financial support of Mr. E. Manchester Boddy, Dr. Lammerts' employer, and the technical skill of his associate, Mr. Howard Asper. It is also abundantly evident that complete success would hardly have been achieved but for the enterprise and wherewithal supplied by Mr. Ralph S. Peer, of Los Angeles, and the Huntington Botanical Gardens, working independently in a similar venture jointly undertaken. It is our good fortune to have all of these parties to this collectively-successful undertaking represented herein.

There were, of course, others in the background whose help was invaluable. One in particular must be mentioned because her constant assistance, steady encouragement and unflinching inspiration had an important bearing on results of great eventual benefit not only to those who grow camellias but to the world of horticulture at large. It is, however, a matter of the greatest sorrow to those who love the beautiful that the one of whom we speak is now among us only in spirit. Miriam Schlichting Lammerts, faithful wife of Dr. Walter E. Lammerts, did not live to see ripen fully the results of the work to which she and her gifted husband were so devoted, for this quiet but staunch friend of the camellia world passed away suddenly on July 21st, 1954, while on a journey with her husband.

Because it deals with one of the major accomplishments with which she was identified, we feel it is singularly appropriate that this Special *C. reticulata* Issue be respectfully dedicated to the memory of Miriam Schlichting Lammerts, that we may record here her inspiring example of devotion to an ideal — the effort to leave behind something of beauty that lives and endures.

— David L. Feathers, Editor.



**BUDDHA**

## THE STORY OF THE YUNNAN RETICULATAS

By Dr. Walter E. Lammerts

Research Division, Descanso Distributors, Inc., Livermore, California

In an article written four years ago for the American Camellia Society,<sup>1</sup> the circumstances having to do with the discovery, importation and propagation of that now famous group of new camellias, the Yunnan Reticulatas, were recited in full. There is therefore no need to recount here the details of that part of the story, but for the sake of completeness and continuity I should like to begin this article with a review of the highlights of what has gone before.

The idea which led to my investigations had its inception in a very interesting meeting held some years ago with a group of amateur camellia fanciers in Southern California. Their enthusiastic interest proved to be quite contagious to one by profession a plant horticulturist and I soon found myself deeply involved in camellia research. This eventually led me down a long and devious trail of study and investigation, to the end that, by April, 1945, I had compiled a descriptive list of no less than 80 species of *Camellia* and *Thea*. Among the material unearthed was an article by a Chinese botanist, H. H. Hu,<sup>2</sup> which called attention to the long existence in Kunming of over 70 varieties of the rather enigmatical species *C. reticulata*. Although this information was certainly quite interesting, my studies of the characteristics of the then known forms of this species and reflection upon the sterility of the only really outstanding variety, now called CAPTAIN RAWES, had led me to discount the significance of this report and it was not pursued further at that time.

In the summer of 1945, I joined the staff of Descanso Gardens of La Canada, California, and organized its research department. Our business was that of assembling, testing and creating new plants, including camellias, which brought me into an endless

search for new and interesting species as material for hybridization and development purposes. After a year of rather unfruitful effort on our camellia investigations, in the fall of 1946 I decided to undertake a new approach entirely and thereupon began the formidable task of contacting botanists associated with the various museums, among whom was Dr. E. D. Merrill of the Arnold Arboretum. It was his suggestion that, along with others, I get in touch with the aforementioned Dr. Hu Hsen Hu, then at the Fan Memorial Institute in Peiping, China. This was done and in July, 1947, I finally heard from Dr. Hu, who reiterated that numerous varieties of *C. reticulata* existed in Yunnan and referred me to Dr. T. T. Yu at the Yunnan Botanical Institute, Kunming, for further details.

This letter had the salutary effect of reinvigorating our efforts and I immediately wrote to Dr. Yu in this regard. However, months passed by without reply and it began to appear that once again our trail was about to reach a dead end. Then on January 15, 1948, a letter was finally received from Prof. H. T. Tsai, of the Yunnan Botanical Institute, a colleague to whom Dr. Yu had, in turn, referred my inquiry, which stated categorically that more than 20 varieties of *C. reticulata* were obtainable in the province! My reaction can easily be realized when it is pointed out that this was almost three years after our first research efforts were begun. Arrangements were immediately made to have a complete set of these plants forwarded by air to San Francisco, packed in their original containers and entirely undisturbed. This was, as I shortly learned, an unintentional violation of United States quarantine regulations, which prohibit import of plant material in foreign soil.

The outcome of all this was that, on March 10, 1948, we finally received word that the plants had actually reached Shanghai safely and were scheduled to arrive in San Francisco on the 15th. Accompanied by my beloved wife Miriam—faithful partner in so many botanical ventures—I left for San Francisco on March 13 in a small panel truck. We went first to the University of California Botanical Garden at Berkeley, which contains a large specimen of the CAPTAIN RAWES variety, to get leaves for comparison with the new *reticulatas* when they arrived. After three trips to the airport, finally, on the night of Monday, March 15, 1948, the plane arrived bearing our precious cargo. Our excitement and hopeful anticipation can readily be imagined. After waiting impatiently for the discharge of passengers, Miriam and I finally saw emerge from the airplane two strange-looking crates between the slats of which could be seen the foliage of the exotic camellias we had been striving so long to obtain. Would they really contain the **C. reticulata** varieties or be a fake—i.e., turn out to be **C. japonica** after all? I was momentarily afraid to look, but, completely confident, Miriam ran up to them and then called excitedly, "They are the real thing!" I immediately rushed up to compare my leaf samples with those of the plants which showed through the crates and breathed a joyous sigh of relief. While the foliage of each one seemed to vary somewhat in shape, all bore unmistakable similarity to the sample in my hands. Our long search was at last at an end!

With great reluctance, we then returned to our hotel, to await clearance of the shipment the next morning by the United States Customs Office. By noon, this had been accomplished and the plants and ourselves arrived at the U. S. Department of Agriculture offices near the old Ferry Building. There the shipment was unpacked

and it was found that the forbidden soil, in which the plants had been growing in 10" clay pots, would have to be carefully removed. With the indulgence of the considerate quarantine officials, I was permitted to undertake the long and tedious job of washing the roots of each plant clean, then replanting the camellias in gallon cans containing nothing but moist peat. Then followed the process of fumigation, in which all plants were subjected to methyl bromide fumes for two hours. At long last, the shipment was released and we loaded our precious plants into the panel truck. It was late afternoon of the next day, March 17, 1948, when we finally arrived at our ultimate destination, La Canada, California, and could say "mission completed."

On the following day, Mr. Howard Asper, Curator of the Gardens, and I transplanted all 20 camellias into large 8-inch pots, using the regular John Innes potting mixture consisting of 7 parts good loam, 3 parts peat and 2 parts sand. The root systems then looked good, with the rootlets a healthy, glistening white. To provide the optimum conditions for recovery from the long journey and the effects of fumigation, the plants were kept in specially contrived and built frames, the burlapped sides of which were moistened constantly to ensure a relatively high humidity and cool environment, with night temperatures being maintained above 60° F. in the greenhouse. On March 19, 1948, Mr. Asper grafted scions from each variety, using large 5-gallon understock, as an added precaution against loss. Notwithstanding early indications of favorable results, by April 28 it was evident that, despite the most painstaking personal care, five of the varieties would not survive. It had also become apparent that not a single one of the grafts would prove to be successful. Subsequently, arrangements were made with Professor Tsai, on two separate occasions, for re-

(Continued on Page 24)



## RETICULATA NOMENCLATURE

By Ralph Peer, Los Angeles, Calif.

Until about 1935, the Western World was familiar with two varieties of *C. reticulata*, both probably obtained from the Flower Market on the island in the Pearl River at Canton:

(1) Semi-plena, later named "Captain Rawes" (semi-double).

(2) Flore plena, recently named "Robert Fortune" (full double).

