

## 2025 BBO PAPER 1

### Question 1

Problem 1. All other things being equal, plants grow quicker when CO<sub>2</sub> levels increase because...

问题 1: 在其他条件相同的情况下, CO<sub>2</sub> 浓度升高会导致植物生长速度加快, 原因是.....

A. they use CO<sub>2</sub> to respire.

植物利用 CO<sub>2</sub> 进行呼吸。

B. CO<sub>2</sub> is needed to split water.

分解水需要 CO<sub>2</sub>。

C. RUBISCO has a low affinity (weak binding) for CO<sub>2</sub>.

核酮糖-1,5-二磷酸羧化酶/加氧酶 (RUBISCO) 对 CO<sub>2</sub> 的亲和力低 (结合能力弱)。

D. CO<sub>2</sub> is needed to make proteins.

合成蛋白质需要 CO<sub>2</sub>。

E. CO<sub>2</sub> poisons herbivorous animals.

CO<sub>2</sub> 对食草动物有毒害作用。

### Question 2

Problem 2. Kidneys reabsorb ~99% of the fluid they initially filter because...

问题 2: 肾脏会重吸收其最初过滤的约 99% 的液体, 原因是.....

A. Animals usually store excess water in their blood so they can eat more salty food.

动物通常会在血液中储存多余的水分, 以便能够摄入更多高盐食物。

B. animals' blood osmolarity can change a lot, so a large amount of water needs absorbing to balance it.

动物血液的渗透压变化较大, 因此需要吸收大量水分来维持平衡。

C. although they only filter a small volume per minute, animals are extremely sensitive to changes in blood volume.

尽管肾脏每分钟仅过滤少量液体, 但动物对血容量的变化极为敏感。

D. although animals can tolerate large changes in blood volume, the kidneys filter a very large volume per minute.

尽管动物能够耐受血容量的较大变化, 但肾脏每分钟过滤的液体量却非常大。

E. animals need to preserve water for sweat.

动物需要保存水分以用于排汗。

### Question 3

Problem 3. When does DNA need to uncoil (unpair bases)?

问题 3: DNA 在什么情况下需要解旋 (解开碱基配对)?

A. So it can be replicated.

DNA 需要复制时。

B. So it can be transcribed.

DNA 需要转录时。

C. So transcription factors can read the sequence and find the correct binding site.

转录因子需要读取序列并找到正确结合位点时。

D. So transcription factors can read epigenetic marks.

转录因子需要读取表观遗传标记时。

E. So crossing over can happen.

发生染色体交叉互换时。

F. So mistakes/damage can be repaired.

需要修复错误或损伤时。

## Question 4

**Problem 4.** What adaptations do mature human red blood cells have?

**问题 4:** 成熟的人类红细胞具有哪些适应性特征?

A. Small size so they can be filtered in the kidneys.

尺寸小, 可以在肾脏中过滤。

B. Untethered cell membrane which can roll along blood vessel walls like tank tracks.

细胞膜无束缚, 可像坦克履带一样沿血管壁滚动。

C. Strong cell wall to resist forces of flowing blood.

细胞壁坚固, 可抵抗血流的力量。

D. Enlarged nucleus so they can express more gene products.

细胞核增大, 以便表达更多的基因产物。

E. Rigid sickle shape so they are not squashed and bent by the forces of flowing blood.

呈刚性强刀状, 不会被血液的力量压扁或弯曲。

F. Lots of iron complexed within protein giving it a finely-tuned oxygen affinity.

红细胞内的血红蛋白含有大量铁元素, 使其具有精准调控的氧亲和力。

## Question 5

**Problem 5.** Put these in order of length (number of monomers in chain) from shortest at the top, to longest at the bottom. Assume a typical human example.

**问题 5:** 请将下列选项按长度 (链中单体数量) 由短到长的顺序排列, 最短的排在最上面, 最长的排在最下面。以一个典型人类为例。

Genome 基因组

Chromosome 染色体

Gene 基因

Primary / early RNA transcript 初级/早期 RNA 转录本

mature mRNA 成熟 mRNA

Codon 密码子

Protein 蛋白质

Regulatory elements influencing expression 影响表达的调控元件

Exon / coding sequence 外显子/编码序列

mature mRNA 成熟 mRNA

## Question 6

**Problem 6.** Trace the journey of an oxygen atom through a plant, from when it enters as water (place at the top), to when it leaves (place at the bottom).

