

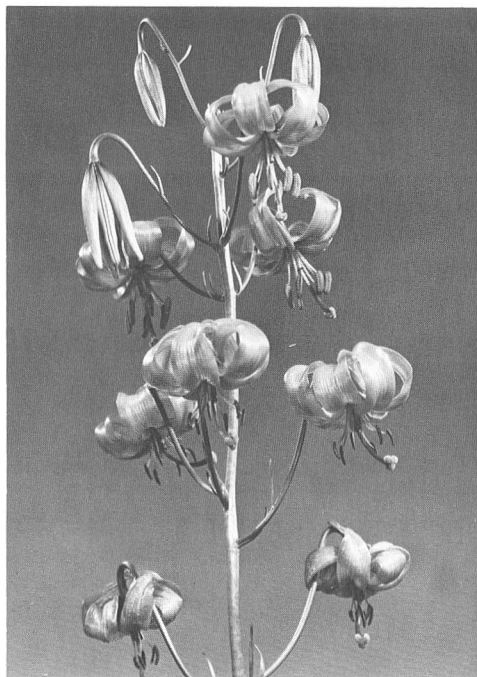
# The Lily Species behind Today's Hybrids: Part Two Small-Flowered Asiatic Species

LEONARD D. MARSHALL  
Casper, Wyoming

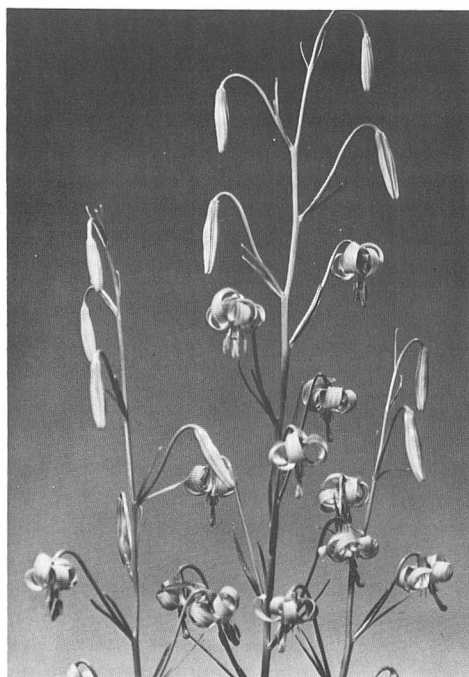
IN the 1981 *Lily Yearbook*, I discussed the importance to hybridizers of an extensive knowledge of the characteristics of the lily species. We must remember that the physical characteristics of past, present, and future *Lilium* hybrids are the product of the species' traits. In that article, I outlined the characteristics of the species which have most affected modern Asiatic hybrids: *Lilium davidii*, *L. wilsonii*, *L. bulbiferum*, *L. dauricum*, *L. tigrinum*, *L. cernuum*, *L. leichtlinii* var. *maximowiczii*, and *L. amabile*. Now I would like to continue the discussion, describing the characteristics and breeding histories of a second group of species: the small-flowered species, *Lilium pumilum*, *Lilium callosum*, and *Lilium concolor*.

## *Lilium pumilum*

Flower form	Strongly reflexed turk's-cap
Inflorescence	Raceme
Color variation	Shiny surface. Brilliant orange-red in type, softer true orange in 'Golden Gleam' mutant forms, and clear lemon yellow in recessive yellow mutants such as 'Yellow Bunting.'
Spotting	None
Bud count	5 to 25. Highly varied, according to geographical location and bulb size.
Height variation	15 inches to 5 feet (0 to 150 cm), depending upon the geographic strain.
Stem strength	Willowly; vigorous strains require staking.
Foliage	Grass-like, averaging 3 inches (8 cm) long and 1/8 inch (0.3 cm) wide. Leaves curl laterally to produce a whirling effect on the stem.
Soil preference	Extremely hardy; will grow in most well-drained garden soils.
Geographic locations	Northeastern Asia—Siberia, Manchuria, and Mongolia. Survives harshest winters.
Germination	Immediate epigeal. Plants develop rapidly and often flower during the first season.
Disease resistance	Since this is usually a short-lived species, producing copious seed and readily grown from seed, it is difficult to assess its response to the various viruses. It is moderately resistant to <i>Fusarium</i> bulb-rot and to <i>Botrytis</i> blight, especially if it is not overwatered. Although considered a short-lived species, it will persist for many years if attended and not permitted to spend itself in seed production.