Wild *reticulata* seeds sent back from Yunnan, a province in southern China, by the British plant explorer, George Forrest, blossomed in England in 1932 and this species form is now available in the U.S.A., Australia, New Zealand and in European countries. In England, two wild forms have been named:

Mary Williams; Trewithen Pink

During the years 1948 and 1949, the Yunnan Botanical Institute, located in Kunming, capital of Yunnan Province, had as its director, Dr. T. T. Yu, and an Assistant-Director, Professor H. T. Tsai, both of whom spoke English. In 1948 Dr. Yu journeyed to Edinburgh and later to London to attend horticultural schools. Through the Chinese Government, Dr. Yu received inquiries from Mr. Walter Hazlewood, an Australian nurseryman, and from Dr. Walter Lammerts about the rumored existence of unknown varieties in southern China. Dr. Yu forwarded these letters to Prof. Tsai who carried on the correspondence and eventually shipped twenty different varieties to Dr. Lammerts (Rancho del Descanso, La Canada, Calif.) and five varieties to Mr. Hazlewood (Epping, N.S.W.). Mr. Hazlewood discussed this matter with me in December, 1948, before his shipment had arrived and, as I was then en route to China, I wrote direct to Prof. Tsai for additional information. He replied as follows:

Yunnan Botanical Institute  
Kunming, China  
January 25, 1949

Ralph Peer, Esq.  
Peninsular Hotel, Hong Kong

Dear Sir:

Your telegram from Singapore arrived us today. Really we have not any kind of list, as the *Camellia* we produced are still on a small scale. The famous *Camellia* in Yunnan is botanically called ***C. reticulata***. A different species to ***C. japonica*** bearing large peony-shaped flowers and large bright leaves. The names of 20 varieties now available in our garden are as following:

- x1. Peony-flowered
2. Butterfly wings, reticulate
3. Butterfly X Peony
- y4. The Dwarf
5. Early peach bloom
6. Great peach bloom
7. Great shot silk
- x8. Purple gown
9. Large *Osmanthus*-lvd.
10. Small *Osmanthus*-lvd.
11. Pine cone
12. Shot silk, reticulate
13. Shot silk, narrow-lvd.
- x14. Queen of Tali
- x15. Noble pearl
- x16. Large *cornelian*
17. Chang's temple
18. Rose-flowered
19. Lion head
20. Great butterfly wings

Those marked x are most highly valued. Plant two feet high is suitable for air shipment. Price is \$15.00 U.S. Gold each, f.o.b., except those marked x which are costed in double price.

If you will order some of or the whole collection of the varieties, please kindly instruct us whether you want a bare rooted or an original potted shipment. Remittance is preferred through the Bank of China.

Yours faithfully,  
H. T. Tsai (Ass't. Dir.)

Subsequently, I used this letter as the basis for the first published nomenclature list of the Kunming Reticulatas. It appeared in the "Southern California Camellia Society Bulletin" for December 1949 including descriptions of each variety, supplied separately from Kunming.

When I met Dr. Yu in London in April 1950, he had his own translations of the original Chinese varietal names — some were different from Prof. Tsai's list. The key to this set of names is given in Dr. Yu's article "Camellia Reticulata And Its Garden Varieties" which is incorporated in "Camellias and Magnolias; Confer-

ence Report, 1950," published by the Royal Horticultural Society.

During 1951 and 1952, Rancho del Descanso made preparations for the commercial distribution of fifteen of the Kunming Reticulatas they had propagated from various importations. In many cases, they found the varietal names unsuitable, and, after consultation with me and other interested persons, applied several entirely new "commercial" names.

We thus have, in some instances, three or four names for the same variety but preference has been given to the names adopted by the Rancho del Descanso.



**MOUTANCHA** (see page 11)

Of the twenty varieties imported originally from Kunming, both by Dr. Lammerts (Rancho del Descanso) and myself, nineteen are old varieties which Dr. Yu assured me had been known since about 900 A.D. One was a cross of the old variety Butterfly Wings X Peony Flowered made by Prof. Tsai. This was named by Rancho del Descanso "Professor Tsai."

Dr. Lammerts also received, in a later shipment, two additional crosses made by Prof. Tsai. They have been

designated "BUDDHA" and "CONFUCIUS" but have not been distributed commercially.

Two varieties from the first shipments — THE DWARF and EARLY PEACH BLOOM — were lost and it has been impossible to import additional plants.

Three other varieties have not been officially "released" by Rancho del Descanso — LARGE OSMANTHUS LEAVED, SHOT SILK, RETICULATE and BUTTERFLY WINGS, RETICULATE.

The following table contains essential information as to the original nineteen Kunming varieties:

Prof. Tsai's Number	Chinese Name	Prof. Tsai Nomenclature	Dr. Yu Nomenclature	Descanso Nomenclature
18	Tsueban or Tungtsaoban	Rose Flower	Chrysanthemum Petal	Chrysanthemum Petal
11	Sungtzelin	Pine Cone	Pine Cone	Pagoda
8	Tzepao	Purple Gown	Purple Gown	Purple Gown
4	Hentienko	The Dwarf	The Dwarf	(Lost)
10	Hsiaokueiyeh	Small Osmanthus Leaved	Small Osmanthus Leaf	Osmanthus Leaf
9	Takeiyeh	Large Osmanthus Leaved	Large Osmanthus Leaf	(Not released)
7	Tayinhung	Great Shot Silk	Large Pink	Shot Silk
12	Mayehyinhung	Shot Silk, Reticulate	Reticulate Leaf Pink	(Not released)
13	Liuyehyinhung	Shot Silk, Narrow Leaved	Willow Leaf, Pink	Willow Wand
6	Tataohung	Great Peach Bloom	Large Crimson	Crimson Robe
5	Tsaotaohung	Early Peach Bloom	Early Crimson	(Lost)
1	Moutancha	Peony Flowered	Paeony Flower	Moutancha
20	Hoyehtiechih	Great Butterfly Wings	Thick Leaf Butterfly	Butterfly Wings
2	Mayehtiechih	Butterfly Wings, reticulate	Reticulate Leaf Butterfly	(Not released)
14	Talicha	Queen of Tali	Queen of Tali	Tali Queen
15	Paochucha	Noble Pearl	Noble Pearl	Noble Pearl
19	Shihtzetou or Chiuszn-shipaban	Lion Head	Lion Head	Lion Head
16	Tamarnao	Large Cornelian	Large Cornelian	Cornelian
17	Changchatiechih	Chang's Temple		Chang's Temple

Below is a list of all other established reticulata varieties:

WILD RETICULATA — Species  
 MARY WILLIAMS — Species  
 TREWITHEM PINK — Species  
 CAPTAIN RAWES (semi-plena) — Garden Form  
 ROBERT FORTUNE (flore pleno) — Garden Form

PROFESSOR TSAI (Tzehtse-Maotan) — Kunming  
 BUDDHA — Kunming  
 CONFUCIUS — Kunming  
 INAMORATA (saluenensis x reticulata) — Hybrid

Dr. Yu mentions in his article the variety Tzepao-yutai which is Purple Gown with a white stripe. He also refers to HUNGMAARNAO, solid red

variety of CORNELIAN and PEIMARNAO, white variety of CORNELIAN. None of these varieties has been imported.



**CRIMSON ROBE** (see page 11)

## THE YUNNAN RETICULATAS — AN AMATEUR GROWER'S REPORT

By Roy T. Thompson, Glendale, California

The Yunnan reticulatas have turned out to be a fascinating and intriguing group of camellias whose size and brilliance have, in most respects, come up to their previous billing. Imported six years ago, they have now been in the hands of amateur growers for two blooming seasons, and, although no final judgments can be made, it is not too early to make a preliminary report on their various qualities. This report will deal with what the amateur growers actually have in their gardens and will ignore, for the time being, the tangled problem of their nomenclature and history.

In the first place, let it be said emphatically that the widely current dictum that "reticulatas will displace and make obsolete" all japonicas is simple untrue; it is the hasty judgment of excited persons who have looked for the first time on one of their giant blossoms. Fine as the reticulatas are, they have their limitations, certainly in the matter of plant growth and appearance. At present they lack the wide variety of forms and colors of the japonicas (although time may alter this situation) and they also lack, by a very wide margin, the adaptability of japonicas to various landscape and garden uses.

