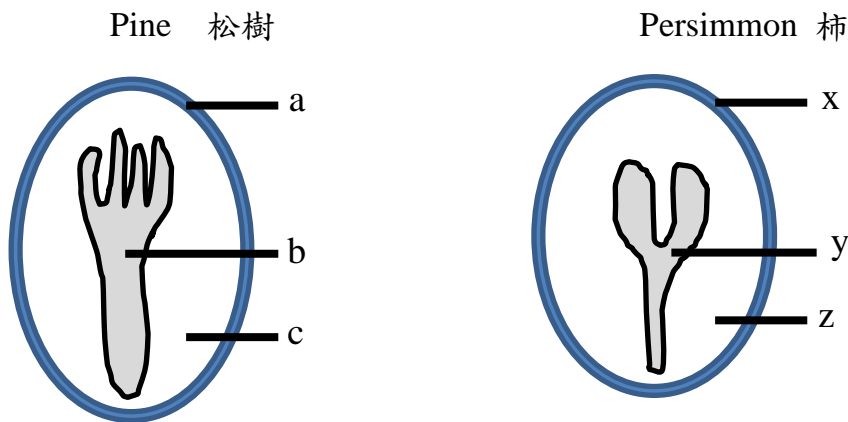


104 生物教甄筆試 測驗題 試題及參考答案

一、請以中文寫出下列 6 個問題的答案與詳解。(註:詳解正確時,才給分)(每小題 5 分,共 30 分)

1. The figures below show the inner structures of pine and persimmon seeds.



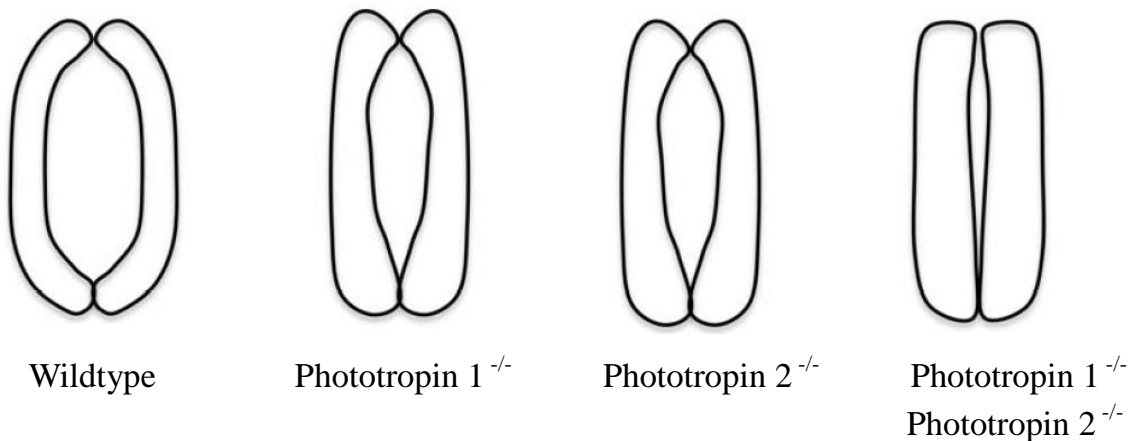
Which of the following statements are correct ?

- (A) Structures a and b are the same in ploidy, but they differ in genetic composition.
- (B) Structures a, b, and c consist of two different sporophytic structures and one gametophytic structure.
- (C) Structures x and y are the same in both ploidy and genetic composition.
- (D) Structure z is three-times higher in ploidy than structure c.
- (E) Structures a and x are both surrounded by the ovary.

Ans:ABD。

詳解(略)

2. Dr. Wang carried out experiments with the model organism *Arabidopsis thaliana*, and identified the two proteins Phototropin 1 and Phototropin 2 as regulators of stomata opening. His experimental results are depicted in the following figure, illustrating the stomata of plants during the day.



Which of the following processes could be regulated and/or mediated by Phototropin 1 and Phototropin 2 ?

- (A) K^+ ion efflux (B) K^+ ion influx (C) Na^+ ion influx (D) H_2O efflux
- (E) H^+ -ATPase activity (F) Blue light sensing

Ans:BEF。

詳解(略)

