A STUDY OF MOSS AND MINIATURE ROSES

RALPH S. MOORE

Sequoia Nursery, Visalia, California, 93277

Successful development of everblooming moss roses after many years of painstaking work has afforded an excellent example of progress in rose breeding. Yet, the result is not due to slow accumulations of minute differences which might be expected according to evolutionary theory. Evidently nothing new has been added, only changes in the DNA message that allow different expressions of already existing genetic material.

Based on findings involving moss roses, new conclusions are possible in explaining the appearance of miniature roses. Miniature roses. or any new roses. are really no more than the "old" gene material in a different combination.

Those people who know something of my work with miniatures are often amazed at its scope and variety. Some of the questions naturally are, "How did you ever get into this?", "How do you make such little ones out of big ones?", and a number of other "whys" and "hews."

Now, I happen to be one of those people who do not believe that our universe, our world, or even a new variety of rose just "happened" by accident, or is the result of the whim of "natural causes." As one studies and works with living things he becomes not only interested in how certain phenomena come about but also why. That is, NOT just the mechanistic answer to "how?", but back of that the philosophical reason. Is there a first and final reason? As posed in the words of Artemus Ward, "Why is this thus? What is the reason of this thusness?"

No man is an island—he does not live unto himself. All we are and do is laid upon the foundation of those who have preceeded or are co-workers with us. The plant breeder—scientist is, as it were, one of "the called of God" to help explore some of the wonders and mysteries of nature.

Each works in his chosen field-or often in the field which is thrust upon him. As each part of a jigsaw falls into place it furnishes part of the pattern for the next. So it is with each achievement, each experiment, each success or failure. At least part (often much) of the direction which the next step takes is directed by what has gone before.

Points of Rose History

And so it is with my own work with miniature roses. Miniatures are not really new, even though many people today do not know that such roses exist. Present day miniatures had their start with the discovery of a little pink miniature rose in Switzerland in 1918. From this, in 1933, came Tom Thumb and the stage was set for development of the many varieties known today. In just a few short years this whole transformation has taken place!

According to some accounts this original Swiss fairy rose (miniature) had been grown by the same family in the same pot for over 100 years! In turn, it was thought to be a last survivor of some miniature roses known to have been grown in France and England during the early part of the 19th century. These are supposed to have originated from miniature roses discovered growing on the Island of Mauritius in 1810.

The accounts do not tell us whether plants or seeds were brought from Mauritius, or if the flowers were single or double, although an early English illustration depicts a single (five petal) form. The literature also indicates that miniatures were known in France before 1810, hence the French may have discovered them on Mauritius first and brought plants or seeds to Europe. According to Ann Wylie, *Rosa chinensis minima (R. rouletti)* was brought from Mauritius to England by Sweet in 1805, It was there known as *R. lawrenceana.* [1]

It is also known that by 1840 several varieties of miniature roses were cultivated in America. But the "modern" story of miniature roses begins with the introduction of Tom Thumb in 1933. This and several other varieties were bred by Jan de Vink of Holland.

Almost without exception these were made by crossing an older variety of polyantha rose with *Rosa rouletti* (the Swiss rose), or its offspring Tom Thumb. For example, several, inducting Red Imp and Pixie were Ellen Poulsen x Tom Thumb. Eblouissant x Tom Thumb produced Red Elf. Cecil Brunner x Tom Thumb made Cinderella. No hybrid tea, floribunda, species or other dissimilar kinds were used.

In Spain, Pedro Dot has done considerable work with miniatures. He has used mostly polyantha x miniature; in some cases miniature x miniature and in a few a Hybrid Tea x miniature (usually *R. rouletti).*

In England, T. Robinson's work was entirely polyantha x miniature, or miniature x miniature, M. Tantau, in Germany, produced Baby Masquerade by crossing Tom Thumb with Masquerade.