The following report is based on the experience of growers in the Southern California area with 18 varieties of the Yunnan reticulata, grown outdoors both in containers and in the ground, and has no reference to their culture under glass:

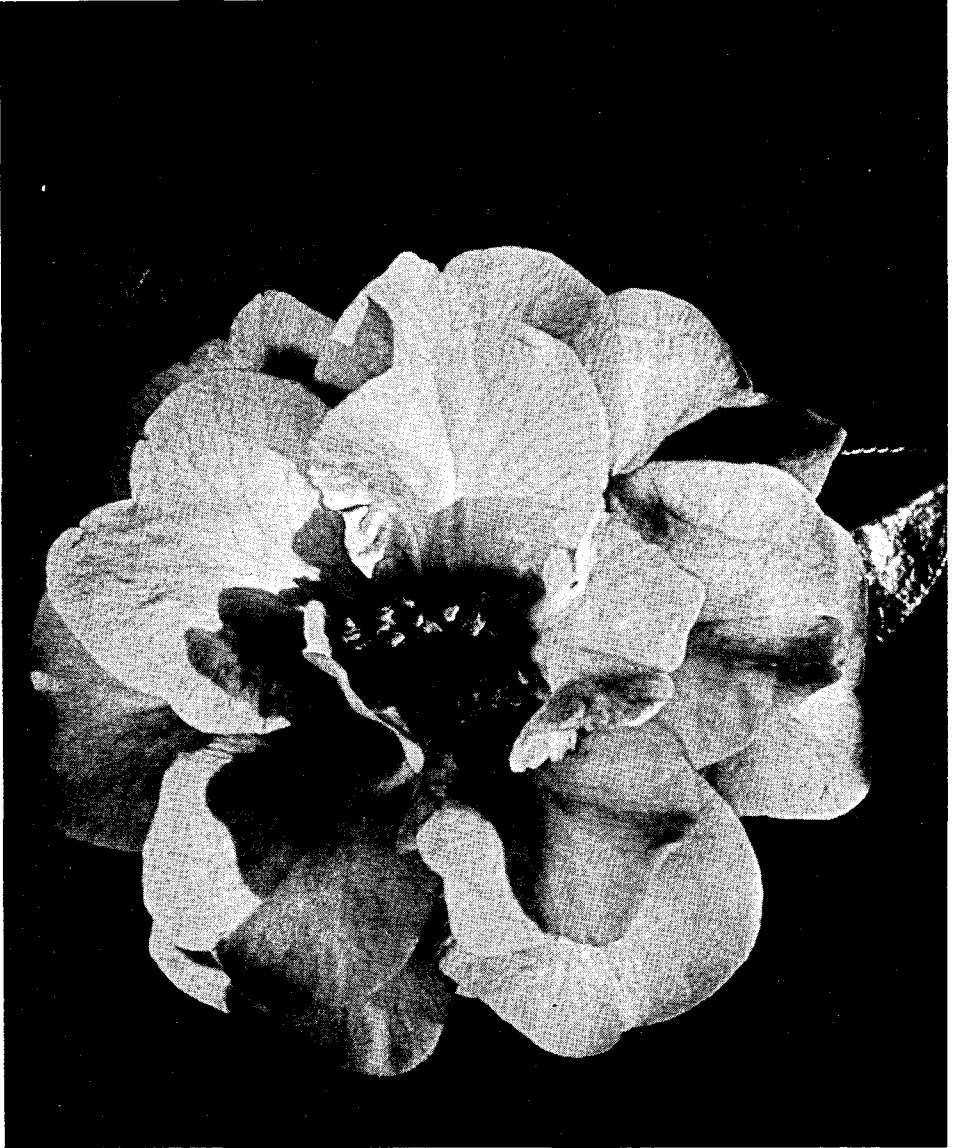
**Crimson Robe.** The two most widely distributed varieties in this area thus far are **Crimson Robe** and **Shot Silk**. (Not to be confused with **Shot Silk Reticulate**). **Crimson Robe** is a prime favorite with everyone who has seen

it and one nurseryman who has had much experience with reticulatas predicts that it will be the "best-seller." It is a vivid bright-red mass of curled petals 5½ to 6 inches in diameter, with an unusually large cluster of yellow stamens in the center. The petals are of a heavy texture and most of them large and much curled, so much so that they give the flower considerable depth in its outer circumference and a depressed, cup-like center. The plant is one of the most satisfactory of all the reticulatas; the leaves are large and of average green and they grow close enough together to give the plant a vigorous, healthy appearance. They do not begin to compare, however, with the close-packed vigor and freshness of foliage of the japonicas **Pearl Maxwell** or **Emmett Barnes**.

**Moutancha.** A fine semi-double, 4 to 5 inches in diameter and a clear light pink in color. The flower is relatively high. The plant is a slow grower and difficult to graft. The above description (based on Descanso's experience) does not agree with the Chinese description (light crimson to bright carmine marked with white veins and stripes on inner petals, formal double) but the discrepancy can only be resolved by time. Foliage about average. (See page 8.)

**Chrysanthemum Petal.** This variety has next to the smallest flowers of any of the reticulatas here listed. They are fully formal with a high center and are a warm pink in color, 3 to 3½ inches in diameter. Leaves are small and very narrow. Flower much like a japonica in appearance.

**Pagoda (Pine Cone).** A loose formal about the color of **Coquetti (Glen 40)** and up to 4½ inches in diameter. A desirable and attractive variety.