**问题 6:** 追踪一个氧原子在植物体内的迁移路径, 即它以水的形式进入 (植物顶端) 到离开 (植物底端) 的全部路径。

需排序的选项:

Transpiration 蒸腾作用

Root hair cell 根毛细胞

Chloroplast 叶绿体

Leaf parenchyma cell 叶肉细胞

Active transport into xylem vessel 主动转运进入木质部导管

Diffusion into inter-cellular space 扩散至细胞间隙

Photosystem II 光系统 II

Stomata 气孔

## Question 7

### Lord Howe Island Stick Insects (Tree Lobsters) 豪勋爵岛竹节虫 (树龙虾)

**Background 背景:** Lord Howe Island, off the coast of Australia, was home to gigantic stick insects nicknamed "tree lobsters." In 1920, a shipwreck introduced invasive rats that ate all the tree lobsters on the island. In 2001, biologists found 24 surviving individuals on Ball's Pyramid, a nearby sea stack. Two breeding pairs were captured in 2003, and by 2023, thousands were bred in captivity. Plans now aim to eradicate rats and reintroduce the species. 澳大利亚豪勋爵岛曾是巨型竹节虫（俗称“树龙虾”）的栖息地。1920年，一艘失事船只将老鼠带入岛上，导致树龙虾灭绝。2001年，生物学家在附近的柏尔金字塔发现24只幸存个体。2003年，两对繁殖个体被捕获，到2023年人工繁育数量已达数千只。目前计划消灭老鼠并重新引入该物种。

**Questions 问题 (Mark TRUE or FALSE 判断正误):**

7. **Suffered from more intense competition. / 面临了更激烈的竞争。**

(A) TRUE 正确

(B) FALSE 错误

**Gained genetic diversity. / 获得了遗传多样性。**

(A) TRUE 正确

(B) FALSE 错误

**Suffered a population bottleneck. / 遭遇了种群瓶颈。**

(A) TRUE 正确

(B) FALSE 错误

**Suffered from more intense predation. / 遭受了更强烈的捕食压力。**

(A) TRUE 正确

(B) FALSE 错误

**Suffered because of the niche exclusion principle. / 因生态位排斥原则而遭受损失。**

(A) TRUE 正确

(B) FALSE 错误

**Experienced weaker genetic drift. / 经历了更弱的遗传漂变。**

(A) TRUE 正确

(B) FALSE 错误

**Experienced stronger positive/directional natural selection. / 经历了更强的正向/定向自然选择。**

(A) TRUE 正确

(B) FALSE 错误

**Likely lost fitness (even in the absence of rats).** / 可能丧失了适应能力（即使在没有老鼠的情况下）。

- (A) TRUE 正确
- (B) FALSE 错误

**Now the species is (temporarily) safe, more pairs should be captured from Ball's Pyramid for the reintroduction programme.** / 该物种现已（暂时）安全，应从柏尔金字塔捕获更多繁殖对用于重新引入计划。

- (A) TRUE 正确
- (B) FALSE 错误

### Question 8

The Big Butterfly Count takes place each July in the UK. Any member of the public can sit outside in one place for 15 minutes and upload the number of butterflies they see. In 2024, >85,000 people took part, submitting >140,000 counts. The results for 2024 were catastrophic with the lowest number of butterflies spotted in the survey's history.

英国每年七月会开展大蝴蝶普查活动。公众可在户外选定一处，坐下观察15分钟，并上传所见蝴蝶的数量。2024年，逾8.5万人参与其中，提交了超14万份统计数据。结果显示，2024年观测到的蝴蝶数量创历史新低，情况十分严峻。

Species	Abundance	Average per count	14-year trend
Gatekeeper	190,413	1.5	-31.82
Meadow Brown	177,844	1.4	-15.41
Large White	138,424	1.1	-2.07
Small White	112,814	0.9	-18.72
Peacock	50,847	0.4	-30.39
Red Admiral	47,109	0.4	-28.1
Ringlet	44,278	0.3	-47.06
Speckled Wood	30,112	0.2	-37.7
Comma	24,498	0.2	-20.28
Green-veined White	18,951	0.1	-65.01
Six-spot Burnet	18,102	0.1	-
Marbled White	17,922	0.1	-18.04
Small Copper	13,962	0.1	-48.05
Small Tortoiseshell	12,432	0.1	-59.44
Common Blue	9,755	0.1	-51.67
Brimstone	8,622	0.1	-17.99
Holly Blue	7,090	0.1	-35.63
Painted Lady	4,170	0.03	-9.27
Silver Y	4,101	0.03	-
Jersey Tiger	3,496	0.03	-
Scotch Argus	499	0.004	-

### Problem 16

The 14-year change should not be used to make predictions about the population of species which show very big swings year-to-year during the survey.

