

I. 次の英文を読み，以下の問①～④に答えよ

The Mystery of Mendel's Pea Genetics Solved

More than 160 years ago, the monk Gregor Mendel meticulously studied seven traits of peas (*Pisum sativum*), including the shape and color of seeds and pods, and achieved groundbreaking research on genetic inheritance (1). In a paper published in *Nature* on April 23, the genes responsible for the last three pea traits of the seven traits were identified.

Mendel, a citizen scientist, is famous for conducting a series of experiments in the mid-19th century in which he crossed about 28,000 pea plants to determine how traits were passed

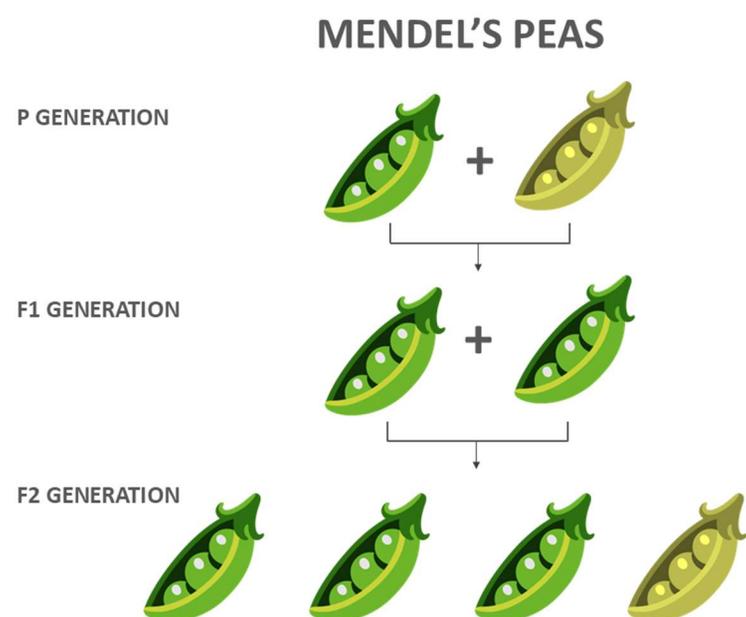
on to future generations. Although the concept of genes did not yet exist at that time, Mendel concluded that plants pass on genetic "factors" to their offspring that determine whether the offspring inherit "dominant" or "recessive" genes (alleles).

Scientists continue to study Mendelian traits today. The first Mendelian trait to be linked to a gene was seed shape. Some pea varieties wrinkle when dried and taste sweet when eaten raw. Mendel showed that those seeds carry a recessive "wrinkled" gene. Peas with a dominant "round" gene remain smooth when dried, are less sweet, and are often used in soups and animal feed (2). In 1990, a gene was identified that codes for an enzyme that converts sugars into starch. The dominant gene packs the seeds with starch, keeping them smooth, while the recessive gene makes an inactive enzyme, leaving the seeds with more sugar. Scientists then discovered the genes responsible for three traits: plant height, and flower and seed color.

Further progress was slowed by the pea's large genome size and the focus on higher-profile crops like wheat, corn, and rice. But as sequencing costs fall, that's changing. In recent years, sequencing and computational tools have advanced enough to tackle genes, and researchers are gradually mapping these traits to DNA sequences.

This work may herald a new era in pea genomics research. The pea protein market is one of the fastest growing alternative protein sources, and a genome map with a rich set of markers will help breeders develop new techniques to build on Mendel's legacy.

引用元： <https://www.jircas.go.jp/en/program/proc/blog/20250502> より一部抜粋



受験番号： _____

① 下線部(1)を和訳せよ [20点]

② 下線部(2)を和訳せよ [20点]

③ 以下の説明の内容が正しいものには○、誤っているものに×をつけなさい。(20点)

メンデルが発見した遺伝の法則に用いられた7つの形質に關与する遺伝子はすべて解明された ()

メンデルの時代には、遺伝子という概念はすでに存在していた ()

最初に遺伝子と關連付けられたメンデルの形質は種子の形だった ()

エンドウの遺伝子研究は、ゲノムサイズが大きく、注目度が高いために進んでいた ()

II. 受験者の卒業研究の要旨あるいは修士課程における研究計画のいずれかについて、20語以上の単語を用いて英文にて示せ [40点]