In France, Alain Meilland has made some crosses involving use of Fashion and other flori-

Figure 1. Variety on left is bright pink with 20 petals and two and one-half inches in diameter, sets seed hips. Variety on right is light red, very double, and under two inches in diameter; sets no seed hips.

bundas in the breeding line; while, in Italy, Q. Mansuino has worked with miniatures for more than 20 years but only this spring are the first of his varieties being introduced by an Italian firm.

Here, in the U. S., Dr. Dennison Morey has done some work with miniatures. Varieties introduced have been based upon crosses of a sport of Dick Koster x Tom Thumb and similar crosses.

Work with Miniature Roses

My own work with miniature roses spans a period of more than 25 years. It involves the use of many types and varieties of roses, including at least five species, Hybrid Teas, polyanthas, floribundas, tea roses, and a number of my own seedlings and hybrids (both as seed and pollen parents).

Almost without exception I use miniatures as the pollen (male) parent. For several reasons this has been the most practical approach. First, it seems that the miniature factor is linked with sterility, especially female. Very few miniatures will set seed hips, and then there is usually but one seed (rarely 2 or 3) to each hip. Some varieties will set seeds, but they are not viable.

On the other hand, a number of miniatures will produce some pollen. But here, the amount produced may be so small as to be almost impractical. Good pollen producers are really very few.

Along the way I have selected several of my varieties which have proven valuable as pollen producers and which have carried desirable genetic material. The first of these was a little variety—an everblooming semi-climber—with one inch, semi-double pink flowers. Known as Zee, it has been without doubt one of my most valuable breeders. This is the parent which made everblooming climbing miniatures possible. Further details as to the various crosses resulting in my own group of miniature roses may be found by referring to my book, *All About Miniature Roses.*[2]

Since 1948, I have also been interested in the breeding of moss roses. Attainment of success along this line has been far more difficult and time consuming than anticipated.

Usually all the undesirable features of the Moss rose parent came through in terms of excessive thorniness of the rose plant stems, with but little moss on the sepals. Also the everbloom-

Figure 2. Crested Moss

ing character of the Hybrid Tea parent was lost in the F_1 generation. Finally, however, I now have everblooming moss roses with a degree of moss on the buds comparable to the lovely old fashioned moss roses, such as Golden Moss and Pink Moss.

And very recently I have successfully crossed the Little Darling with Crested Moss. For many years, rose breeders have been trying without success to obtain hybrids between the Crested Moss rose and Hybrid Teas or Floribundas, so this hybrid with the floribunda Little Darling is the cause of much rejoicing. Seedlings have bloomed for the first time this year.

As shown in Figure 1, the unusual Crested Moss rose characteristic has "come through" completely in its expression even though present in only those chromosomes from the pollen parent, Crested Moss. (Compare with Crested Moss shown in Figure 2.)

As may be easily seen the flower has much of the fine bud form of Little Darling and relatively few thorns on the stem. It has good foliage and a flower of bright pink color. The seedling on the right is bright red, very double, but has no anthers and sets no seed. The bright pink seedling fortunately sets seed so we have here the start of a new breeding line by which we hope to eventually get Hybrid Tea sized flowers of excellent bud form and ever blooming behavior.