对于在调查期间同比波动幅度非常大的蝴蝶种类，不应依据14年的变化来预测其种

群数量。

- A. TRUE (正确)
- B. FALSE (错误)

**Problem 17**

The survey conclusions are invalid because the number of butterflies spotted by each person is usually very low.

该调查结论无效，因为每个人观察到的蝴蝶数量通常都很少。

- A. TRUE (正确)
- B. FALSE (错误)

**Problem 18**

Ecologists should use the "abundance" value, rather than the "Average per count" value to draw conclusions about year-to-year changes.

生态学家应依据“丰度”值而非“单次计数的均值”来得出同比变化的结论。

- A. TRUE (正确)
- B. FALSE (错误)

**Problem 19**

Changes in the location of the counters each year have no impact on the changing population estimates.

每年计数者位置的变化对种群数量的估算没有影响。

- A. TRUE (正确)
- B. FALSE (错误)

**Problem 20**

Calculate Simpson's index ( $\alpha$ ) using only the 6 most abundant species.  $N$  = the total number of organisms in the community (only consider the 6 species).  $n$  = number of organisms for one species. Give your answer to 2 decimal places.

仅使用丰度最高的6种蝴蝶来计算辛普森指数 ( $\alpha$ )。其中， $N$ 为群落中生物个体的总数（仅考虑这6种蝴蝶即可）， $n$ 为某一种蝴蝶的个体数量。答案需保留两位小数。

公式：

$$\alpha = N(N-1) / \sum n(n-1)$$

(需计算后填写答案)

**Problem 21**

Simpson's index is greater if there is a similar number of each species (versus some very dominant and some very rare species).

若各种蝴蝶的数量相近（相较于蝴蝶种类占比严重不均的情况而言），则该指数更高。

- A. TRUE (正确)
- B. FALSE (错误)

**Problem 22**

Simpson's index is smaller if there are more species present.若现有蝴蝶的种类更多，则该指数更低。

A TRUE (正确)

B FALSE (错误)

### Problem 23

Simpson's index would be larger if only the first 10 species of butterfly were included.若仅考虑前10种蝴蝶，则该指数会更高。

A TRUE (正确)

B FALSE (错误)

### Problem 24

Simpson's index would be larger if only the last 10 species of butterfly were included.若仅考虑后10种蝴蝶，则该指数会更高。

A TRUE (正确)

B FALSE (错误)

## Question 9

Behavioural scientists have long debated whether dogs are self-aware (although dog owners often have no doubt). Consciousness is being aware of one's body and the environment. Self-awareness is recognising that consciousness and appreciating one's own individuality, feelings and experiences.

行为学家长期以来一直在争论狗是否具有自我意识（尽管狗主人通常对此深信不疑）。意识是指对自身及周围环境的感知。自我意识是指认识到这种意识，并理解自身的个体性、情感和经历。

Dogs usually fail the mirror test. In the mirror test, dogs are marked somewhere on their body where they cannot normally see (e.g. the top of their head). They are then presented with a mirror and scientists measure whether they attempt to touch the mark on their body. Animals which are reported to pass the mirror test include: Whales, Apes (but not monkeys), Many birds, Elephants, Some fish, Some crabs. Dogs usually attempt to interact with the reflection (e.g. play with it, or bark at it) or ignore it completely.

狗通常无法通过镜子测试。在镜子测试中，狗的身体上某个通常难以看到的部位（比如头顶）会被做上标记。接着，狗被置于镜子前，科学家会观察它们是否会尝试去触碰自己身上的标记。已知能够通过镜子测试的动物包括：鲸鱼、猿类（不包括猴子）、许多鸟类、大象、某些鱼类、某些蟹类，而狗通常会试图与镜中的影像互动（例如与之玩耍，或对其吠叫），或者完全忽略镜中影像。

### Problem 25

Animals which do not pass the mirror test are definitely not self aware.

未通过镜子测试的动物一定没有自我意识。

A) 正确 (TRUE)

B) 错误 (FALSE)

### Problem 26

Assuming all the animals which pass the mirror test are self-aware, this is actually good evidence dogs are also self-aware.

中文：假设所有通过镜子测试的动物都有自我意识，这实际上也是狗有自我意识的

有力证据。

- A) 正确 (TRUE)
- B) 错误 (FALSE)

### Problem 27

The simplest explanation is animals which pass the mirror test just think they can control another animal with their movements (i.e. they are not really self-aware).