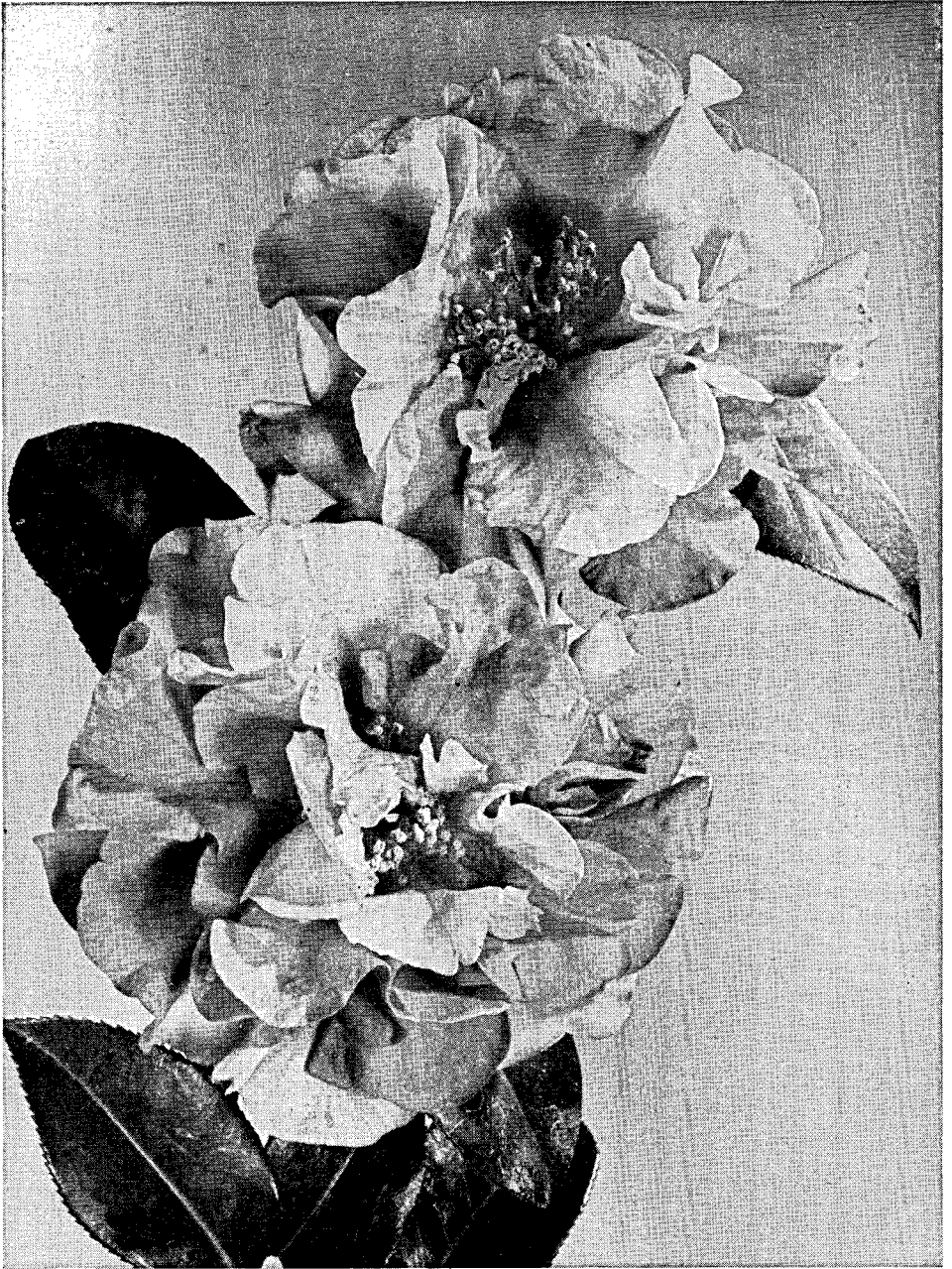
### SHOT SILK

This variety does not produce as large flowers on the average as some of the other varieties but the flowers have a striking vividness and liveliness which gives them distinction. They are bright pink semi-doubles and when looked at in the sun show pin-points of sparkling reflected light. The stamen cluster in the center is relatively small. The leaves are smaller and wider than those of **Captain Rawes**; like **Captain Rawes** too, there are plenty of stems visible through the leaves. Thus far, this seems to be the fastest grower of the lot, and is quite easily grafted.

**BUTTERFLY WINGS**

When at its best, this flower always creates a sensation. It is a loose hemisphere of longish light-pink petals with stamens intermixed in the center and, under glass, has reached 9 inches in diameter. Outdoors it tends to be a little tighter and somewhat smaller, but is still a magnificent flower. Leaves are flat, with a minimum of undulation like those of **Captain Rawes**, and the general appearance of the plant is much the same.





### LARGE CORNELIAN

A variegated semi-double-to-peony pink and white with the white predominating. This flower, in many ways, may be looked upon as typical of the Yunnan *reticulatas* as a group: it has vividness — the pink runs to the lavender side and the white is clear and pure — it has that peculiar combination of size

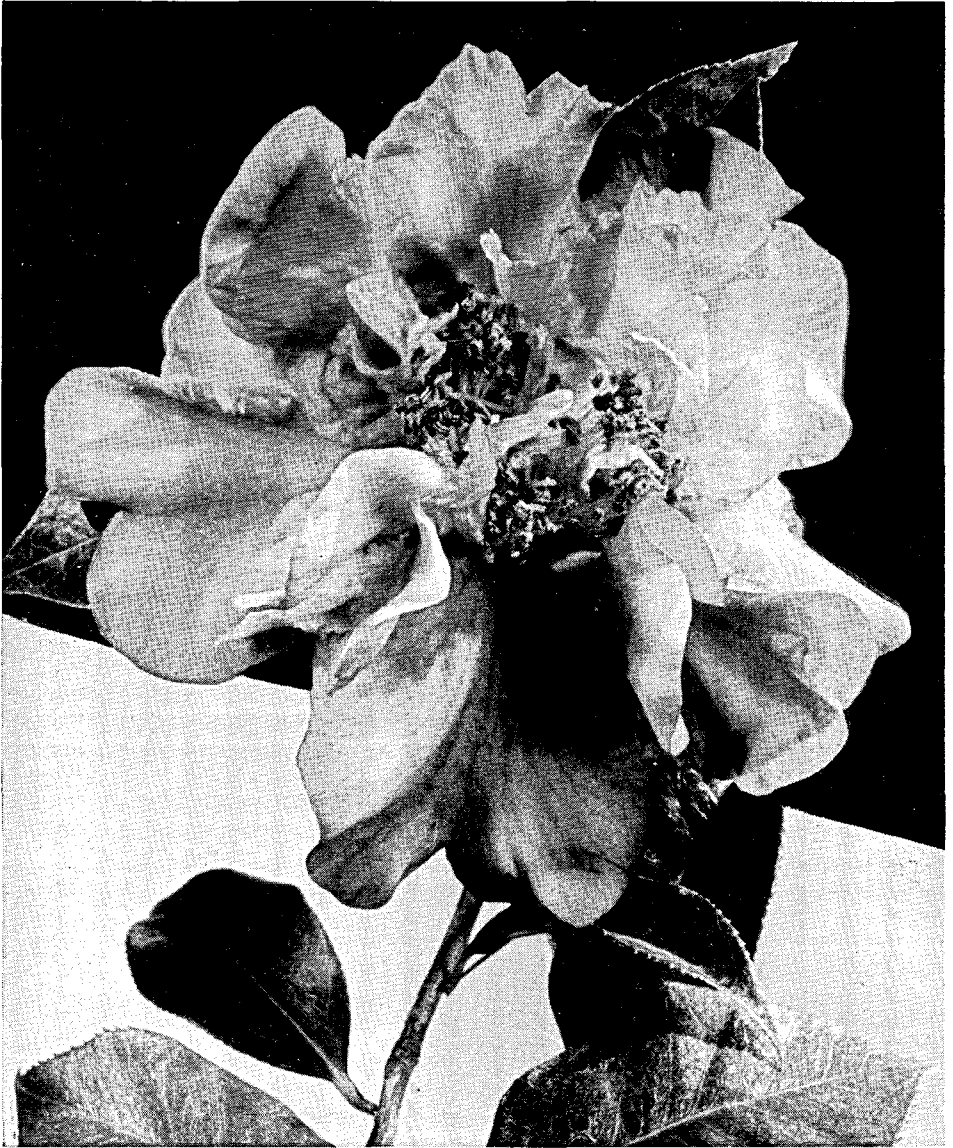


and delicacy so characteristic of the group. In fact, the combination of lavender-pink and white in this flower is more reminiscent of the sasanquas than of the japonicas. In size it ranges from 4½ to 5 inches in diameter, and it builds up to 3½ inches in height. The foliage and plant growth are average.



### CHANG'S TEMPLE

Much like **Cornelian** in general appearance — so much so that many think them to be the same. This question has yet to be resolved. The plant is a fine, vigorous grower, the leaves large, thick, undulating, pointed, and spotted with variegation.