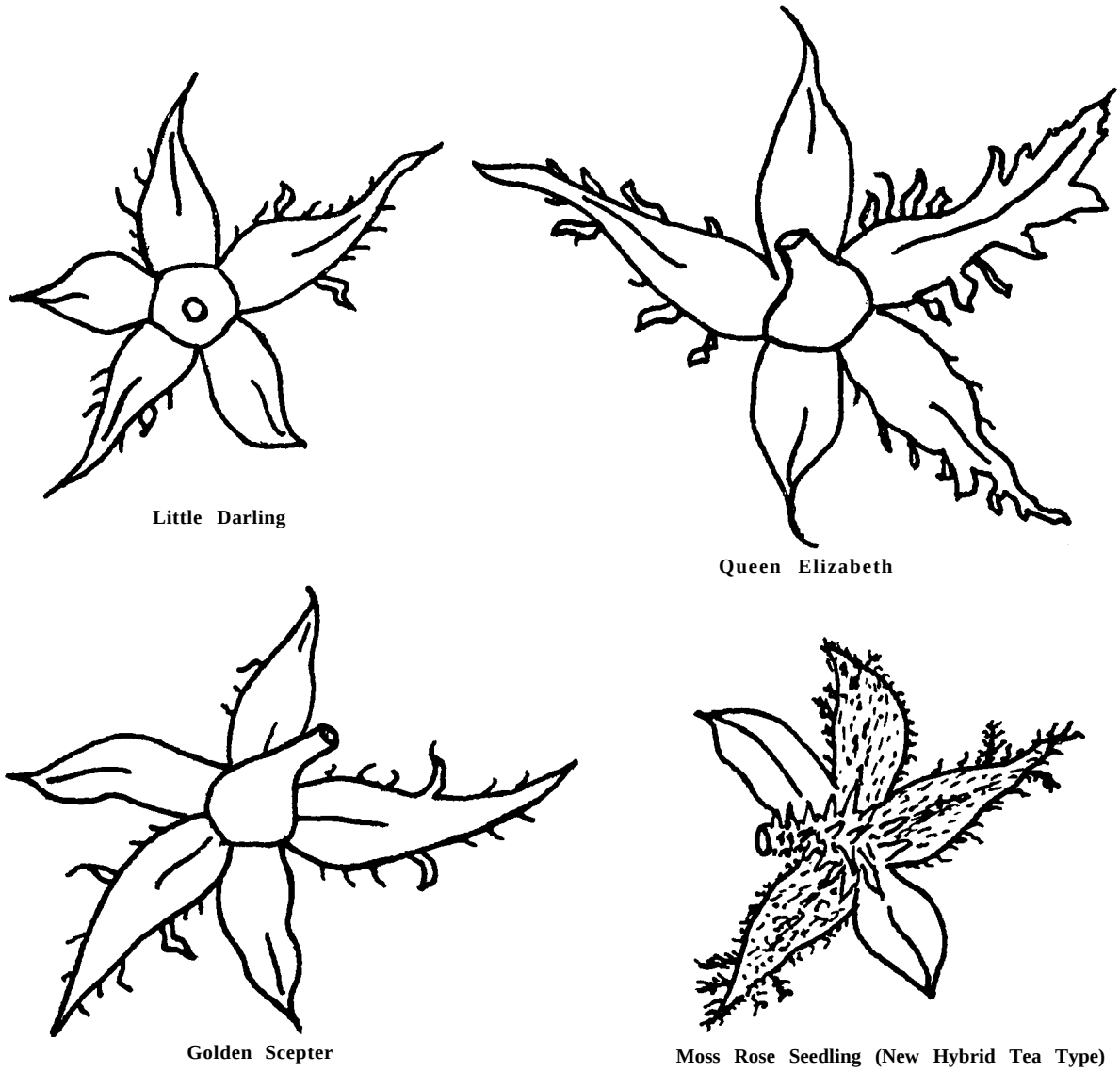
This unusual recent example is typical of the way much of the progress in rose breeding occurs. It certainly is not the result of the slow accumulation of minute differences and mutations, as one would expect on the basis of the evolution theory. Significantly, the Crested Moss rose had a sudden and rather mysterious origin which would seem to involve the transformation of one or several gene loci at one time.

Observations About Roses

After working with and carefully observing moss roses, including many hybrid seedlings over a period of about twenty years, it appears that the following observations may be made:

(1) Sterility is a constant problem and in fact is a major limiting factor in breeding new and improved varieties.

(2) In some crosses, such as those involving Joanna Hill (Hybrid Tea), albinism is also a



Little Darling

Queen Elizabeth

Golden Scepter

Moss Rose Seedling (New Hybrid Tea Type)

Figure 3. Five sepal pattern, showing two mossed (or foliated), one plain, one mossed, and one plain petal, in clock-wise rotation, in all varieties.

limiting factor, as many as 25% of the seedlings completely lack chlorophyll and thus die soon after sprouting.