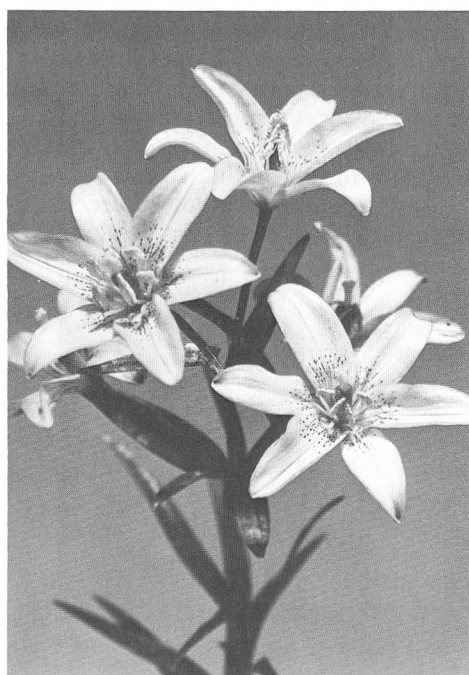
*Lilium pumilum*



*Lilium callosum*



*Lilium concolor*



*Lilium concolor* f. *coriðion*

Interspecific compatibilities Will cross with *L. dauricum*, *L. bulbiferum*, *L. concolor*, *L. davidii*, *L. amabile*; and others. Crosses with *L. cernuum* by embryo-culturing.

At Columbia-Platte, we have been directing much attention to hybrids from *L. pumilum*, being captivated by its brilliant colors, dainty flower size, and charming grace. The most intense effort has been applied since 1975; it took a number of years before this to acquire proper breeding materials and to evaluate their affinities. An account of this team effort appears in the 1978 *Lily Yearbook*, and it includes photographs of several of the hybrids described below.

While I was attempting to find parents for  $F_1$  crosses to broaden our breeding base, Judith McRae was searching the lily world for existing *L. pumilum* hybrids, which were scarce. (*Lilium pumilum* is an extremely fertile species intraspecifically, and many "hybrids," in which it was pollinated by other parents, prove to be simply true *L. pumilum*. Most of the true hybrids have had *L. pumilum* as the pollen parent, although some pollinations upon *L. pumilum*, as discussed later, have produced true hybrids.) She received some fine stock from Charles Robinson in Canada; he had worked for some years to produce hybrids which incorporated *L. cernuum*, *L. davidii*, and the Stenographer hybrids into *L. pumilum* breeding. (See his article in the 1977 *Lily Yearbook*.) She also received from Dr. Fritz Ewald of Germany bulbs of several *L. pumilum* hybrids, including the hybrid described by Peter Geiser in the 1975 *Lily Yearbook*, *L. pumilum*  $\times$  *L. bulbiferum*; this hybrid was originally produced in Eastern Germany, and we appreciate the efforts of our Swiss and German friends in making it available for our hybridization.

Two of our own  $F_1$  *L. pumilum* crosses have been most valuable in breeding and are proving to be of great importance in our programmed breeding. The first is "L218," my cross of *L. pumilum* pollinated with a bicolored 'Rainbow' selection; this produced several clones, one pollen-free, and all with the long elegant raceme and charming poise of *L. pumilum*. These are fertile, and in the second generation they have engendered pastels of the whole gamut from creams to pinks to buffs to yellows to golds to oranges, as well as the deep brilliant reds; and these are produced in flower forms varying from pendant and reflexed to upright and starry.

Our second important "breeder" is *L. concolor*  $\times$  *L. pumilum*, and we were quite pleased to see its semi-pendant flowers, verifying its status as a true hybrid and



"L 218" *Lilium pumilum*  
 $\times$  'Rainbow' bicolor



One of several clones  
from *Lilium pumilum*  $\times$   
'Rainbow' bicolor

not an apomictic *concolor*, when it first flowered. This duplicates the cross originally made by Harold F. Comber, aptly named by him *L. × intermedium*, for it is intermediate between the two parents. Ours was produced by embryo-culturing, and it has proved to have fertile pollen, so that we were able rather quickly to produce a large second and third generation. These again have permitted the broad color spectrum and range of forms to emerge, depending upon the other parents used; and we have looked for hybrids with the daintiness and elegance of *L. pumilum* and *L. concolor* in the offspring.

Ruth Clas also contributed to our effort with her hybrid 'Scamp,' 'Golden Chalice' (very close to true *dauricum*)  $\times$  *L. pumilum*, and her second-generation 'Scamp' hybrids. She used A. J. Porter's fine *L. pumilum*, and a number of the hybrids from 'Scamp' have shown the deep yellow-gold flowers and lovely black stems and leaves (and bud reverse) which came from it. One attractive clone from 'Stroynaja'  $\times$  'Scamp' has unspotted brilliant yellow pendant flowers and glossy black stems, and it has in turn produced upright and outfacing black-stemmed yellow and gold lilies of sturdier stature.