最简单的解释是，通过镜子测试的动物只是认为它们可以通过自己的动作控制另一只动物（即它们并非真正具有自我意识）。

- A) 正确 (TRUE)
- B) 错误 (FALSE)

### Problem 28

Dogs may fail the mirror test because they do not care about vision / appearances very much (e.g. a version of the mirror test should be repeated using smell).

狗可能无法通过镜子测试，因为它们对视觉/外观并不十分在意（例如，应该使用嗅觉重新设计一个版本的镜子测试）。

- A) 正确 (TRUE)
- B) 错误 (FALSE)

### Problem 29

Dogs may be overwhelmed with emotion (e.g. anger/fear) when they see a dog reflected, so they do not think about whether it is themselves.

当狗看到镜中的影像时，可能会被情绪（例如愤怒/恐惧）所淹没，因此它们不会去思考镜中的影像是否是自己。

- A) 正确 (TRUE)
- B) 错误 (FALSE)

### Problem 30

Dogs may fail the mirror test because they do not realise the mark is unusual.

狗可能无法通过镜子测试，因为它们没有意识到标记是异常的。

- A) 正确 (TRUE)
- B) 错误 (FALSE)

### Problem 31

Dogs may fail the mirror test because they do not care about the mark.

狗可能无法通过镜子测试，因为它们对标记并不在意。

- A) 正确 (TRUE)
- B) 错误 (FALSE)

### Problem 32

Monkeys, which fail the mirror test, respond to the mirror extremely aggressively and attack the reflection. Which potential criticism of the mirror test does this highlight?

猴子未能通过镜子测试，却对镜子表现出极大的攻击性，并攻击镜中的影像。这突显了镜子测试可能会遭受哪种批评？

A. The simplest explanation is animals which pass the mirror test just think they can control another animal with their movements (i.e. they are not really self-aware).

通过镜子测试的动物只是认为它们可以通过自己的动作控制另一只动物（即它们并非真正具有自我意识）。

B. Animals may fail the mirror test because they do not care about vision / appearances very much.

动物可能无法通过镜子测试，因为它们对视觉外观并不十分在意。

C. Animals may fail the mirror test because they do not realise the mark is unusual.

动物可能无法通过镜子测试，因为它们没有意识到标记是异常的。

D. Animals may be overwhelmed with emotion (e.g. anger/fear) when they see the reflection, so they do not think about whether it is themselves.

当动物看到镜中的影像时，可能会被情绪（例如愤怒/恐惧）所淹没，因此它们不会去思考镜中的影像是否是自己。

E. Animals may fail the mirror test because they do not care about the mark.

动物可能无法通过镜子测试，因为它们对标记并不在意。

### Problem 33

The fish which pass the mirror test are cleaner fish which specialise in finding and eating parasites from other fish. After looking in the mirror they remove the mark and come back to check the mark is gone. But, they only do this if the mark is shaped like a parasite. Which potential criticism(s) of the mirror test does this highlight?

通过镜子测试的鱼类是清洁鱼，它们专门以清除其他鱼类身上的寄生虫为生。在镜子中看到标记后，它们会移除标记并返回查看标记是否消失。然而，它们仅在标记形状类似寄生虫时才会这样做。这突显了镜像测试可能会遭受哪种（些）质疑？

A. Animals may fail the mirror test because they do not care about vision / appearances very much.

动物可能无法通过镜子测试，因为它们对视觉/外观并不十分在意。

B. The simplest explanation is animals which pass the mirror test just think they can control another animal with their movements (i.e. they are not really self-aware).

通过镜子测试的动物只是认为它们可以通过自己的动作控制另一动物（即它们并非真正具有自我意识）。

C. Animals may fail the mirror test because they do not realise the mark is unusual.

动物可能无法通过镜子测试，因为它们没有意识到标记是异常的。

D. Animals may be overwhelmed with emotion (e.g. anger/fear) when they see the reflection, so they do not think about whether it is themselves.

