NARCISSUS VIRIDIFLORUS

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Several years ago Jan de Graaff kindly sent the writer three small seedling bulbs of *Narcissus viridiflorus* Schousb. These were potted in a mixture of one part each of clayey loam soil, coarse sand and black carex peat. These plants were watered regularly and fertilized with Vigoro (at fortnightly intervals) from September through April, and

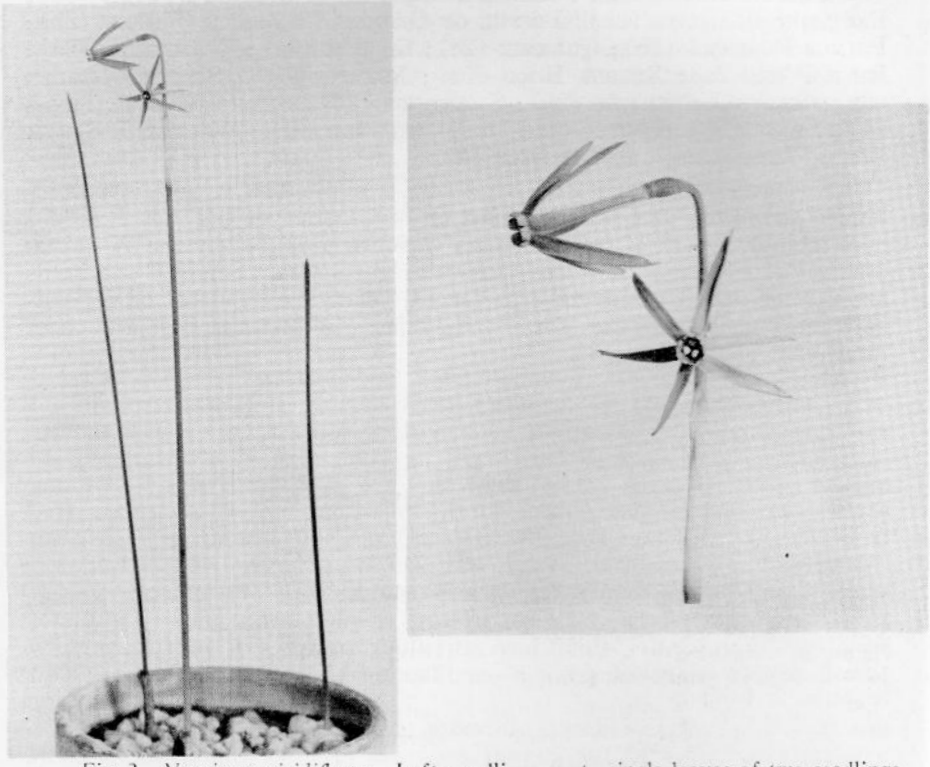

Fig. 3. *Narcissus viridiflorus.* Left, seedlings; note single leaves of two seedlings not in flower, and inflorescence of center seedling without a leaf. The top of this same inflorescence is shown in natural size to the right.

were kept entirely dry in the pot from May through August. The plants did not flower during the first two years but one bulb flowered in the fall of the third year as shown in Fig. 3. The following year all three bulbs flowered. The flowers are entirely green and give off a delightful fragrance that can be detected over a wide area. It is a very charming subject which should be more widely cultivated. In the Southwest, par-

ticularly in California, the species thrives out of doors and blooms regularly in the fall. Unfortunately, sufficient stock is not as yet available, but it is hoped that before long this deficiency will be corrected by the commercial growers.

It may be that this species can be used in breeding experiments. Such attempts will be started by the writer during the season 1953-1954. This may not be an easy project but is surely worth trying.

A report on *Narcissus rupicola*, *N. serotinus*, *N. cyclamenius*, *N. scaberulus*, *N. jonquilla* var. *henriquesii*, *N. bulbocodium* var. *nivalis*, *N. bulbocodium* var. *concolor*, *N. bulbocodium* subsp. *obesus*, *N. triandrus* var. *cernuus*, and *N. asturiensis* as grown under southern California conditions will be included in a later issue of HERBERTIA.