(3) The same five sepal pattern is present in all varieties, both moss and non-moss. Three are larger and/or longer. These show the extra foliaceous parts or moss, depending on whether they are the usual varieties or moss roses. These are arranged so that two mossed or foliaceous are together and the third mossed (or foliaceous) sepal is opposite. On either side of this single mossed sepal are the two smooth margined sepals. Thus the pattern is two mossed (or foliated), one plain, one mossed and one plain. (See Figure 3.)

These two plain sepals in the tight bud are overlapped by the three mossed (or foliaceous) sepals, and may at times show just a narrow line or portion of the sepal mossed. This is true of the modified thorn type moss rose, as well as the Crested Moss.

(4) The amount of mossing or extra foliaceous parts on the sepals may vary with the variety, plant vigor, season of the year, and age of the plant.

(5) This phenomena (Mossing) and its related extra foliaceous parts on non-moss varieties may not be far removed from what is called "prolification" (extra petals, buds, flowers and/or foliage

arising as a deformation—usually in the center of a spent rose bloom).

This is carried to its extreme limit in *Rosa viridiflora* (the Green Rose) in which there are no true flower parts but only a rosette of leaves which mimic a flower. Again, reproductive parts are damaged or missing with resulting sterility.

(6) There has been much speculation on the origin of moss roses (practically all such information dealing only with the thorn-type moss)[3]–the generally accepted idea being that moss roses, including the modified thorn type *(Rosa centifolia muscosa,* cultivated prior to 1750—See *Modern Roses* VI[4]–there is evidence that forms of moss rose were cultivated as early as 1696) and the more rare Crested Moss *(Rosa centifolia cristata,* 1827, *Modern Roses VI)* originated as sports from forms of *Rosa centifolia* (Cabbage Rose; Provence Rose in *Modern Roses VI).*

(7) Having worked in moss rose breeding experiments over the past 18 years (making slow progress until recently), I would like to suggest the idea that both types of moss roses very likely originated as sports (mutations), *not by adding something new* (moss) but by a change in the DNA message produced by suppression (blocking or partial blocking) of a normally present inhibitor (or complex).

That this tendency to extra sepal foliation (within controlled limits) is always present cannot be denied (see drawings). It is an observed fact on all varieties and types of roses studied–Hybrid Tea, Floribunda, Grandiflora, Polyantha and Miniature.

(8) In breeding, I have observed that the moss factor tends to behave as a dominant (a fact also observed in 1840 by the eminent English nurseryman, Thomas Rivers). This similar trait of dominance (for the miniature phenomena) is also observed in breeding miniature roses.

However, it is my thinking that "miniaturization" is caused by an inhibiting influence or factor rather than strictly a factor for dominance (See *All About Miniature Roses,* Chapter 19). Variation in expression of moss rose traits is shown in Figure 4.

This is my present thinking insofar as moss roses are concerned. Such inheritance mechanism (or substance) as I have suggested may be a complex which includes, or is in close association with, the observed phenomena of moss roses, extra foliar sepal parts and, possibly, prolification.

(9) The normal rose flower then is kept within certain guide lines (could also apply to thorns since the thorn type moss seems to be made up of special thorns and oil glands) by the "master" DNA message. This would include normal sepal foliation. Yet, when certain of the guide lines are altered (temporarily or semi-permanently) by removal or change of the controlling suppressant (inhibition), then the phenomena of mossing, either in the "modified thorn" type, or the "crested" type may appear.

Now, such mutations are not necessarily an advance insofar as the plant is concerned and, in the case of mossing, it adds the burden of growing these superfluous parts. Also, as has been observed, sterility and other problems seem to be associated with mossing and present difficulties for the rose hybridizer. Certainly such plants would be at decided disadvantage in the natural state.