当动物看到镜中的影像时，可能会被情绪（例如愤怒/恐惧）所淹没，因此它们不会去思考镜中的影像是否是自己。

E. Animals may fail the mirror test because they do not care about the mark.

动物可能无法通过镜子测试，因为它们对标记并不在意。

### Problem 34

Scientists designed a test to assess the body awareness of dogs. Body

awareness is the ability of organisms to understand the nature of their own body, how it feels and how it interacts with the environment. Similar tests were carried out in elephants (passed) and human infants (fail under 18-24 months, get better up to 30 months old). Dogs often do badly at intelligence tests when the goal is food oriented because they have learnt "good girls/boys do not try and get secured food but ask a human to help". Therefore, the objective of this body awareness test is to pass a toy from the floor to a human. 32 dogs were tested in each of 4 conditions:

科学家设计了一项测试，用以评估狗的身体意识。身体意识是指生物理解自身身体特性、感觉以及与环境互动方式的能力。类似的测试曾在大象（通过）和人类婴儿（18-24个月以下未通过，30个月左右表现更好）中进行。狗在以食物为目标的智力测试中往往表现不佳因为它们已经学会“乖狗狗不应尝试自己获取固定食物，而应当寻求人类的帮助”。因此，这项身体意识测试的目标是让狗将地板上的玩具传递给人类。共有 32 只狗分别在以下 4 种情形下接受测试：

Condition 1. The toy was placed on a floor mat. The dogs were asked to fetch the toy.

情形 1：玩具放置在地垫上，狗被要求去取玩具

Condition 2. Toy placed on floor mat. Researcher tugs at mat while dog asked to fetch the toy.

情形 2：玩具放置在地垫上，在狗被要求去取玩具时，研究人员拉扯地板垫，

Condition 3. Toy attached to floor mat. Dog asked to fetch toy. Dog can only succeed if it steps off the mat and leans over to pickup both the toy and mat.

情形 3：玩具固定在地垫上，狗被要求去取玩具。狗只有离开地垫并俯身同时取回玩具和地垫才能完成任务。

Condition 4. Toy attached directly to floor so it cannot be moved. Dogs standing on mat and asked to fetch toy.

情形 4：玩具直接固定在地板上无法移动。站在地垫上的狗被要求去取玩具，

### Problem 34

The results from elephants and humans suggest the test has appropriate validity to give meaningful results.

大象和人类的测试结果表明该测试具有适当的效度，能够提供有意义的结果。

- A) 正确 (TRUE)
- B) 错误 (FALSE)

### Problem 35

Each condition demonstrates whether...

每种情形说明.....

Sort options A)-E) into a)-a) groups

将选项 A)-三) 匹配到对应组别 a)- d) 中。

Groups 组别:

- a) Condition 1 情形 1
- b) Condition 2 情形 2
- c) Condition 3 情形 3
- d) Condition 4 情形 4

A) dogs understand their body is an obstacle to their desires 狗是否意识到自己的身体阻碍了目标的实现

B) dogs are physically capable of performing the task 狗是否具备完成任务的身体能力

C) dogs move off mat without understanding why 狗是否在不理解指令的情况下离开地垫

D) dogs understand the task 狗是否理解任务 E) dogs get off mat due to sensation in paws 狗是否因爪子的触感而离开地垫

### Problem 36

Dogs overwhelmingly passed this body awareness test. This conclusion is valid because: Note, for condition 4, assume 'the mat' refers to a virtual area of floor which would be covered by the mat in conditions 1-3. Not all outcomes need to be used, some can be used more than once.

狗在这项身体意识测试中表现出色，几乎全部通过。这一结论是有效的，因为：注意：在情形 4 中，假定“地垫”指的是情形 1 至 3 中地垫实际所覆盖的地板区域。并非所有选项都需要使用，有些选项可以使用多次。

Each condition demonstrates whether...

每种情形说明.....

Sort options A)-E) into a)-a) groups

将选项 A)-E) 匹配到对应组别 a)-d) 中。

- a) Condition 1 情形 1
- b) Condition 2 情形 2
- c) Condition 3 情形 3
- d) Condition 4 情形 4

A) Almost all dogs fail but move off the mat 几乎所有狗都没有通过测试，但离开了垫子

B) Almost all dogs fail and do not move off the mat 几乎所有狗都没有通过测试，并且没有离开垫子

C) Almost all dogs pass but do not move off the mat 几乎所有狗都通过了测试，但没有离开垫子

D) Almost all dogs pass and do move off the mat 几乎所有狗都通过了测试，并且离开了垫子

### Question 10

#### Problem 37

Scientists introduced luciferase (a light-producing gene from fireflies) into a plant in front of a promoter for a gene that normally controls the expression of a phosphate transporter. The scientists then measured the amount of light

coming from phosphate-starved plants after being grown in different conditions (RLU - relative light units).

