

## Arum Maculatum: It's all about sex

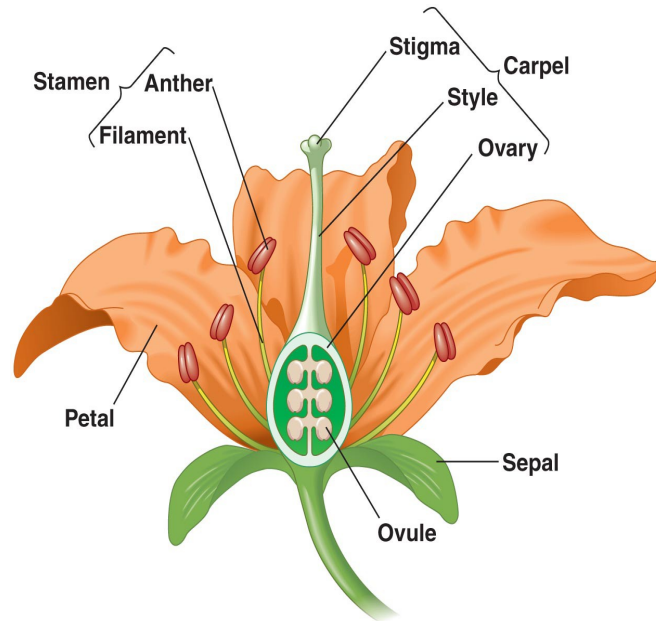
Sex is the invention of nature to guarantee a broad genetic variation, so that in case of changing environmental conditions organisms are able to react and to adapt.

Sex in plants - boring????

Today you'll get to know an example of how a plant makes itself attractive to its pollinators. Pollination? Pollinators? What was that again?

Let's get back to the bees and the flowers.

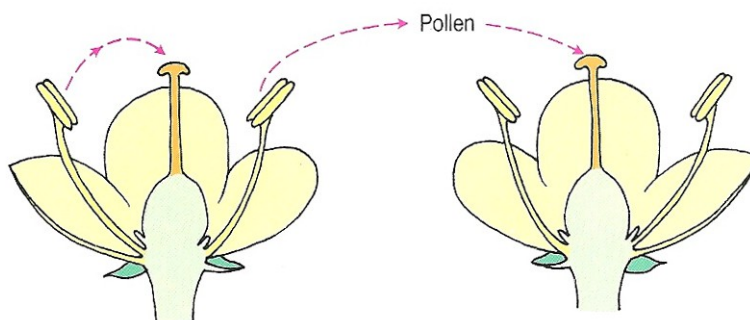
Reproductive organs in flowering plants:



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Pollination is the transfer of pollen (containing the male sex cells) produced in the anthers onto a stigma of a flower.

### Pollination:



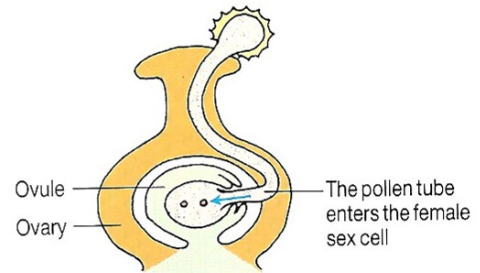
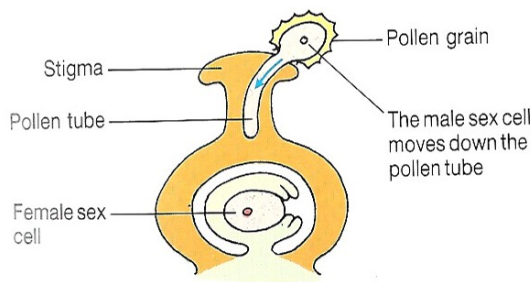
Pollen may be carried to a stigma in the *same* flower. This is called **self-pollination**.

Or pollen may be carried to a stigma in another flower. This is called **cross-pollination**.

The female sex cell is placed inside the ovule in the ovary and for fertilization to take place a tiny tube has to grow from the pollen to transport the male sex cells to the female sex cells. When male and female sex cell have fused (voilà!) fertilization occurs and from the

fertilized egg cell a new embryo can grow inside the ovary of flowering plants.

**Fertilization:**



1 First a tube grows out of the pollen grain. It grows towards the female sex cell. A male sex cell moves down the tube.

2 The tube enters the female sex cell. The tip of the tube bursts open. The male sex cell joins up with the female sex cell. The ovule then becomes a **seed**. The ovary becomes a **fruit** with the seed inside it. The petals die and drop off.

So pollination is important before fertilization can occur.

In some flowers you have female and male parts joined in one single flower as in the picture above, in others female and male flowers exist separately like in our example of *Arum maculatum*. Pollen from one plant has to be transported to other plants of the same species. This is sometimes done by wind (wind-pollinated plants) sometimes by insects (insect-pollinated plants).

Many insect-pollinated plants have specialized on certain pollinators and have evolved mechanisms to attract their pollinators and at the same time pollinators have adapted to these plants in the course of evolution. This process is called co-evolution.

The plant you are going to study is an example of such a co-evolution with pollinators.

**Material:** pooter, inflorescences of *Arum maculatum*, razor blades, brushes, petri dishes, stereomagnifier, identification key insects

Fig. 1

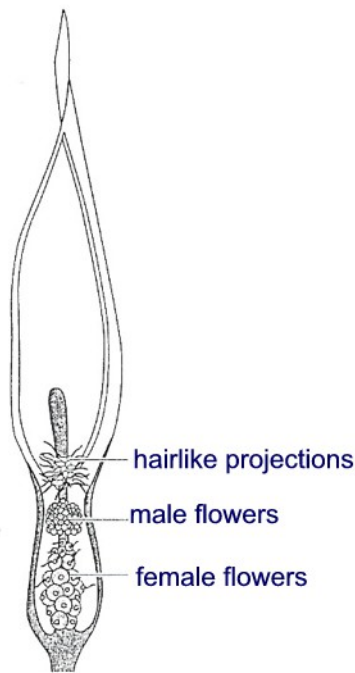


1. Take one inflorescence of *Arum maculatum* (cuckoopint or Lords-and-ladies) and identify the parts you can see in fig.1.

2. Smell the flower/ the spadix. What does this flower smell like?

3. Open the closed part of the spathe and check if any pollinators are present. Capture them with the help of a pooter. And try to identify which group of animals they belong to.

fig. 2.



4. Identify the structures that you can see in figure 2. Use the stereomagnifier.

5. Touch the inside of the spathe. What does it feel like?

Information: In the spadix of the inflorescence of Arum starch is broken down by cellular respiration. In this process heat is produced so that the spadix and the inside of the spathe heat up in relation to their environment.

This has two effects:

Chemicals smelling of carrion (rotting dead animals) diffuse into the surrounding and attract flies and midges.

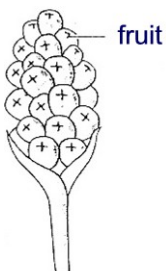
Secondly the warm inside of the spathe is attractive as nights in spring can be quite cold.

The inside of the spathe is extremely smooth and slippery as it is covered with a film of oil. Animals having slipped in to the bottom cannot move out again as the way back is blocked by

hairlike projections at the top of the spadix. The female flowers at the bottom are pollinated with pollen the insects are carrying. The male flowers that mature later transfer their pollen to the insects. Then the hairlike projections at the top wither and the pollinators can get free and the process can be repeated in the next flower.

So if pollination and fertilization is successful Arum maculatum will have red berries in autumn:

fig. 3



So making yourself attractive for a partner think of Arum maculatum and make sure you use a different fragrance!