(10) It appears that moss roses (especially the Crested Moss form) might be considered genetically in the same category as cristate forms of Cacti—an abnormal form, of interest horticulturally, which renders the plant-so afflicted-less able in various respects to survive in nature. These (moss roses, etc.) are thus mutations on the minus side rather than the plus.

It appears to me that, in certain areas, we might think of mutations as: (a) temporary and abnormal aberrations or changes. By "temporary" I do not mean that all mutations are likely to revert to the parent or original form immediately. They may persist–often with the help of man—for generations.

(b) plus (positive) and minus (negative) phenomena–that is, plus (+) is the genetically normal form for the species (or variety); minus (–) would include all those changes or mutations involving less than the full state or complement of genetic factors. This idea might be a way of explaining (understanding) how we can get such significant changes as the crest (cristate) form of moss on roses in a single cross.

(11) Therefore, I suggest that the observed Crested Moss phenomena may be caused by an inhibiting influence which, for the time being, covers or masks out certain portions of the full DNA code for the normal type thus allowing this straying (an ever-present possibility) from the norm. Nothing is being "added." In a sense, the plant is merely "side stepping."

Conclusions on Miniature Roses

My conclusions after working with miniature roses are in certain respects similar to those resulting from my moss rose work as outlined above. It might well be asked if *Rosa rouletti,* the little Swiss fairy rose is really as old as suggested. Is it really one of the older French varieties (Pompon de Paris) which somehow survived and was thus rediscovered? Was the

Figure 4. Variations in expression of moss rose traits. Left to right: Salet, Gothe. and unidentified Old Rose-Crested Moss type.

island of Mauritius the true and/or only source of discovery of this mutation, ***Rosa chinensis minima?***

I have long doubted some of these contentions. In my breeding work it appeared that the miniature factor behaved as a dominant, as it need only come from one parent. Although my breeding work has long been conducted with this in mind, I was not satisfied that it was the true answer. Might it not be an inhibiter which prevented the "message" for "normal" from being delivered? But some men questioned this theory on the basis that a positive "dominant" gene might be easier to explain.

Now, with the discovery (by Dr. Bonner) that the histone covering, or sheath, can block part of the DNA "message," this might furnish a clue. Again, the question is brought up that the histone sheath is not transmitted. But some similar message could be (and very likely is) transmitted to succeeding generations to block the complete, or "normal" message. Since the miniature factor seems to be also linked to the sterility/fertility factor, and since this phenomenon appears whether the miniature is inherited from the male or female parent, such linkage cannot be ignored.

Several years ago I made some interesting crosses. One was ***Rosa wichuraiana x*** Goldilocks; the other was ***R. wichuraiana x*** (polyantha seedling x Goldilocks). Since the climbing (tall) factor is dominant, all seedlings in this F_1 generation were climber and once blooming (spring flowering). But instead of being strong climbers with intermediate sized flowers they were almost, without exception, miniature climbers, 1½ to 4 feet tall and bore flowers about one inch in diameter—most in white to cream color. With but one or two exceptions, all were female sterile. I did not check for male fertility.

Then, more recently, I have grown three different lots in different years of self-set seed gathered from an isolated plant of Old Blush (Parson's Pink China) –supposedly in cultivation before 1759.

Germination was rather poor, but from the first lot a number of the seedlings were definitely of the miniature type. In seven years, several of these have grown no more than 7 to 12 inches in height. One (only 7 inches high) is semi-double with flowers the same color as ***Rosa rouletti.***

Another (# 23-57-2) grew only about 8 inches high with tiny double flowers resembling the

miniature Peggy Grant. Another grew about 10 inches with double flowers resembling Pink Joy (a seedling of Oakington Ruby) in both color and form. Yet another produced 1¼ inch semi-double lavender blue (magenta) flowers on a 12 inch plant.