3. Select the chemical property that is shared by all types of lipids forming the plasma membrane.

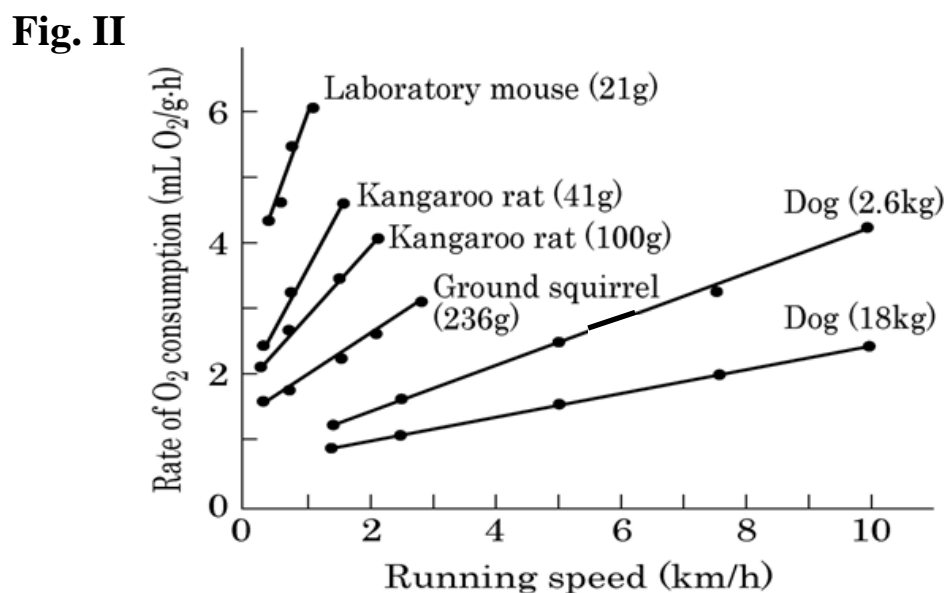
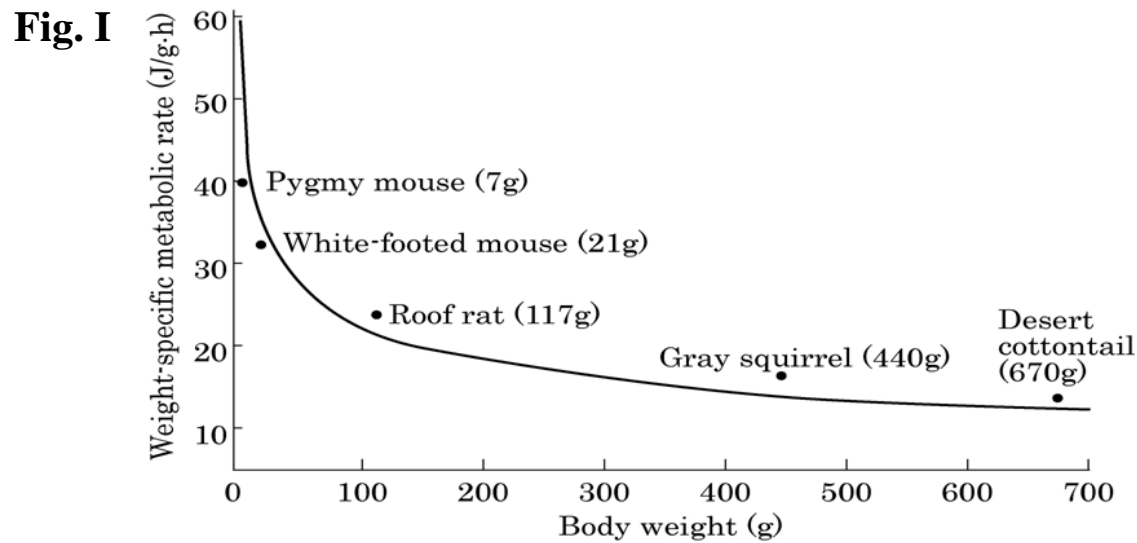
- (A) Polar head (B) Sugar component (C) Glycerol backbone (D) Phosphate group (E) Hydrophobic

region ◦

Ans:E ◦

詳解(略)

4. Fig. I shows the relationship between weight and the specific metabolic rate of the indicated animal species, and Fig. II shows the O_2 consumption rate of the indicated species as a function of running speed (on a treadmill machine).



Which of the following explanations are correct ?

- (A) At rest, smaller animals consume more energy per weight than the bigger animals consume.
- (B) Using the same amount of food per body weight, a smaller animal can travel a longer distance than a bigger animal can travel.
- (C) Using the same amount of food, bigger animals generate more ATP than the smaller ones generate.

Ans:AC ◦

詳解(略)

5. There are two types of bird hatchlings: precocial and altricial. In general, precocial birds are covered with feathers when they hatch, and can find their own food with the help from their mothers. In

contrast, altricial hatchlings require feeding and caring for from the parents. Based on this, which of the following statements are correct ?

- (A) Precocial hatchlings usually take longer to hatch than altricial hatchlings.
- (B) Altricial hatchlings usually develop imprinting earlier than precocial hatchlings.
- (C) Parents invest more in precocial hatchlings than in altricial hatchlings during nestling period.
- (D) For a group of young birds that hatch at the same time, altricial hatchlings tend to develop the ability to move earlier than precocial hatchlings.
- (E) Parents of precocial and altricial hatchlings have the same level of investment in reproduction during the breeding season.

Ans:AE。

詳解(略)

6. Two enzymes X and Y form a biochemical pathway that converts substance A into substance C via an intermediate substance B. In order to infer on which human chromosomes genes Xh and Yh are located, Mr. Lin generated mouse/human hybrid cell lines. These cell lines contain all mouse chromosomes and a few human chromosomes, as shown in Table 1. Prior to the experiment, a non-sense mutation was induced at the beginning of the mouse gene Ym. Mr. Lin used specific antibodies to test if human enzyme Xh is produced in each cell line (Table 2). In addition, Mr. Lin added substance A to the cell cultures and, after some time, used colorimetric assays to determine which of the substances A, B or C is present (Table 2). On which human chromosome is Gene Yh located ?

Table 1

Cell line	Human Chromosomes							
	1	2	3	4	5	6	7	8
a	+	-	+	-	+	+	-	-
b	+	+	-	-	-	-	-	+
c	+	+	-	+	+	-	+	+
d	-	+	+	+	-	+	-	+

Table 2

Cell line	Production of Xh	Substance present
a	+	C
b	-	B
c	-	C
d	+	B

Ans:染色體 5 號。

詳解(略)