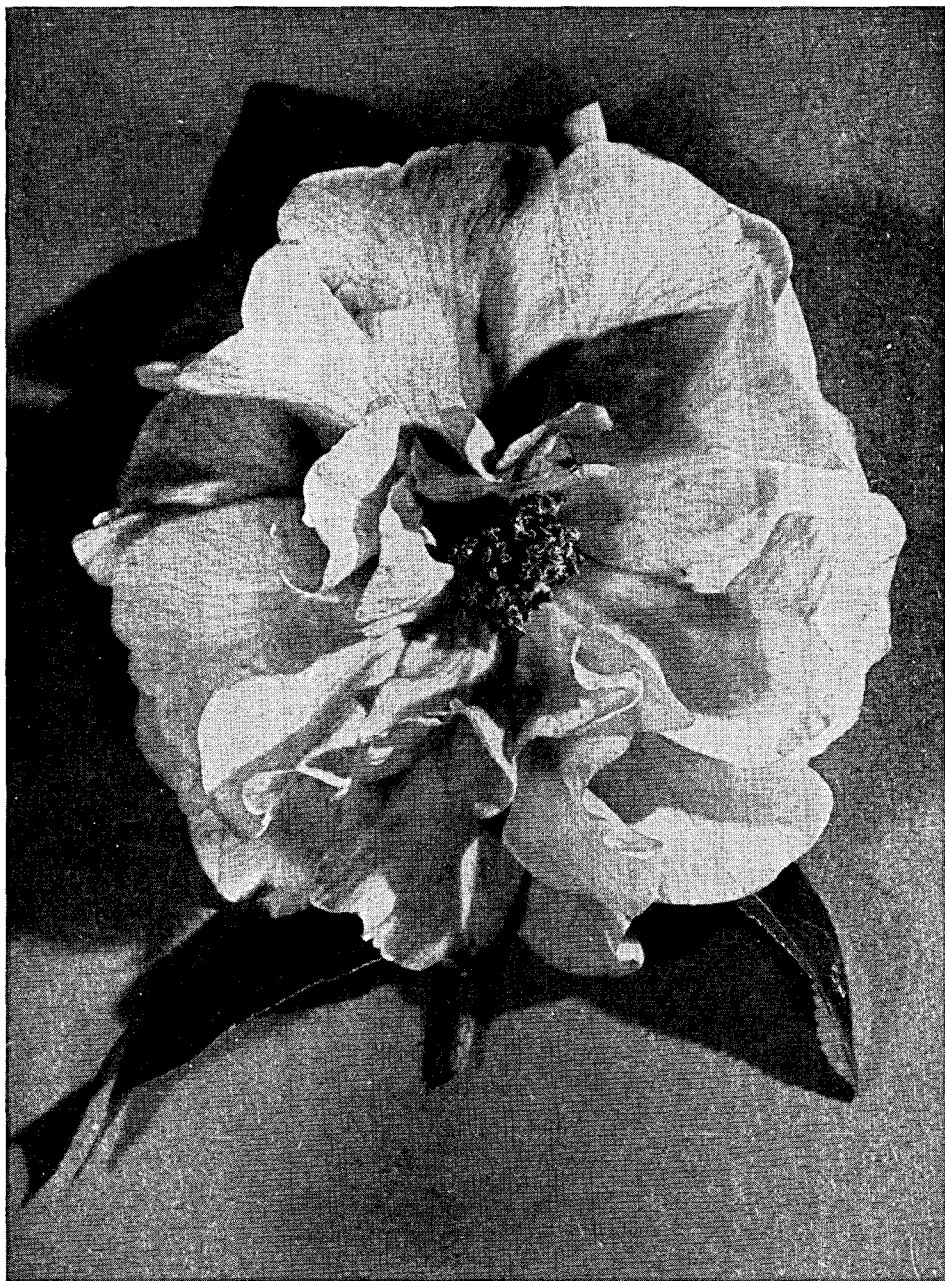
### LION HEAD

A rich pink, variegated white, semi-double to peony. Petals are heavy and much fluted and the flowers tend to take irregular shapes. This tendency may explain the naming of the variety; it may have looked like a lion's head to the person or persons who named it. It has a large group of central stamens which assume varying combinations among the central petals. (See cover.)

*(Some doubt as to identification this photo—flower may be a variation—Ed.)*

### WILLOW WAND

A vivid, orchid-tinted semi-double pink 5 inches in diameter and above average height. Leaves are long and narrow, thus giving rise to the name. This one deserves a high rating.

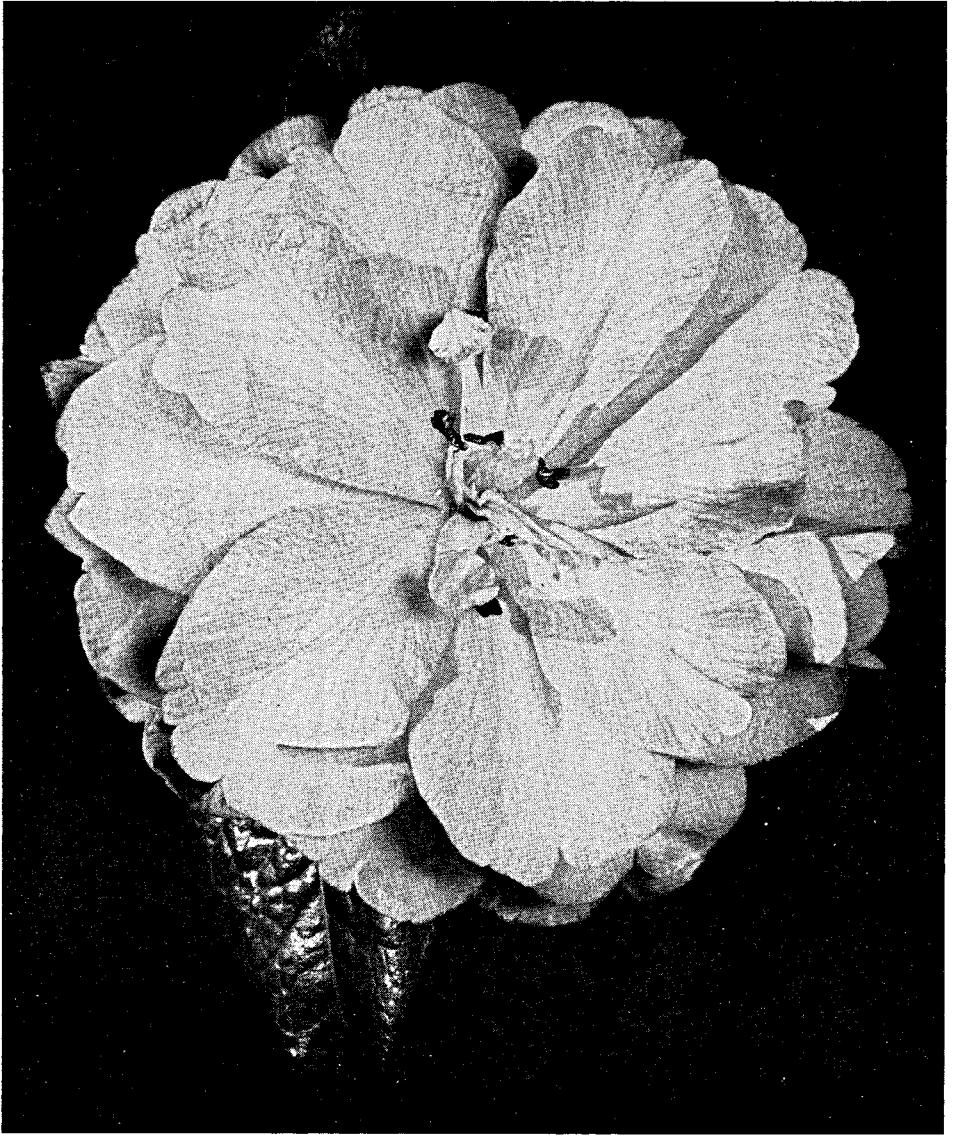




### **PURPLE GOWN**

This variety was described by the Chinese as "deep purple-red with pin stripes of white." The flowers we have seen in Southern California have been deep red tending toward the blue or purplish side rather than the orange and have varied from solid color to splotted or spotted with small markings. No pin stripes have appeared. The flower opens in a high hemisphere with petals regularly spaced, but flattens somewhat after it ages. It shows a small cluster

of stamens when fully opened. The largest flowers thus far have been 5 inches in diameter. According to Mr. Howard Asper, this variety has the best growth habits of any of the *reticulatas* and is fairly compact. New growth is a rich chestnut red in color.



#### **PROFESSOR TSAI**

A relatively flat, light pink flower which sometimes looks like a loose formal and sometimes like a flat peony. Flowers range from 3 to 4½ inches. Not a distinguished variety, but it is an early bloomer and tends to be more floriferous than most others.

