【8】 ①－1

Natural selection occurs because of the reproductive advantages of some individuals. This view of the world implies that all individuals are in competition with each other and will behave to (1)further their own interests. From a philosophical viewpoint, the idea that the world is full of **selfish individuals clashes** with many of the values we hold for **human societies**, such as **cooperation, community spirit, and selflessness**.

【8】①－2

Does the variety of behaviors that we observe in animals, even the (2)apparently **cooperative ones**, really arise from the interactions of **selfish individuals?** Can traits evolve that favor the larger interests of a group or society? Does evolution lead only to selfishness? These are key questions that interest social scientists, philosophers, and biologists. (a)Biologists do not think that individuals ever act for the good of the species, **but** there are many situations in which what appear to be **selfish individual behaviors** actually **benefit a group**.

【8】②

It is easy to imagine that populations of selfish individuals might overexploit the available resources and become extinct, whereas populations that have evolved **social** behaviors preventing overexploitation of resources might have better long-term survival prospects. Natural selection for traits that favor **groups** rather than individuals is termed **group selection**. | The idea that groups of animals could evolve self-regulating mechanisms that prevent overexploitation of their food resources was first argued in detail in 1962 by (b)V. C. Wynne Edwards, an ecologist in Scotland. Despite its intuitive appeal, group selection is not considered very important in producing changes in species traits. Group selection operates much more slowly than individual selection, making it a much weaker selective force in most circumstances.

【8】 ③－1

Imagine, for example, a species of bird, such as the puffin that lives in large colonies and lays only a single egg. Could laying a single egg have evolved in puffins by group selection to limit population growth and maintain an adequate food supply for the long-term good of the puffin colony? The answer is no. Any genetic change that increased the number of eggs laid would be favored only if individuals laying two eggs leave more copies of their genes to the next generation, compared with birds laying a single egg.

【8】 ③－2

But ecologically speaking, costs would increase as well as benefits. | A puffin with **two eggs** would have to collect more calcium to **lay two eggs** and would have to fly more to feed two young. There are ecological costs to **increasing (3)the clutch size** in puffins. Consequently, genes for laying **two eggs** would not spread through the population unless the benefits would exceed (c)the costs. Individual selection favors **the small clutch size** in puffins. | Short-term advantages to selfish individuals will develop much more quickly than long-term advantages to the group, so it is difficult to see how traits favored by group selection can be maintained in a population unless they are also favored by individual selection.

【8】④

But this does **not mean** that all behavior must be selfish and that **(4)altruism** does not exist. To understand apparently cooperative behaviors that benefit the group or society, we need to look for the benefits to individuals. **Individual selection** can produce behaviors that are **a benefit for the group**.