科学家将荧光素酶（一种来自萤火虫的发光基因）导入植物，并将其置于一个通常控制磷酸盐转运蛋白表达的基因启动子前。随后，科学家测量了在不同条件下生长的缺磷植物发出的光量（RLU-相对光单位）。

### Problem 37

Sucrose induces phosphate-starved plants to produce phosphate transporters  
蔗糖促使缺磷植物合成磷酸盐转运蛋白选项：

- A) TRUE 正确
- B) FALSE 错误

### Problem 38

Plants make phosphate transporters without sugar  
植物在无糖条件下也能合成磷酸盐转运蛋白

- A) TRUE 正确
- B) FALSE 错误

### Problem 39

These data are missing a negative control to show that sucrose does not glow  
这些数据缺失了一个阴性对照，以证明蔗糖本身不会发光

- A) TRUE 正确
- B) FALSE 错误

### Problem 40

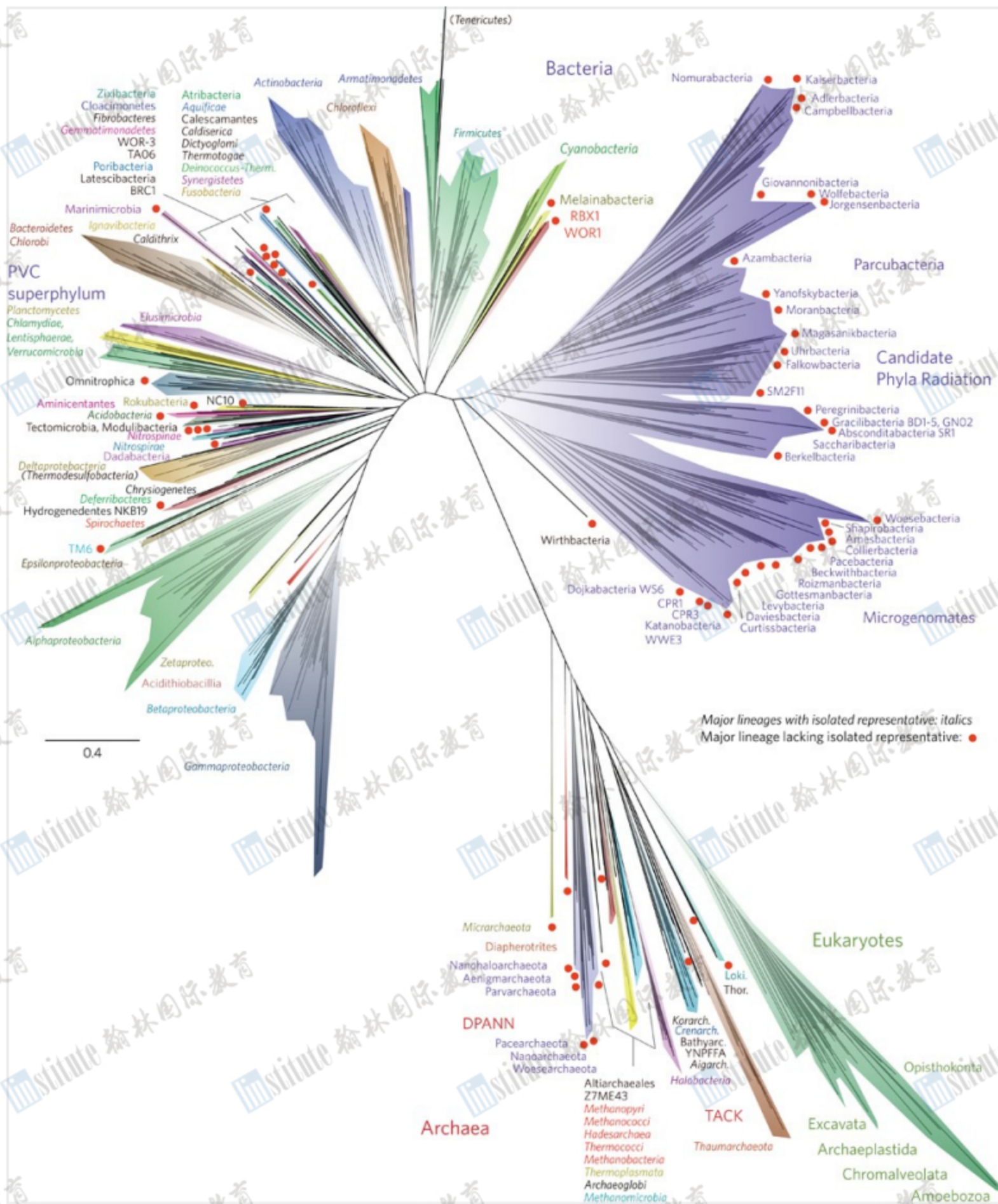
All sugars induced the expression of the phosphate transporter  
所有糖类均可诱导磷酸盐转运蛋白的表达