Several set seed hips but seeds often contain no embryo. Germination has been very poor from any of these seedlings. However, some seedlings of the, lavender blue (Mr. Bluebird) variety have been grown. All are miniature—usually with very narrow lance shaped petals and so far all have been female sterile but some pollen is produced.

The other lots grown from Old Blush, although in smaller lots, gave similar results.

Miniature Roses Not Magic

Now, in view of the above and many other observations, I believe that *Rosa rouletti* may not be as old as supposed. It may even be a fairly recent seedling from one of the old China varieties such as Old Blush. The miniature factor (or more likely an inhibition linking both size and sterility) can and has arisen in various times and places. Since this phenomenon is apparently caused by an inhibtion, or blocking of the "normal" (complete message) factors for rose size, fertility (and other associated phenomena), it may not only appear when "blocking" occurs, but may be reversible and may disappear with removal of blocking and return to normal.

Blue and lavender miniature roses can be produced as they are with hybrid tea and floribunda roses, insofar as these colors are possible. There is apparently no possible source of true blue in roses. (There are those who believe that at some magic moment a chance mutation will bring this about.)

So called "blue roses" are merely those in which the magenta has the ascendancy. Lavender color apparently is produced by the combination of magenta and yellow. Some will doubt this, but about 15 years ago in a conversation, I told Dr. Fred Nisbet, then Executive Secretary of the American Rose Society, that I believed such to be the case. A check of the pedigree of so called lavender roses will show that this is true.

I have made crosses a number of times using the old multiflora rambler, Violette; i.e. Violette x Zee (pollen from most other miniatures has failed). From such crosses have been selected several miniatures, both bush and climber, showing pinkish-lavender to magenta colors. The "bluest" of these is Purple Elf which at times is petunia purple, All these are very difficult to propagate.

More recently I have produced a really lavender miniature rose from a cross of Ellen Poulsen x (Little Darling x Zee). The male parent (Little Darling x Zee) is yellow aging to pink and light red similar to Baby Masquerade. Thus our lavender miniature was produced exactly as set forth above: magenta in combination with yellow.

There is no trick; there is no magic involved in producing any new rose, miniature or otherwise. All that we call new is but the old in a different combination. These principles and the materials are basically the same—today, or in that yesterday we call Creation. God is the same yesterday, today and forever. All we do is think God's thoughts after Him.

Literature Cited

[1]Wylie, Anne, "History of Garden Roses" (Master's Memorial Lecture, 1954), *Journal of the Royal Horticultural Society*.. Volume LXXIX, part 12 and Volume XXX parts 1 and 2. December 1954. Page 13 in the reprint from this article.

[2]Moore, Ralph S. *All About Miniature Roses.* Diversity Books, Kansas City, Missouri, 1966.

[3]Hurst, Major C. C. and Breeze, Mabel S. G., "Notes on the Origin of Moss-Rose," *Journal of the Royal Horticultural Society*, Vol. XLVII, Part 1, 1922.

[4]*Modern Roses* VI. J. Horace McFarland Company, Harrisburg, Pennsylvania, 1964.

REINTERPRETATION OF FACTS BEHIND THE THEORY OF EVOLUTION

WARREN R. HOWARD

398 Grant Avenue, Beverly, New Jersey, 08010

Variations among organisms within a particular kind do not lead to the formation of new kinds or alter God's design that organisms reproduce "after their kind." So-called evidence for the theory of evolution is merely persuasive or circumstantial, and can be used to support the Genesis account as well as the theory of evolution. All that is really known is that organisms vary markedly due to changes in genetic make-up and due to interactions with the environment. God has designed the living world of different types of organisms to survive by adapting to changes in conditions.

First of all there is such a thing as genetic variation which produces a marked degree of variation in living organisms of any particular type:

1. There are systematic variations in offspring due to recombination of genes, expressed as dominant and recessive characteristics.[1]

2. There are less systematic variations due to gene and chromosome mutations. Mutations may be small or great, and they usually affect the viability and the fertility of the organism and its offspring.