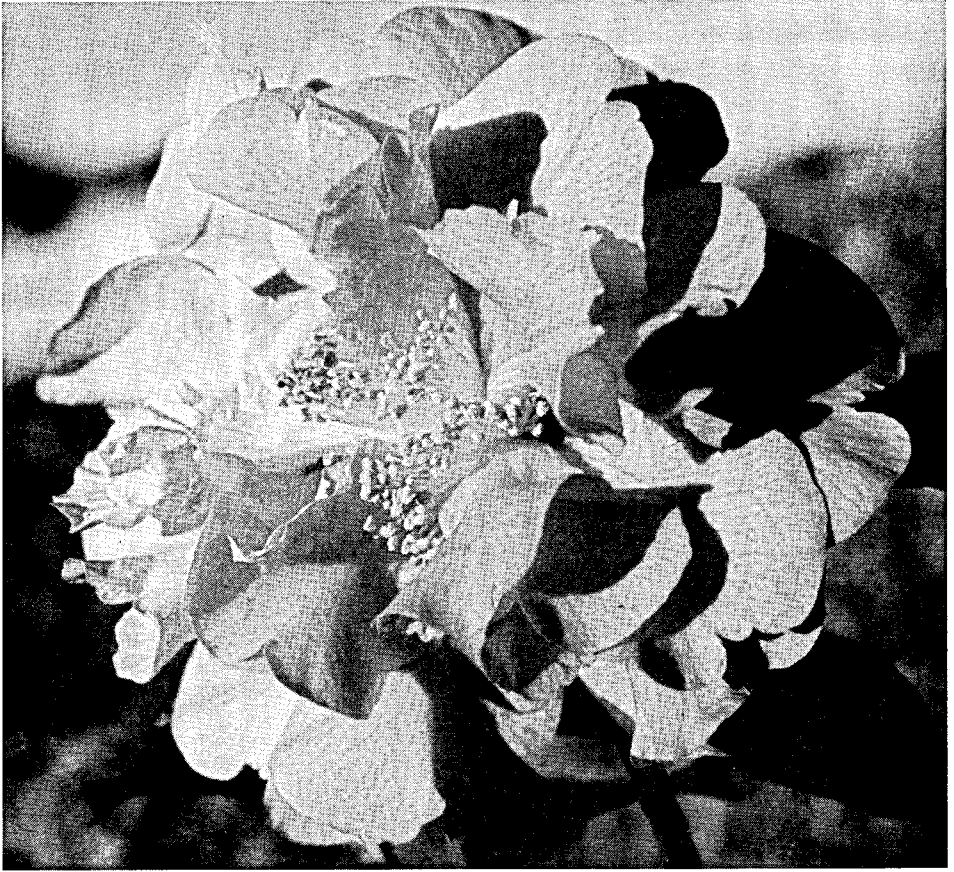


### **NOBLE PEARL**

Another giant hemisphere of curled petals of so deep a pink that one is inclined to call it a red. Descanso Distributors, Inc., has had 7-inch flowers of this. The petals are large and loosely arranged; they form an arabesque pattern through which one glimpses the bright yellow stamens in the flower's center. The leaves are thick and stiff, dark green and undulating, making the plant one of the most satisfactory of the *reticulatas*.

### QUEEN OF TALI

A deep rich-pink peony with an irregular burst of stamens in center. The curled and notched petals are fairly close together and give the flower a very lovely appearance. It reaches 6 inches in diameter and 3 inches in height. The Chinese description calls for "light variegation" but thus far the flowers have been solid pink. A very fine variety.



**Butterfly Wings Reticulate.** (Not to be confused with **Butterfly Wings**.) Semi-double pink about 3½ inches in diameter. Petals are recurved. The plant blooms early and somewhat profusely, but is one of the least desirable of the lot.

**Shot Silk Reticulate.** (Not to be confused with **Shot Silk**.) It is much larger and has a somewhat orange-pink cast without the shining iridescence of **Shot Silk**. There are many intertwining petaloids and the flower is 5 to 6 inches in diameter. Leaves are long and narrow.

(Continued on Page 27)



**CONFUCIUS**



## NOTES ON RETICULATA PROPAGATION

By J. Howard Asper, Superintendent, Huntington Botanical Gardens,  
San Marino, California

In a letter from Professor Tsai of Kunming, Yunnan Province, China, written prior to his first shipment of Reticulatas to America, he stated that they could be propagated only by the approach graft method. "All other methods," he warned, "will result in failure." Now, after having grafted them for six years, I am ready to admit that he was at least partially correct. When the first plants were grafted here, his warning was entirely ignored and the cleft graft was used. Results were not then, nor since, satisfactory. The rate of loss has always been higher than when grafting japonica.

Several sizes and types of understock have been used. Whether sasanqua or japonica seems not to matter, but the size and vigor of the understock certainly does. The ratio of loss seems much higher in smaller plants and is also high in the real old plants of 2" and 3" in diameter. Plants of the  $\frac{3}{4}$ "-1" diameter (five gallon) size have given the highest "take" percentage.

In the plants imported from China there were several instances where the top or grafted part of the plants died while the root stock remained alive. These were carefully brought on to blooming size and curiously enough they turned out to be **C. japonica** Alba Plena. Just why the Chinese used this variety is a matter of speculation. It is very slow growing, but this might have been desired since many of their plants were container grown. Another possibility could be that by using a white-flowering variety the grafted plant would not be affected by the root stock.

The time of year that grafts are made is, of course, very important. Winter, spring and summer grafts have been tried with varying degrees

of success. Winter grafting seems not to be desired unless the grafts can be given artificial heat either in a greenhouse or hot bed. In the Reticulatas the grafted scions seem to have a decided tendency to dehydrate and it is therefore quite important that they be brought on very fast. This can perhaps best be accomplished by late spring grafting. Scions taken just as the growth buds are about to swell, seem to heal and grow quickly. Percentage of "take" was highest when scions at that stage were grafted to five-gallon size, healthy understock. Summer grafts have only lately been tried and while final percentages have not been figured, indications are that they will not be as good as those of late spring grafting.

It should go without saying that all the best grafting techniques must be employed. Sharp knife, good rubber bands, clean, sterilized jars and healthy understock are taken for granted. Also recommended are prayers and pious living on the part of the person doing the grafting!

A decided difference in the percentage of "take" among different varieties is apparent even though conditions are identical. **Shot Silk**, **Crimson Robe**, **Butterfly Wings** and **Chang's Temple** are easiest to graft, while **Moutancha** is unquestionably the hardest. No explanation offers itself except that the aforementioned are more vigorous and faster growing plants.

It is entirely possible that in the future some better understock for Retics will be found. Plants grown from seed of the Forrest strain of the Wild form of Reticulata offer the greatest possibility at present. Plans have been made to try them as soon as some such plants now growing have attained sufficient size. Mean-

while, by following leads herein mentioned, considerable success can be attained.

So far, no general effort to root Reticulata cuttings has been made. However, from observations of the few trials completed, it is apparent that several varieties will root. Best showings were made by **Shot Silk**, **Crimson Robe** and **Butterfly Wings**. Whether or not these plants on their own root will be as vigorous as grafted plants remains to be seen.

It is now established that several varieties set seed rather freely. These are **Crimson Robe**, **Butterfly Wings**, **Chang's Temple**, **Lion Head**, **Cornelian** and **Willow Wand**. The seed pods are a dull brown and in some cases have attained enormous size. Since this is the first year seeds have set,

it remains to be seen how many seeds per pod will be harvested, or what germination will be had. Unfortunately they are practically all chance pollinations since this seed set was not anticipated. The significant factor is that these varieties do set seed and can be used as female parents. Results of using pollen from these varieties on japonica have not been satisfactory since the japonica characteristics seem to predominate.

One need only to experience the thrill of watching one of these glorious flowers unfold to repay him for any problems of propagation. Long years of patient work, by one of the most intelligent peoples on earth, have gone into their development. Truly we are fortunate to be able to grow reticulatas in our American gardens.

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### STORY OF THE YUNNAN RETICULATAS..(Continued from Page 6)

placement shipments of the lost varieties but, in spite of every precaution at both ends, we were unsuccessful in establishing those we lacked. In the spring of 1949, scions of the five varieties were imported which arrived in excellent condition, giving every promise of success. However, notwithstanding the most careful handling this method also proved unfruitful. A year had now elapsed since our first plants were received.

About this time, we were astonished to learn that Mr. Ralph Peer, independently of us, had established contact with Prof. Tsai and as a result had imported a shipment of 19 of the varieties. Unfortunately, only three of these ultimately survived the long trip and fumigation. Arrangements were made for us to graft from these plants and fortunately, in this manner, two of the lost varieties were safely established. Finally, in March 1950, we made another importation from China and succeeded in establishing a total of 18 varieties in all. Then followed the work of building

up a stock of these plants. This was the problem of my associate, Mr. Howard Asper, who, in an accompanying article, sets forth full details of this important undertaking.