- A) TRUE 正确
- B) FALSE 错误

### Problem 41

#### 实验数据表格

处理条件	-Sugar 无糖	Glucose 葡萄糖	Fructose 果糖
RLUs 相对光单位	5	75	30.7



What is the percentage increase in the luminescence of glucose-treated plants compared to fructose-treated? "-sugar" = no sugar. Give your answer as a percentage without the % sign.

与经过果糖处理的植物相比，经过葡萄糖处理的植物的发光强度增加了多少百分比？"-sugar" 表示无糖。请以百分数形式给出答案，但无需写出百分号"%"。

## Question 11

### Problem 42

Sort options A)-G) into a)-x) groups 将选项 A)-G) 匹配到对应组别 a)-x)

将下列分类级别 (A-G) 匹配到最符合其特征的组别描述 (a-x) 中

- a) Evolves as a unit / 作为一个整体进化
- b) Unique niche / 独特的生态位
- c) Well intermixed gene pool / 充分混合的基因库
- d) Often can interbreed in some circumstances / 在某些情况下通常可以杂交
- e) Often similar environment / 通常生活在相似的环境
- f) Recently separated

genepools / 近期分化的基因库

g) Similar adaptations but exaggerated differently / 具有相似的适应性特征，但表现程度不同

h) Share chemical building blocks / 共享化学构建模块

i) Cell division controlled similarly / 细胞分裂的调控机制相似

j) Often similar appearance but wide range of sizes and colours / 外观通常相似，但体型和颜色差异较大

k) Very similar adaptations / 具有非常相似的适应性特征

l) Fundamentally similar physiology (e.g. warm blood) / 具有基本相似的生理特征 (如恒温性)

m) Share foundational physiology (e.g. multicellular) / 共享基础的生理特征 (例如，多细胞)

n) Tend to similar lifestyle (e.g. parental care, intelligence) / 倾向于相似的生活方式 (如亲代抚育、智力)

o) Last common ancestor 100-200 million years ago / 最后共同祖先生活在1亿至2亿年前

p) Share a fundamental aspect of lifestyle (e.g. heterotroph) / 共享生活方式的一个基本特征 (例如，异养性)

q) Similar development / 相似的发育过程 r) Interact with environment in fundamentally similar way (e.g. vision, movement) / 以基本相似的方式与环境互动 (例如，视觉、运动) s) Cells have similar components / 细胞具有相似的组成成分

t) Pharmacological tests can usually be extrapolated between members / 药理学测试通常可以在成员之间外推

u) Expression of genes controlled by some interchangeable machinery / 基因表达由某些可互换的机制控制

v) Often similar role in food web in range of environments / 在多种环境中，其在食物网中的角色通常相似

w) Last common ancestor >4 billion years ago / 最后共同祖先存在于 > 40 亿年前

x) Share very similar genetic code / 具有高度相似的遗传密码

### Options 分类级别选项:

A) Species (种) - e.g. wolf (例如: 狼)

B) Genus (属) - e.g. Canis (例如: 犬属)

C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)

D) Class (纲) - e.g. Mammal (例如: 哺乳动物)

E) Kingdom (界) - e.g. Animal (例如: 动物界)

F) Domain (域) - e.g. Eukaryote (例如: 真核生物)

G) All life on earth (地球上所有生命)

42-1 Evolves as a unit / 作为一个整体进化

A) Species (种) - e.g. wolf (例如: 狼)

B) Genus (属) - e.g. Canis (例如: 犬属)

C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)

D) Class (纲) - e.g. Mammal (例如: 哺乳动物)

E) Kingdom (界) - e.g. Animal (例如: 动物界)

F) Domain (域) - e.g. Eukaryote (例如: 真核生物)

G) All life on earth (地球上所有生命)

42-2 Unique niche / 独特的生态位

A) Species (种) - e.g. wolf (例如: 狼)

B) Genus (属) - e.g. Canis (例如: 犬属)

C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)

D) Class (纲) - e.g. Mammal (例如: 哺乳动物)

E) Kingdom (界) - e.g. Animal (例如: 动物界)

F) Domain (域) - e.g. Eukaryote (例如: 真核生物)

