

# MENDEL'S PEAS.

## THE QUESTIONS.

HOW MANY KINDS? ————— A

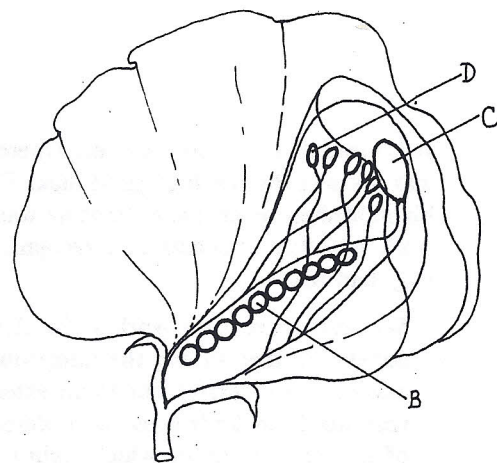
HOW MANY OF EACH? —————

PEA BLOSSOM.

OVULE.

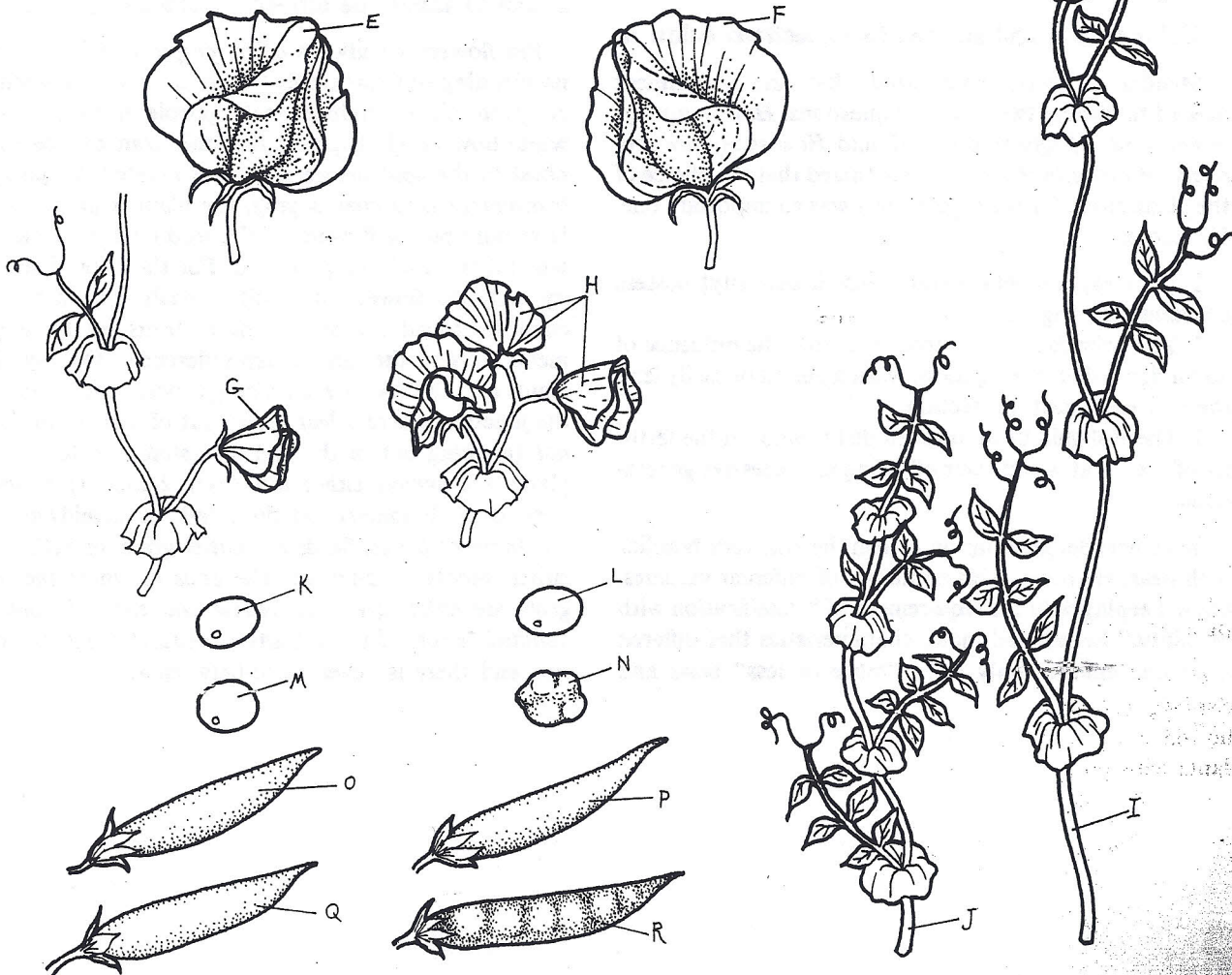
STIGMA.

