



BULB LOG 03.....16th January 2013



Snow and the cold have returned halting all my work in the garden. The cold is also slowing down the flowering even more. I suspect that in a month or so the Narcissus that would have flowered over the last three months will eventually come into flower, just as the ones that always wait until spring also open, giving us a compressed but intense flowering season.

Apart from the snow nothing much has happened in the garden that I can share with you since last week so I have decided, as this is the Bulb Log, to look at what a bulb actually is. Like most people I tend to use the term 'bulb' loosely to cover most underground storage structures including bulbs, corms and tubers.





True bulbs like *Allium*, *Narcissus*, *Galanthus* etc are made up of a basal plate on which sits tightly wrapped modified leaf bases. They are so modified that the majority of them never grow above the ground but simply act as a food store. To help understand the structure of a true bulb I show a progression through celery with loosely clustered thick leaf bases rising from the basal plate, through leeks, where the leaf bases are much more tightly wrapped but still elongating to break through the ground to an onion which is in the form of the classic true bulb with tightly wrapped stem bases most of which are compressed and stay underground.



Narcissus bulbs showing the roots emerging from a ring around the edge of the basal plate. True bulbs like these are also perennial bulbs – that is they persist from year to year adding extra layers each year and when they are growing well, will split to form clonal offsets.



This section of a Narcissus bulb shows clearly how the offsetting/splitting works. As the bulb grows well additional buds form on the basal plate between the leaf bases called scales. The basal plate is a compressed stem and if you think of a normal shrubby plant stem with leaves emerging along its length from nodes in the leaf axils then imagine compressing that down to an almost flat disk that is what we are seeing here.



Here I have further dissected the bulb removing the small developing bulbs from the basal plate to illustrate them clearly. If left alone these would after a few more years of growth become big enough to separate of the parent bulb. On the left you can see that I have dissected one of these immature buds to show that it too has exactly the same layered structure.

The other notable feature these bulbs is that they make their flower buds for the following growing season before they go into their summer dormancy.

The picture below shows a bulb dissected in May showing that the flower is there complete with all its parts. Although I do not show it here the detail is complete, right down to anthers, ovary, embryo seeds, etc all in perfect miniature.

These buds are now ready to burst quickly into growth so they can flower, get fertilised and set seed all in the brief growing season of favourable conditions.

The fact that everything is formed within the bulb and just has to enlarge is why bulbs can come into flower so quickly.



Narcissus bulb showing the flower bud.



Fritillaria bulbs

The definition of a bulb is that it is made of modified, swollen, leaf bases and while the many layers are obvious in Narcissus etc they are less obvious in Fritillaria. There are many variations and fascinating forms of Fritillaria bulbs but the classic form, such as in *Fritillaria meleagris*, has typically two scales loosely joined at the base with a hole in the centre where the old flower stem came through. Above I have separated the two scales to show, on the

left side, the new shoot that contains next season's growth just above and to the side of the old now dried roots emerging from where the base of the old stem had been.. The other important fact to understand about Fritillaria bulbs is that they are annuals, only lasting one year. Every year a completely new bulb forms at the base of the new flower stem and the old bulb withers and dries as it passes on its food reserves to fuel the growth of the plant with any surplus being passed to help swell the new forming scales. If a Fritillaria bulb is mature enough and growing conditions are favourable another bud can develop on the second scale and so the plant will produce not only two stems but two new bulbs will form, one at the base of each stem.



Here I show a **Fritillaria bulb** with the new stem growing up from between the scales. In good growing conditions the plants growth will be sustained from the new roots at the base of the stem and these scales will pass all their reserves on to the new scales that will form but if there is insufficient moisture or food available the energy stored in the scales will go directly to support the plant growth. You will also see that this is one of the Fritillarias that



form many small bulbils that offer a great way to clonally increase your stock of the bulb.

Colchicums also have annual bulbs but have another variation on the form a bulb can take.

Colchicum bulbs

Colchicum bulb

You have to strip of the papery tunic of many bulbs to reveal their structure- I have done that here to show a colchicum bulb just coming into flower.

Like all true bulbs the bud, including the flower if the bulb is mature enough, is fully formed prior to the dormant period.

The first thing to notice that there is basically just a single scale and the bud forms at the side – in Colchicum there is a groove in the side of the scale to contain and help protect the growth bud.

The swollen area at the base of the stem where the roots are emerging is where the new bulb will form over the growing season.

The energy contained in the single large scale will first of all fuel the enlargement of the flower - this is why many Colchicum bulbs can produce a flower even though they are not planted - then as the roots develop they will take over and the remaining reserves will pass to the new bulb that will form in the course of the growth cycle.





Tulip bulbs

Tulip bulbs are much the same as Colchicums with the shoot emerging from the side of the bulb which again is usually seen as a single large scale - the dried remains of last season's growth can be seen in the picture above.



Sometimes, often due to lack of moisture during critical growth stages the bulbs can split into multiple scales as you can see above these will take around three years of good growth to reach flowering size.

Crocus corm



The other common type of 'bulb' we encounter are corms - unlike true bulbs, which are made from modified leaf bases, corms are made from compressed stems. Imagine you took a plant stem and squashed it down that is what a corm is.