G) All life on earth (地球上所有生命)

42-3 Well intermixed gene pool / 充分混合的基因库

A) Species (种) - e.g. wolf (例如: 狼)

B) Genus (属) - e.g. Canis (例如: 犬属)

C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)

D) Class (纲) - e.g. Mammal (例如: 哺乳动物)

E) Kingdom (界) - e.g. Animal (例如: 动物界)

F) Domain (域) - e.g. Eukaryote (例如: 真核生物)

G) All life on earth (地球上所有生命)

42-4 Often can interbreed in some circumstances / 在某些情况下通常可以杂交

A) Species (种) - e.g. wolf (例如: 狼)

B) Genus (属) - e.g. Canis (例如: 犬属)

C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)

D) Class (纲) - e.g. Mammal (例如: 哺乳动物)

E) Kingdom (界) - e.g. Animal (例如: 动物界)

F) Domain (域) - e.g. Eukaryote (例如: 真核生物)

G) All life on earth (地球上所有生命)

42-5 Often similar environment / 通常生活在相似的环境

A) Species (种) - e.g. wolf (例如: 狼)

B) Genus (属) - e.g. Canis (例如: 犬属)

C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)

D) Class (纲) - e.g. Mammal (例如: 哺乳动物)

E) Kingdom (界) - e.g. Animal (例如: 动物界)

F) Domain (域) - e.g. Eukaryote (例如: 真核生物)

G) All life on earth (地球上所有生命)

42-6 Recently separated genepools / 近期分化的基因库

A) Species (种) - e.g. wolf (例如: 狼)

B) Genus (属) - e.g. Canis (例如: 犬属)

C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)

D) Class (纲) - e.g. Mammal (例如: 哺乳动物)

E) Kingdom (界) - e.g. Animal (例如: 动物界)

F) Domain (域) - e.g. Eukaryote (例如: 真核生物)

G) All life on earth (地球上所有生命)

42-7 Similar adaptations but exaggerated differently / 具有相似的适应性特征, 但表现程度不同

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-8 Share chemical building blocks / 共享化学构建模块

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-9 Cell division controlled similarly / 细胞分裂的调控机制相似

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-10 Often similar appearance but wide range of sizes and colours / 外观通常相似, 但体型和颜色差异较大

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-11 Very similar adaptations / 具有非常相似的适应性特征

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-12 Fundamentally similar physiology (e.g. warm blood) / 具有基本相似的生理特征 (如恒温性)

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-13 Share foundational physiology (e.g. multicellular) / 共享基础的生理特征 (例如, 多细胞)

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-14 Tend to similar lifestyle (e.g. parental care, intelligence) / 倾向于相似的生活方式 (如亲代抚育、智力)

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-15 Last common ancestor 100-200 million years ago / 最后共同祖先生活在1亿至2亿年前

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
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- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-16 Share a fundamental aspect of lifestyle (e.g. heterotroph) / 共享生活方式的一个基本特征 (例如, 异养性)

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
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- G) All life on earth (地球上所有生命)

42-17 Similar development / 相似的发育过程 r) Interact with environment in fundamentally similar way (e.g. vision, movement) / 以基本相似的方式与环境互动 (例如, 视觉、运动)

- A) Species (种) - e.g. wolf (例如: 狼)
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- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-18 Cells have similar components / 细胞具有相似的组成成分

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
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- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-19 Pharmacological tests can usually be extrapolated between members / 药理学测试通常可以在成员之间外推

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
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- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-20 Expression of genes controlled by some interchangeable machinery / 基因表达由某些可互换的机制控制

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
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- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-21 Often similar role in food web in range of environments / 在多种环境中, 其在食物网中的角色通常相似

- A) Species (种) - e.g. wolf (例如: 狼)

- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
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- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-22 Last common ancestor >4 billion years ago / 最后共同祖先存在于 > 40 亿年前

- A) Species (种) - e.g. wolf (例如: 狼)
- B) Genus (属) - e.g. Canis (例如: 犬属)
- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)

42-23 Share very similar genetic code / 具有高度相似的遗传密码

- A) Species (种) - e.g. wolf (例如: 狼)
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- C) Family/Order (科/目) - e.g. Canidae/Carnivora (例如: 犬科/食肉目)
- D) Class (纲) - e.g. Mammal (例如: 哺乳动物)
- E) Kingdom (界) - e.g. Animal (例如: 动物界)
- F) Domain (域) - e.g. Eukaryote (例如: 真核生物)
- G) All life on earth (地球上所有生命)