We have also done some hybridizing with Professor Taylor's old *L. pumilum* hybrid 'Goldcrest,' which has been growing for over thirty years. It has given some highly vigorous and attractive seedlings, notable for their daintily-proportioned flowers and often luminous golden tones.

*Lilium pumilum*'s assets include tiny flowers, glistening flower surface, dense pigmentation, early flowering, rapid maturity from seed, long racemic inflorescence, and great hardiness. In hardiness it rivals *L. dauricum*, and their areas of origin overlap.

The principal drawback is narrow foliage, which does not breed out until the second or third generation. The untested virus tolerance may prove to be disadvantageous, but hybrids so far seem to have a good degree of tolerance. We do not think that the usual short longevity will prove to be a problem, for this does not seem to be characteristic even of the first generation hybrids. The scent of *L. pumilum* is transmitted to its offspring, often subtly changed, so that among them will be some seedlings with a pleasing fragrance and some that unfortunately faintly shadow the Margatons in their "essence of old tennis shoes."



CP-1, *Lilium pumilum*  $\times$  'Hallmark' clone. Soft buff flowers on a stocky plant



'Stroynaja'  $\times$  'Scamp' (*L. pumilum*  $\times$  'Golden Gleam')

*Lilium callosum*

Flower form	Tiny, tightly-recurved turk's-cap. Tepals hug and envelop the entire ovary before flaring.
Inflorescence	Raceme with very short pedicels
Color variation	Dull brick red in type; lovely bright yellow in form <i>flaviflorum</i> (or <i>luteum</i> ).
Spotting	Tiny black streak spots on type. Form <i>flaviflorum</i> (or <i>luteum</i> ) which we have seen is spotless.
Bud count	5 to 10 on average; well-cultivated forms may exceed this.
Height variation	Tall! 5 feet (150 cm) or more. Flowers look like many little emblems atop a flag pole.
Stem strength	Not strong enough for height.
Foliage	Up to 5 inches (13 cm) long and ½ inch (1 cm) wide. Rather brittle and easily broken in wind.
Soil preference	Neutral to slightly acid on type. Isolated yellow form likes acid volcanic soil.
Geographic locations	Type is widely distributed in China, Manchuria, Japan, and Formosa. Yellow form is isolated on the island of Okinawa.
Germination	Immediate epigeal. Matures rapidly from seed.
Disease resistance	This species is short-lived and needs specific growing conditions, so that it is hard to assess virus tolerance. Extremely susceptible to fusarium and only moderately resistant to botrytis.
Interspecific compatibilities	Hybridizing data in early stages. Will cross with <i>L. amabile</i> , <i>L. pumilum</i> , <i>L. dauricum</i> , and <i>L. concolor</i> ; others are possible.

In the late 1960's Ruth Clas returned to hybridizing with *L. callosum*, crossing *L. callosum* with *L. amabile* and its forms and later crossing these hybrids with *L. leichtlinii* var. *maximowiczii* f. *unicolor*, to produce 'Maxiclas.' (This was discussed in our account of *L. amabile* in the 1981 *Lily Yearbook*.) Through the help and sharing of Ruth Clas and of Harrison (Pete) Peters, the materials came to Columbia-Platte for further work.

Advancing *L. callosum* hybrids has been interesting, for there are many drawbacks to overcome. We knew from the beginning that it would not be easy! Such things as strengthening and shortening stems and giving *fusarium* resistance and longevity had to be top priorities.

*Lilium callosum* offers some unique and appealing advantages, however. It has the tiniest flowers of any species, Asiatics or otherwise, and it flowers in the late season—the only tiny-flowered Asiatic species to do so. It can be crossed (with some difficulty) with *L. concolor*, which helps in opening up that recalcitrant species to a broader breeding program.

Our efforts have been directed in two ways: first, in breeding with stronger and more resistant later-flowering hybrids, and then by returning these closer to *L. callosum* for its tiny flowers and late flowering. The second stage still needs further work; we are selecting for tiny, upfacing, late-flowering garden plants. We were pleased to have a seedling M-43, an upright, lemon-yellow with mid-sized flowers of typical *callosum* form, receive the Hornback Award at the NALS Annual Show in



M-43, Len Marshall's complex *L. callosum* hybrid which received the Hornback Award in 1982



Another clone from M-43, a shorter seedling with outfacing flowers.

1982. This was produced from crossing a vigorous, short, upright, spotless yellow Asiatic with [‘Golden Dauricum’  $\times$  *callosum flaviflorum*)  $\times$  [(*callosum*  $\times$  *amabile luteum*)  $\times$  *callosum flaviflorum*]]. These seedlings were all quite vigorous and showed an interesting variation in height, flower size, and flower form.