Careful examination of the blooms of these new reticulatas had indicated the presence of fertile pollen—a fact verified by a number of experimental crosses with several promising varieties of **C. japonica**. Accordingly, in 1949, 1950 and 1951, an extensive series of cross pollinations was made by Mrs. Lammerts under my general supervision, using proven techniques and with pollen from at least 8 of the Yunnan varieties. From this large number of crosses, 73 seeds were obtained, but only 15 living hybrids resulted. Most of these have now flowered but the final results, while interesting, have nevertheless proven to be disappointing. However, valuable information has been gained and a brief report on the techniques employed and the eventual outcome, with suggestions for further experimentation, may prove of value to others.

## Methods Used

Single and occasionally semi-double flowering varieties of *C. japonica* having a good record for seed set were used as female parents in order to provide conditions as ideal as possible for successful cross-pollination. All flowers were carefully emasculated and covered with manila bags immediately after pollination in order to minimize danger of contamination by either self-pollination or pollen from other *C. japonica* varieties. Each flower was checked carefully with a 20x hand lens before and after emasculation so as to be sure that none of the anthers had already started to shed pollen, thereby effecting self-pollination. All of the Yunnan varieties except Moutancha, Professor Tsai, Osmanthus Leaf, Pagoda and Willow Wand were used as pollen parents. These were too double to yield enough pollen.

## Results of Cross Pollination

About 25 crosses were made in March of 1948 using pollen of the few flowers still on the original plants imported from Kunming. Over 500 crosses were made in the spring of 1949, some on *C. saluenensis*. Another even more extensive series of crosses was made in the spring of 1950 and finally in 1951 several hundred flowers of Donckelari and My Darling were pollinated with Cornelian, Noble Pearl and Lion Head.

Each season the results were similar. About 50 percent of all flowers pollinated set seed capsules which began maturing quite normally. After about six weeks to two months, however, some capsules began shriveling and examination indicated this was due to degeneration of the embryos. All during the summer months this loss of capsules continued so that by fall relatively few mature capsules could be harvested. Only 23 of the 1948 crosses matured capsules with viable looking seed. Usually only one seed was fully mature-looking in size and characteristic dark brown

color. The others were very light brown, from  $\frac{1}{4}$  to  $\frac{3}{4}$  normal size and usually shriveled at one end. The minute dried-up embryo was at the other end of the seed.

All of the normal seeds from the 1949 crosses were embryo cultured. A total of 20 seedlings including the two from the 1948 crosses were obtained. Six of these were very weak and eventually died. The other 14 were quite normal in growth and as soon as well established were placed under continuous light. All of them looked very similar to the *C. japonica* female parents in foliage and plant habit. They began flowering in the spring of 1950 and by the winter of 1951 all had flowered. The flowers were also discouragingly similar to the various female parents in color, size, shape and petal number. They were evidently not hybrids at all but either accidental self-pollinations (in spite of elaborately careful technique) or "maternal hybrids", that is, pollination merely caused the parthenogenetic development of an egg already diploid through a failure of the chromosome reduction division, the male elements being in no way incorporated. The fact that the plants so nearly resembled their respective female parents would suggest the latter interpretation.

The seeds of the 1950 crosses were planted in peat and only five plants were obtained. Those from the semi-double white and red *C. japonica* x *C. reticulata* Forrest are undoubtedly hybrids having the leaf venation and general appearance of the *C. reticulata* parent. At least one of the single red x Changs Temple is a hybrid as determined by leaf appearance, though others are very similar to *C. japonica*. Finally 8 of the 14 plants from Donckelari, which were very weak, died, leaving only 6 which appear similar to *C. japonica* but do seem to differ sufficiently from Donckelari to possibly be interspecific hybrids. Final decision on these must await flowering.

## Discussion

The results so far, while disappointing, are similar to those previously reported for other plants such as tobacco (*Nicotiana*) and Wheat (*Triticum*).<sup>3</sup> At the time the crosses between *C. japonica* varieties and the Kunming *reticulatas* were made, their chromosome number had not yet been reported. Later Patterson, Longley and Robertson<sup>4</sup> reported *C. reticulata* as being hexaploid, i.e., having 45 pairs or 90 chromosomes. *C. japonica* has only 15 pairs. Evidently then the same behavior is here occurring as experienced with tobacco, wheat and other plants. Since large specimens of the various *C. reticulata* varieties are now available, crosses using pollen of *C. japonica* varieties on selected *C. reticulata* varieties would possibly give much better results than the reciprocal crosses of high chromosome *C. reticulata* on low chromosome *C. japonica* varieties, reported above. Successful hybrids of *C. reticulata* varieties used as female parents have been obtained, particularly with *C. pitardii*. A number of the Kunming varieties such as Lion Head, Crimson Robe and Shot Silk set seed readily.

This brings us to the final consideration of this paper. Though many fascinating possibilities could be realized should fertile hybrids between *C. reticulata* and *C. japonica* ever be obtained, other even more interesting and probably more readily obtainable hybrids are possible. Thus as reported by E. K. Janaki Ammal,<sup>5</sup> *C. oleifera* and *C. sasanqua* also are hexaploid having 90 chromosomes. They are, furthermore, all placed in the section CAMELLIA by J. R. Sealy,

English specialist in the taxonomy of this group. Presumably they should then cross with *C. reticulata* varieties much more readily than do either *C. japonica* or *C. saluenensis*, each of which is diploid and has only 15 pairs or 30 chromosomes. The fall flowering behavior of the *C. sasanqua* varieties might thus be combined with the remarkable flower quality and size of *C. reticulata* and conceivably the fragrance of *C. oleifera*!

*C. rusticana* is reported by Barnsley as being winter hardy.<sup>6</sup> The leaves of this species resemble those of *C. japonica* in gloss and texture. Since it is also diploid, cross-pollination with genetically desirable semidouble *C. japonica* varieties might result in reasonably fertile hybrids. Treatment of these with colchicine would be worth trying in hopes of inducing tetraploids. By back crossing to *C. rusticana* using the colchicine-induced tetraploid as female parent, triploid hybrids having two sets of *C. rusticana* and one set of *C. japonica* chromosomes would be obtained which, if successfully treated with colchicine, would give the ideal hexaploid for crossing into the *C. reticulata* x *C. sasanqua* hybrids. In this way the stage would be set for combining the desirable cold resistance factors of the *C. rusticana* with the most desirable flower qualities of *C. reticulata*, the fall flowering qualities of *C. sasanqua* and fragrance of *C. oleifera*.

Though of course a program such as outlined above calls for patient and long-continued hybridization, it is not at all beyond the realm of possibility. All steps of it have been accomplished in other plants and so the

various suggested steps are not merely imaginative dreaming. Hoffman<sup>7</sup> reports various techniques for applying colchicine to camellia seeds and seedlings. Though actual tetraploids are not reported by him, at least his data on treatment and survival are helpful. Since tetraploids have been successfully produced by colchicine treatment in both the peach and cranberry, it should also be possible to obtain them in the camellia.

The results, then, so far attained by hybridization of *C. reticulata* indicate that though much more difficult than expected, crosses resulting in true hybrids are possible. By taking advantage of the well established principle that when species of a polyploid series are crossed, the most successful ones are those in which the female parent has the larger chromosome number, we may confidently expect a much greater degree of success. Since the distinctive features of the hexaploid species may be in part due to geographic isolation from one another there is a good chance that they may be genetically rather closely related and therefore more readily intercrossed with each other than with *C. japonica*. Along this line of thought it is of interest to report that several hundred attempts to cross *C. japonica* with *C. sasanqua* varieties have been completely unsuccessful, both when used as female and pollen parent. In all cases *C. japonica* and *C. sasanqua* varieties which had an excellent record for

seed set were used as female parents, and yet not a single seed capsule was obtained. *C. sasanqua* evidently then differs genetically even more from *C. japonica* than does *C. reticulata* and so from this point of view might be expected to be more cross-fertile with *C. reticulata* than either one has been found to be with *C. japonica*. Of course the possibility always exists that the genetic divergence may be in the opposite direction, but certainly careful cross-pollination studies would seem to be abundantly worth trying.