In the article that follows these notes, Mr. Hannibal discusses the subject of fall-flowering *Narcissus* species from the standpoint of breeding.

THE FALL FLOWERING NARCISSUS

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The Fall Flowering *Narcissus* have been known for many years, but their star of popularity is near nil since only a few collectors have seen or grown the plants. Yet they have no particular cultural problems if grown in large pots or well drained frost free beds containing a sandy-clay-loam mixture.

The writer became interested in the group some ten years back when it was suggested that they could possibly hybridize with the spring flowering Daffodils to produce a fall flowering type. Thus far little has been accomplished beyond propagating a quantity of these hard-to-locate bulbs. The hybridizing of fall daffodils is as remote as ever since genetic studies have indicated that the problem is far more complex than the layman would anticipate. Nevertheless the lack of results should not deter a discussion concerning the habits of these odd plants.

In 1858 Gay established the section *Autumnales* to the genus *Narcissus* L. in order to account for the fall flowering species that he knew: *Narcissus elegans* Spach., *N. serotinus* L., and *N. viridiflorus* Schousboe. This is a mechanical arrangement that is entirely satisfactory from a geographical or cultural standpoint, but there have been some minor variations in morphology that have caused the experts to disagree in a number of ways as to the validity of such an arrangement. The decision was finally settled through chromosome studies by Dr. Fernandes (1943) in Portugal. These studies will be touched upon later, but for the time being Gay's outline is very convenient.

Narcissus elegans Spach grows along the shores of the Mediterranean from Morocco to Tunis, and in some scattered areas about Sicily and Southern Italy. Rarely is it found more than a half score miles inland. In most instances the bulbs are located on limestone or clay hillsides where the soil is thin and well drained.

Growth begins in October with the first light rains. One or two leaves emerge a few days after the moisture reaches the bulb which is four or five inches down. The scape shows shortly after and often within a fortnight the bulbs will be in flower. *N. elegans* is considered a *Tazetta* and on seeing a cluster of blossoms one can readily recognize the relationship. The flowers are definitely such with long slender milk-white segments, a small cup varying from yellow-green to citron depending upon the age. Even the blossoms have the characteristic odor of the "Paper White" *Narcissus*. Usually the blossoms last several weeks and during this time the petals slowly reflex to take on a twisted appearance, making the flower appear as a child's small paper pinwheel. Then too the scape which may be three or four inches when the bud opens continues to grow until long after the flower fades, eventually reaching a length of 18 inches or more by the first of March.

This habit of scape elongation is not limited to *N. elegans* as it also occurs with the other two species, which are actually sometimes leafless. This point represents an interesting economy of foliage with a consolidation of functions where the scape either assists the leaves or replaces their function entirely depending upon the species. The combination of a shortage of moisture and very long growing period makes this possible.

Dr. Fernandes (1943) has pointed out that *N. elegans* has two subspecies: variety *intermedius* Gay having a larger diameter scape and being most closely a *Tazetta* whereas variety *fallax* F.Q. is of more recent origin. The chromosome number (20) is identical, but the pattern varies slightly.

Narcissus serotinus L. is a dwarf autumn species somewhat reminiscent of *N. elegans*. Its native range covers most of the shores of the Mediterranean from Gibralter to Egypt and Lebanon. Apparently it grows under a variety of soil conditions and rainfall. Tom Craig (1946) commented recently upon its erratic habits and flowering habits in French Morocco where the minute blossoms had the facility of appearing most everywhere, even in the middle of the army drill fields.

A single flower generally appears upon a leaf like scape. Leaves themselves rarely appear as the scape functions as a leaf. The wee flower is well shaped with nicely rounded petals about a proportionally large cup, but the parts are all so small that if the flower were placed face down on a 10 cent piece the perianth segments would barely cover the coin.