Judith started in 1980 to develop tiny pastel *L. callosum* hybrids, crossing the tiny pastels that have originated from second- and third-generation *pumilum* and *concolor* hybrids with the ‘Jewels of Albany,’ yellow *L. callosum* hybrids of medium height, broader-than-type foliage, small flowers, and a range of spotting types and shades of yellow. Some are almost chartreuse.

Unless the breeder is so inclined, it is unwise to start over with this species. Drawbacks are difficult to overcome. It is wiser to use the existing hybrids and to watch for others as they are released. This will save much time and effort.

Like *L. concolor*, *L. callosum* has a short style. Its pollen grains do not have to grow long pollen tubes. For this reason, when using pollen of *L. callosum* or its hybrids, it helps to amputate the style of the female parent. Better seed yields, however, will come from using *L. callosum* as the seed parent.

#### *Lilium concolor*

Flower form	Upfacing small star shapes. Fairy-like with great charm.
Inflorescence	Only upfacing Asiatic species with racemic placement.
Color variation	Type is brilliant scarlet. True yellow in recessive mutants.
Spotting	Highly varied from spotless to black, fine-streak spotting.
Bud count	5 to 10, depending upon form.
Height variation	Usually 18 to 30 inches (50–75 cm); well-cultivated forms may be taller.
Stem strength	Adequate but should be improved by hybridizing.
Foliage	Usually about 3 inches (8 cm) long and $\frac{1}{3}$ inch (0.3 cm) wide. Sparse on stem—a dominant trait in $F_1$ hybrids.
Soil preference	Slightly acid to slightly alkaline

Geographic locations	Northern Japan and northeastern Asia. Very hardy.
Germination	Immediate epigeal. Matures rapidly from seed
Disease resistance	Another short-lived species, usually grown from seed, so that virus tolerance is not well evaluated. Fusarium resistant and not overly susceptible to botrytis.
Interspecific compatibilities	Very difficult to cross with other species. May be crossed with <i>L. pumilum</i> and <i>L. callosum</i> under ideal conditions. Henry Payne has crossed with mutant stubby-styled hybrids.

For tiny upright hybrids, the possibilities promised by *L. concolor* are exciting. To me, this is the most beautiful of all the tiny-flowered Asiatic species. Its brilliant color is delightful, and its little star-shaped flowers look straight up. The tepals spread, making the flowers flatter than those of its large cousins *L. dauricum*, *L. wilsonii*, and *L. bulbiferum*—and *L. concolor* does not have their unattractive “claws.”

This is a difficult species to use in hybridizing; when true crosses are finally achieved with it, they are often quite difficult to breed with as well.

The bulbs are small, with very few scales. The leaves are sparsely scattered on the stem. Both these traits are hard to eliminate in hybrids. When used as the seed parent, *L. concolor* will produce apomictic (non-hybrid) seed, which can be a great disappointment to the breeder who thought he had at last found a compatible cross. It is probably better to use *L. concolor* as pollen parent. Its short style means that when this is done, the long style of the mother plant should be amputated or totally removed before pollination.

At Columbia-Platte, we are slowly but with determined effort working to bring more fertility into *L. concolor* lines. We now have a great number of first- and second-generation hybrids from our original (*L. concolor* × *L. pumilum*) cross. Among these are tall and sturdy uprights with up to 40 3½ to 5 inch flowers on a perfect raceme, some in astonishingly brilliant colors and some in delicate pastels. Our original purpose was to produce smaller-flowered forms in much shorter lilies, but these taller lilies have such great appeal that we may introduce some of them; it is pleasing to see them remain in flower for up to five weeks!

Several years ago, Henry Payne sent me pollen of his *L. concolor* hybrids, and these have offered strength to the whole *L. concolor* hybrid complex.

We are still not satisfied with our true “miniatures” from these lines, and we will release them only when we are. We are getting closer with each generation, however. When you see them, *L. concolor* traits will be apparent in the tiny upfacing flowers, the glistening surface, and often in the tiny “whiskered” spotting pattern. We want to be sure that any hybrids introduced will have resistance and long life—these are the promises Judith and I have made to ourselves. Judith is still culturing new second- and third-generation crosses, and we are still both hybridizing to take the broadest approach to the problems.

We are presently working with new F<sub>1</sub> crosses, too, such as [(*L. callosum* × *L. amabile luteum*) × *L. callosum flaviflorum*] × *L. concolor coridion*. Here the *L. amabile* influence makes the hybrids hang on long enough to do additional work with them.

*Lilium concolor* flowers in the later part of the early season, about a week or ten days after *L. pumilum*.