Cobra Lily, *Arisaema consanguineum*

Incarceration, liberation and sex change in *Arisaema*

Peter Williams

One of the enduring joys of gardening is the fascination that results from accidentally stumbling across a 'new' plant group that one goes on to grow, study and love. My current infatuation is with the genus *Arisaema*.

My first plant was an unexpected gift from a gardening friend who suggested that arisaemas might go well in my woodland garden. It was labelled *Arisaema consanguineum* – Cobra Lily. I recognised the plant's name and could probably have picked it out from a set of photographs in a multiple-choice question, but I knew virtually nothing about it except that it might be distantly related to our native Lords and Ladies (*Arum maculatum*). I did know that in this family the flowers are arranged on a swollen stem, known as a spadix, and hidden from view by a curved, leaf-like bract or spathe. I also knew that our native Lords and Ladies presented an ecological mystery because some plants are covered with dark spots and others are not. The mystery concerns the possible value of the spots and the reason why populations in the south of Britain are

heavily spotted, and those in the north are essentially unspotted.

I put my new alien arisaema into that part of my polytunnel where I store impulse buys and other plants I don't immediately know where to plant. I really do intend to plant them in the garden very soon, but invariably they languish in the tunnel for weeks or even years. I realise that this really amounts to plant purgatory – a prison sentence with no planned parole that results, all too often, in serious neglect and death in custody.

During this plant's incarceration, I noticed that it produced a large single leaf each year – I thought that this was interesting, but not so interesting that I was motivated to do anything with it. However, I must have become subconsciously attracted to the family because early one spring I bought another couple of plants of the same species at a specialist plant fair. Again, I did little with the new plants apart from putting them in 'jail' along with the first specimen, and I certainly did not consider planting them out straight away.

Later that year the first flowers appeared on my original captive plant and on one of the newly purchased specimens. When I saw the flower heads I immediately thought that these exotic, cobra-like beauties, would look wonderful planted near some ferns and a large *Podophyllum* 'Spotty Dotty' in a shady part of the garden. All three were immediately released from captivity. Sometimes you can sense that plants are 'overjoyed' to gain their freedom and are exactly suited to their new environment and this was certainly the case with my arisaemas. Their leaf and stem colours became much brighter and straightaway they looked well and totally at home. Their flowers lasted for about three weeks, then faded before the plants collapsed in autumn. The following late spring, the plants emerged through the leaf litter like missiles from their bunkers! (fig. 2). They grew rapidly and reached a far greater size than in previous years and all flowered. I was delighted with how they looked in the garden and I became excited when the fading flowerhead of one of the plants started to swell, indicating that pollination had occurred and seeds could be expected. The fruits were bright green and very reptilian looking at first (figs 3a & b), and by November were turning red. At Christmas, the plant had totally collapsed and the bright scarlet fruit, completely ripened, was lying on fallen leaves (fig. 4).

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Obviously I had to try to grow the seeds and a quick internet search revealed that they should be removed from the scarlet fruits, washed to remove a germination inhibitor (fig. 5), and could then be sown immediately without cold stratification. I ignored this last piece of advice because I routinely stratify many woodland species and acer seeds. I mixed the seeds with moist peat, put them into a small polythene bag and stored it in the salad drawer of our refrigerator for two months. I did, however, take note of the warning that the fruit contains crystals of oxalic acid that can be a skin irritant, so I wore teflon gloves for the extraction.

Each fruit contained between one and three white seeds and I sowed half of the hundred or so seeds in a standard seed tray in late February. Germination began in mid-March and the germination rate was very high. The young plants were composed of just a single entire leaf (fig. 6) that, after a few weeks' growth, became pale green and looked unhealthy. I thought at first that the seedlings were suffering from nutrient deficiency or a fungal disease, but fertilizer additions and fungicide applications had no effect, and the leaves died over the next few weeks. I kept the seed tray under the glasshouse bench and the following May, seedlings re-emerged with trifoliate leaves. I then realised that the newly germinated seedlings of *Arisaema consanguineum* naturally have only a very short growing season and yellowing and death of the first leaf after just a few weeks of growth is quite natural.


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After a couple of years in a cold glasshouse, the young plants were transferred to the garden, where they thrived and started flowering two years later. In subsequent years, I tried sowing without stratification and the advice was indeed correct: stratification is not needed.

I started to read about the genus and the feature that fascinated me most was the ability of many to change sex on a frequent basis. When plants flower for the first time, all the flowers on the spadix are male, producing only pollen. This is usually repeated for another season or two, then the following year all the flowers are female. As each plant produces only one leaf and one flower stem each year, effectively it has changed its gender.

The structures of male and female flowers look very similar externally (fig. 7), except for the fact that the male has a small opening at the base of the spathe (fig. 8) to allow pollinating insects to escape and possibly enter a female flower. If the female flowers are pollinated, a large fruit is produced. The year following fruit production, the plant usually flips sex again and becomes male for one or more years before becoming female again.

This remarkable behaviour is thought to relate to resource allocation in the breeding populations and simply shows that being female is expensive! The female plant is so depleted of resources after seed production that it usually cannot repeat the act the following year and reverts to being an 'inexpensive' male. In effect, this is essentially the same type of behaviour that we are familiar with in less exotic plants. Thus, many apple varieties, but especially the large-fruited types such as Bramley's Seedling, frequently become biennial bearers.

After a heavy crop, the tree needs a year to recover before cropping well again. This pattern is even more exaggerated in trees such as beech (*Fagus sylvatica*) and oak (*Quercus* species), where a heavy seed crop, or mast, occurs only every ten or so years. The depleting effect of a mast year is apparent from the width of the annual growth rings that are very narrow in, and following, mast years. This strategy also has great survival value for the tree, because in a mast year the amount of seed produced is far greater than can be eaten by the resident rodent population, allowing some seeds to escape predation and become established as young trees.

The sex-change strategy in *Arisaema* is quite unusual; ecological studies have shown that in natural populations the ratio between males and females varies but is about 6:1, which ensures that there is a high probability of cross pollination and the population is genetically diverse. Plants from my first seed crop are still at the babes or boys stage (so far they have not flowered, or they have produced only male flowers), but perhaps this year some will begin to show their feminine side.

Peter Williams notes that while gender inequality causes problems in human society, arisaemas have no such problems.