Narcissus viridiflorus Schousboe is also sometimes leafless, unless one considers the scape a leaf. The interesting features are the extreme reduction of all flower parts to the ultimate minimum and the introduction of green chlorophyll into the petals such that they too function as leaves. The small slender green-rayed flower, with its very small six-

segmented corona, is delightfully fragrant and will perfume an entire garden. It has the Jonquil odor 100%.

The natural range of this plant is very restricted, being found only about Gibralter and Tangiers, and usually in clay soils. However the writer has found it very adaptive to many localities in California. The segmentation of the corona into six small lobes has long puzzled botanists, who, not knowing that the *Jonquillae N. rupicola* was similarly lobed, considered this a unique primitive factor and went to some trouble to substantiate the relationship of *N. viridiflorus* to the other *Autumnales*. Dr. Fernandes (1943) has settled this difficulty. The chromosome patterns of *N. viridiflorus* and *N. jonquilla* L. are identical except that *N. viridiflorus* has double the number (28) of *N. jonquilla* L. (14). This may point to a close relationship and may indicate that *N. viridiflorus* with its high count is far from primitive.

It also appears that the cleft corona is not so rare either. A *N. schizocoronatus* bicolor (Meyer, 1936) hybrid has been isolated and bred with this cleft corona. The character does not appear particularly primitive or recessive.

To some, chromosome studies may appear confusing, but they can be a very useful tool. The established relationship of *N. viridiflorus* to the *Jonquillae* group gives a clew as to the most practical line of inter-species breeding to be taken. Namely that if viable seedlings are desired the Jonquil would be the most promising line of material to work with.

In turn *N. elegans* with its 20 chromosomes resembles the Tazetta patterns of 20 and 22 chromosomes and should cross with "Paper White" or one of the other few viable forms in the trade. It may be a waste of time to cross *N. elegants* with a trumpet daffodil, or Incomparabilis, as the Tazettas rarely take on these forms. It may, however, produce sterile hybrids with *N. triandrus* or *N. poeticus* species..

Narcissus serotinus has a chromosome count of 30 and its analysis is quite distinct from any other known *Narcissus* form. It probably represents an "orphan" group. Sterile hybrids, both natural and man-made, have been reported (4) between it and *N. viridiflorus*, so it is possible that it may breed with others of the *Jonquillae* group, and it may cross with other polyhybrid daffodils.

It appears that if the Fall flowering Narcissus have any potential values for breeding the combinations may be limited. Pollens can be stored for six weeks or more, but some tricky temperature controls are needed to advance or retard flowering dates to effect the crosses.

The culture of the species fall-flowering *Narcissus* is not difficult if conditions simulating their Mediterranean homeland are maintained. The most necessary item is a hot dry summer position where the bulbs bake for a long period. Soil temperatures of 90 or 100 degrees appear beneficial and will insure certain flowering. More than a mild frost may burn the foliage, but frosts of 18 degrees has not been serious. The major distinction is seed germination. Seeds of the *Autumnales* germinate as soon as the ripe seeds drop to the ground. This is a bit unusual

as all other Daffodils require that their seed remains dormant over the summer and be planted the following fall. Attempts to send fresh seed from Europe to South America disclosed that this aestivation was necessary, as the six months difference in seasons discouraged germination completely for fresh Daffodil seed.

The reclassification of *Narcissus* sections *Jonquillae, Autumnales,* and *Hermione:* Since Dr. Fernandes work on the species of *Narcissus* has been mentioned in the preceding article we present herein his recent reclassification as published in the Boletim da Sociedade Broteriana, Vol. 17, 2a series, P. 38 (1943).

Jonquillae DC. ap. Red.
N. scaberulus Henriq.
N. calcicola Mend.
N. rupicola Durf.
N. Watieri Marie
N. juncifolius Lag.
N. gaditanus Boiss. et Reut.
N. jonquilloides Willd.
N. viridiflorus Schousboe

Serotini Parl
N. serotinus Linn.
Hermione (Salisb.) Sprenger
a) *Autumnal* (Baker)
N. elegans Spach.
var. *intermedius* Gay
Var. *fallax* F. Q.
b) *Vernal* (Baker)
N. *tazetta* Linn.

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