<sup>1</sup>LAMMERTS, W. E.: "The New Camellia Reticulata Hybrids," *Yearbook American Camellia Society*, (1950), pp. 1-11.

<sup>2</sup>HU, H. H.: "Recent Progress in Botanical Exploration in China," *Journal Royal Horticultural Society*, (1938), No. 63, pp. 381-389.

<sup>3</sup>LAMMERTS, W. E.: "Interspecific Hybridization in Nicotiana. XII. The amphidiploid *rustica-paniculata* hybrid; its origin and cytogenetic behavior." *Genetics* 16, pp. 191-211 (1931).

<sup>4</sup>PATTERSON, EARL B., LONGLEY, MARY O., ROBERTSON, DONALD S.: "Chromosome Numbers in Cultivated Camellias." *American Camellia Yearbook*, pp. 107-113 (1950).

<sup>5</sup>AMMAL, E. K. JANAKI: "Chromosome Relationships in Cultivated Species of Camellias." *American Camellia Yearbook*, pp. 106-114 (1952).

<sup>6</sup>BARNESLEY, W. H.: "Some Notes on Camellia Breeding." *American Camellia Yearbook*, pp. 114-119 (1952).

<sup>7</sup>HOFFMAN, R. M.: "The Use of Colchicine in Camellia Breeding." *American Camellia Yearbook*, pp. 122-126 (1952).

## AN AMATEUR GROWER'S REPORT (Concluded from Page 21)

**Large Osmanthus Leaf.** A medium-pink, medium-large flower with an orchid-pink cast and many very fine and very wavy petaloids with stamens intermixed. While not as large as some others this flower is outstanding because of its vividness and striking beauty. Leaves are not large and the plant is fairly compact.

**Small Osmanthus Leaf.** This variety has the smallest flowers and leaves of any. The flowers are orchid pink, fully double, with incurved petals and are 2½ to 3 inches in diameter. One of the least desirable in the group.



*Photograph courtesy Frederic Heutte*

### **CRIMSON ROBE**

A one-year graft with five blooms, as grown on the Atlantic seaboard

## RETICULATAS IN THE NORFOLK-SUFFOLK REGION OF VIRGINIA

By Frederic Heutte, Superintendent of Parks, Norfolk

While three years is a short time in which to pass judgment on the acclimatization of any plant to a given section of the country, it is, however, sufficient in the case of the "Yunnan Reticulatas" to permit of a fair appraisal of their worth. Because I speak as a representative of this area I probably should begin by giving a general evaluation of the species as it was first introduced here about ten years ago through the original variety now known as "CAPTAIN RAWES." Because this variety has not proven very satisfactory in this area, or perhaps I should say in the Southeastern part of the United States, for that matter, there was a good deal of skepticism as to the desirability of the Yunnan group when they were first offered for public sale. The feeling seemed to be that the species *C. reticulata* had suffered in comparison with the good results obtained here with *C. japonica* and *C. sasanqua*. Consequently, when the Yunnan group was offered only as a unit of 15, very few were purchased here and to the best of my knowledge the collection of the Misses Hill at Lynnhaven, Va. and that so kindly given to our Bureau of Parks by Mrs. Charles R. Grandy of Norfolk are the only ones in this section.

Here in Tidewater, Virginia, and neighboring Suffolk, in an average winter the temperature will go down as low as 12° F, and in Norfolk about 18° above zero. The japonicas seem to be able to withstand these temperatures, although the buds of imbricated varieties will sometimes blast. Consequently, the late blooming season of the Reticulatas, as well as their flower form, is in their favor in this regard.

The largest plant we have of *C. reticulata* in the Park collection is of the CAPTAIN RAWES variety, and is now about ten years old. It is now

50" high with a 40" spread and has set an average of a dozen buds each of the past 5 years. This plant is a graft made in 1945 of a scion obtained from the famous W. R. Coe collection, Long Island, New York, where it is grown under glass. Our CAPTAIN RAWES graft bloomed for the first time in the spring of 1948, when it was 3 years old. It set no buds in 1949 and in the following three seasons (1950, 1951 and 1952) dropped all its buds, although the winters were not unusually severe. However, it had about a dozen good blooms in 1953 and in 1954 appears to have about 15 flower buds.

Our collection of the so-called Kunming Reticulatas was purchased in 1952 and two of the varieties bloomed in 1953. At the time of this writing (August 10th) these plants are 30 to 36 inches in height, show good annual growth and our plant of CRIMSON ROBE now has about a dozen healthy-looking buds. No attempt was made the first year to propagate these reticulatas and they were placed out of doors in a lath-house. While we kept a sharp eye on them owing to the fact that we then had only the original 15, they were not coddled and on only two nights during the winter 1952-53, when the temperature dropped to 20°, did we bring them in as they were then still in the original 10-inch pots.

In 1953, we made 12 grafts, of which 7 were successful, and this year (1954) we grafted 31 scions, of which 17 survived. Our results in grafting have therefore been somewhat disappointing (slightly better than 50% success). A graft of the variety CRIMSON ROBE, made in 1953 on 6-year understock, produced five good blooms this past season and is now the finest in our entire collection, including the original plants. (See cut.)

This plant has been given to Mrs. Grandy in appreciation of her many favors to the Park Department of the City of Norfolk over the years.

All of the reticulatas, including the grafted stock, are now planted out-of-doors and are putting on normal growth. To all appearances, they have become acclimatized and evidently are perfectly healthy and thriving. Miss Elizabeth Hill and Miss Evelyn Hill, who have the other local collection, like ourselves have not babied them. These two famous amateur horticulturists, who have succeeded with more unusual plants in this section at their lovely estate on the Lynnhaven River than anyone else hereabouts, casually remark that reticulatas seem to have possibilities in this section. Although they have lost one out of their original collection of 15, they have not yet attempted to propagate them. Their cultural technique is exactly the same as with any other member of the genus *Camellia*. To date, their reticulatas appear to have grown rather slowly and somewhat on the gawky side, although no taller than ours. However, our plants appear stockier and bushier, no doubt due to the pruning for scion wood. They are planted out in the open under a grove of oak trees, where there is good soil and plenty of natural mulch.

At our 1954 Annual Camellia Show in Norfolk we exhibited nice flowers

of Cornelian, Crimson Robe, Shot Silk, Osmanthus Leaf and Lion Head, out of approximately 20 blooms which were produced from March 10th to April 10th. Mr. W. H. Bacon brought in a magnificent bloom of the variety LION HEAD, which he said was grown out-of-doors at his place in Richmond, Virginia, and which was exhibited at our show on March 20, 1954.

In conclusion, I might say that it is my present feeling that the Kunming Reticulatas will eventually play a very important part in the future culture of the genus *CAMELLIA* in this area. This will come about after they have been thoroughly integrated into our climate and soil, and their place in relation to the other species has been established. On the whole, I am of the opinion the genus *CAMELLIA* has by no means reached its ultimate point in geographical distribution. I feel that too much stress is laid upon temperature drop hereabouts and that succeeding generations may disprove many of our present-day theories. However, a few more years will be needed in which to judge these Reticulatas by actual experience and the observations given here must necessarily be qualified accordingly. At the moment I am one of the comparatively few growers in this section of the Camellia Belt who regards these new Reticulatas with an optimistic view.

### ADDENDUM

It is perhaps pertinent to this presentation that we make one or two editorial comments.

First, as we go to press there is a report, as yet unconfirmed, that a completely white flower has appeared on one of the Yunnan Reticulatas in Southern California. If so, it remains to be seen whether this mutation will remain fixed. In any case, it would seem merely a question of time until this happens, thus completing the color cycle.

Secondly, and this is entirely a personal observation, one cannot help but reflect upon the strange parallel between the long obscurity of the CAPT. RAWES variety in the Western World (fully 100 years) and the complete secrecy which surrounded the Yunnan Reticulatas for so many centuries—even eluding such horticultural sleuths as Fortune and Forrest.



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— NOTES —