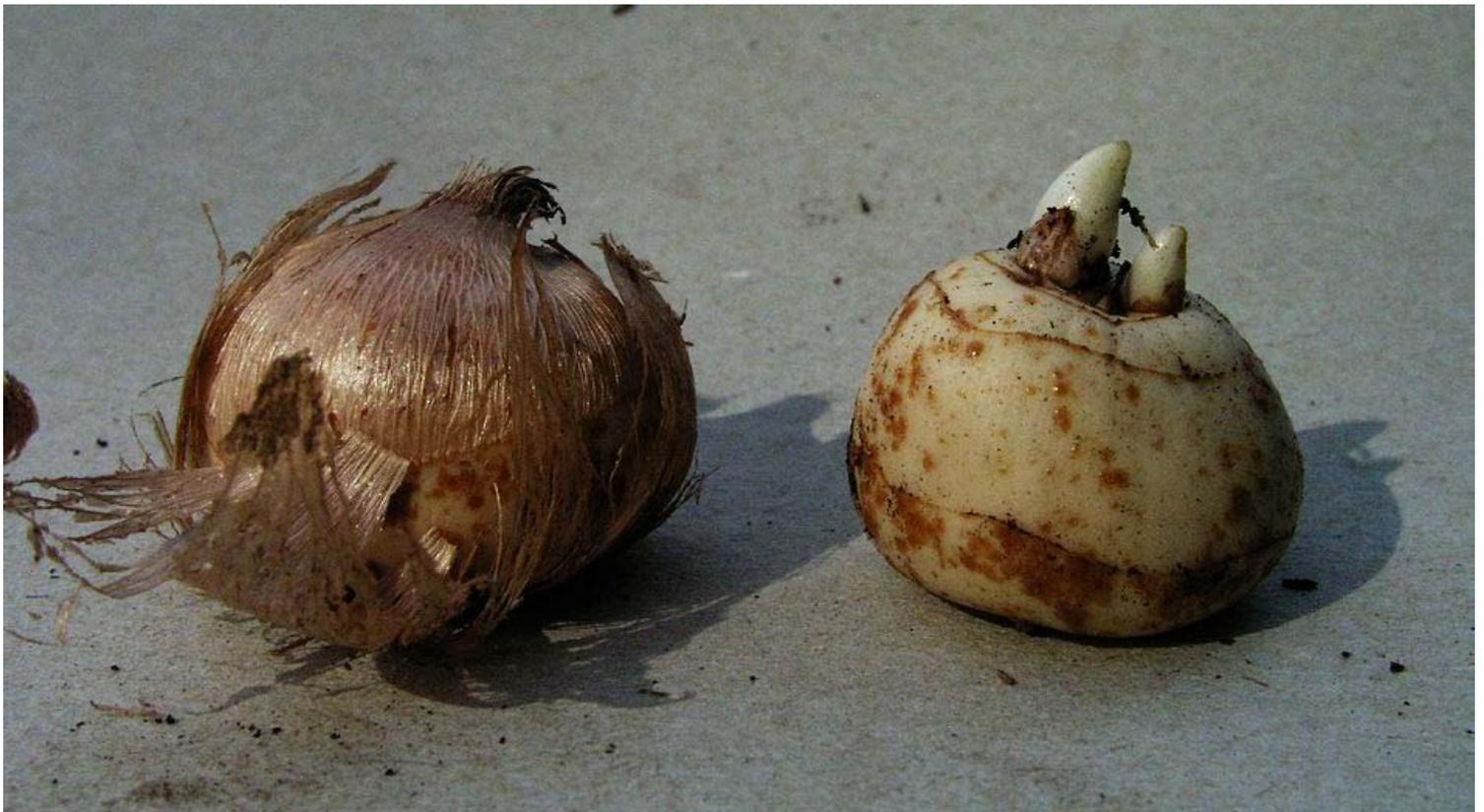
They are all annual with a new corm forming on top of the old one - at the base of the growth shoot.



The roots come out of the bottom of the corm and the main shoot comes from the top of the stem but, just as on a regular plant stem, secondary shoots can appear from anywhere on the stem. The scar you can see on the base of the corm on the right is where I removed the dried remains of the last season's corm.



Some species such as **Crocus nudiflorus**, shown above, regularly produce extra shoots that move out horizontally forming a new small cormlet some distance from the main corm.



Crocus corms

Corms also have tunics that surround and protect the plant and in Crocus the structure of these tunics form a major diagnostic device used to differentiate between the species. I have had to remove the tunics from these corms to expose the underlying structures but if left alone new corms form within the protective layers of previous year's tunics.

When growing strongly some corms will produce two shoots on the top, above right, and a new corm will form at the base of each stem resulting in extra corms.



I have stripped away the tunics to reveal the growth on this corm just as it starts to go into its summer rest and it illustrates all I have said above. The old roots are emerging from the remains of last season's corm and both these structures will pass their reserves on to the new corms. Looking from the top you can see that the corm produced three growth shoots during the season and a new corm has formed at the base of each resulting in one flower sized corm and two that should attain flowering size after a further year's growth.



Erythronium 'bulb'

The term bulb, corm, tuber, etc are names applied by humankind as we try to classify and put order into the plant world. As we can see from our attempts to classify the species, plants do not follow our rules and so it is with the terms we apply to different types of bulb structures. A corm is a swollen stem and a bulb consists of swollen modified leaf bases sitting on a basal plate which is a compressed stem so - what should we call an Erythronium? It is an annual structure lasting only one season with a substantial amount of compressed stem (corm?) but the shoot is surrounded by modified leaves (bulb?) so what should we call it? My research through the literature found it called both a corm and a bulb. In my view it has a foot in both camps and shows that plants do not always make it easy to draw clear boundaries between either the different species or in the type of structure. My conclusion and using the definition that it has modified leaf bases, I favour calling it a bulb. I will look at tubers, rhizomes, etc in a future bulb log.



As my parting shot for this week here is how the same Hamamelis that I have shown for the last two weeks looks today.....