ANTHER.



## PEA PLANT CHARACTERISTICS.

FLOWER★	PURPLE <sub>E</sub>	WHITE <sub>F</sub>
	AXIAL <sub>G</sub>	TERMINAL <sub>H</sub>
HEIGHT★	TALL	DWARF,
SEED★	YELLOW <sub>K</sub>	GREEN <sub>L</sub>
	ROUND <sub>M</sub>	ANGULAR <sub>N</sub>
POD★	GREEN <sub>O</sub>	YELLOW <sub>P</sub>
	INFLATED <sub>Q</sub>	WRINKLED <sub>R</sub>



# MENDEL'S PEAS

It is clear that Mendel's success where others had failed was not just the result of good luck. The introduction to his published report shows that he was familiar with the work of other scientists and recognized what mistakes they had made:

Whoever surveys the work in this field will come to the conviction that among the numerous experiments not one has been carried out to an extent or in a manner that would make it possible to determine the number of different forms in which hybrid offspring appear, permit classification of these forms in each generation with certainty, and ascertain their numerical relationships.

In this paragraph we see Mendel performing what many great scientists have emphasized is the most important step in a scientific investigation: making a clear statement of the experimental question. He didn't phrase it as a question, with a question mark at the end, but he did state exactly what answers his experiment should provide.

**Color title A and the two questions below it.**

Mendel correctly recognized that the experiment needed to answer two essential questions: *How many different kinds of offspring result?* and *How many are produced of each kind?* He also recognized that the choice of the plant group for the experiments was an important one. He wrote:

1. [The experimental plants must necessarily] possess constant differing traits.
2. The hybrids must be protected from the influence of all foreign pollen during the flowering period or easily lend themselves to such protection.
3. There should be no marked disturbance in the fertility of the hybrids and their offspring in successive generations.

Since Mendel grew up on a farm, he was very familiar with peas. He began with a number of different varieties, but in keeping with his requirement of "classification with certainty," he rejected many characteristics that differed from one another only on a "more or less" basis and

settled on seven pairs of traits that always showed up as either one thing or the other.

**Color the heading Pea Blossom and titles and structures B, C, and D.**

Mendel knew that peas had a flower structure that inhibited cross-pollination. As the illustration shows, the reproductive parts of the pea flower are completely enclosed by the petals. Before the flower even opens, the *anthers* burst and dust pollen all over the *stigma*. Thus unless an insect (or a scientist) interferes, self-pollination is virtually certain.

**Color the heading Pea Plant Characteristics and each successive heading and pair of titles and structures as they are mentioned in the text. Choose contrasting colors for each pair wherever possible. Use light purple for E and white or some very light color for F. K and P should be different shades of yellow; L and O should be different shades of green.**

Pea flowers are always either *purple* or *white*; there is no blending of those traits, which are clearly hereditary. A given plant produces only purple flowers or only white flowers. (It happens that this trait can be recognized in the seed before it is even planted. If the semi-transparent seed coat is gray, the plant it produces will have only purple flowers. If the seed coat is white, only white flowers will be produced. For the sake of simplicity, only the flower color will be dealt with in this discussion.) Mendel chose the other traits for his experiments to have the same sharp differences. On any given plant, all the flowers are *axial* (growing out of the axil, the junction where a leaf grows out of a stem) or *terminal* (growing out of the end of a stem). In height, pea plants are always either *tall* (over 2 meters) or *dwarf* (less than 1 meter). Medium-tall or semidwarf pea plants never occur. Seeds are either *green* or *yellow* and either *smooth* or *angular*. The pods in which the seeds grow are either *green* or *yellow* and either *inflated* or *deflated*. Each of these traits is distinct from its opposite, and there is never an in-between state.