

2009年4月入学第1回 長浜バイオ大学大学院

バイオサイエンス研究科 博士課程前期課程

一般入学試験（英語）

【注意事項】

1. 問題1部、解答用紙2枚を配付。事前に受験番号が記入されているので、確認すること。
2. 解答用紙は1問につき1枚を使用すること。解答の際、必ず設問番号を最初に記入すること。
3. 解答用紙の下欄に科目名、学籍番号、氏名の記入は不要。
4. 試験時間は、10:00～11:30（90分）。
5. 電子辞書等の使用および試験時間中の途中退室は不可。
6. 解答用紙は、ホッチキス止めをしているのではずさないこと。
7. 問題用紙、解答用紙は、入学試験終了後全て回収。

次の問 1、問 2 に答えよ。

問 1 以下の英文を日本語で 200 文字以内に要約しなさい。

The first genetic maps, constructed in the early decades of the twentieth century for organisms such as the fruit fly, used genes as markers. To be useful in genetic analysis, a gene must exist in at least two forms, or alleles, each specifying a different phenotype, an example being tall or short stems in the pea plants originally studied by Gregor Mendel. To begin with, the only genes that could be studied were those specifying phenotypes that were distinguishable by visual examination. So, for example, the first fruit-fly maps showed the positions of genes for body color, eye color, wing shape, and suchlike, all of these phenotypes being visible simply by looking at the flies with a low-power microscope or the naked eye. This approach was fine in the early days but geneticists soon realized that there were only a limited number of visual phenotypes whose inheritance could be studied, and in many cases their analysis was complicated because a single phenotype could be affected by more than one gene. For example, by 1922, over 50 genes had been mapped onto the four fruit-fly chromosomes, but nine of these genes were for eye color. In later research, geneticists studying fruit flies had to learn to distinguish between fly eyes that were colored red, light red, garnet, carnation, ruby, sepia, scarlet, pink, cardinal, purple, or brown. To make gene maps more comprehensive, it was necessary to find characteristics that were more distinctive and less complex than visual ones.

The answer was to use biochemistry to distinguish phenotypes. This has been particularly important with two types of organisms, microbes and humans. Microbes, such as bacteria and yeast, have very few visual characteristics, so gene mapping with these organisms has to rely on biochemical phenotypes. For humans it is possible to use visual characteristics but, since the 1920s, studies of human genetic variation have been based largely on biochemical phenotypes that can be scored by blood typing. These phenotypes include not only the standard blood groups, such as the ABO series, but also variants of blood serum proteins and of immunological proteins such as the human leukocyte antigens (the HLA system). A big advantage of these markers is that many of the relevant genes have multiple alleles.

[引用 “GENOME 3 (T.A. Brown; Garland Science)]

問 2 以下の英文を全文和訳しなさい。

(1)

Many of the basic rules of genetics that govern how genes are passed from one complex organism to the next were discovered in the nineteenth century and have come to us basically unchanged. Working in the 1860s, Gregor Mendel laid out these rules and described how they affect the appearance and behavior of individual organisms. Mendel's work focused largely on the genetics of pea plants. His results and conclusions were soon forgotten, only to be rediscovered independently by three researchers in 1900. During the decade that followed, it became clear that these rules-we now call them Mendelian genetics-apply to virtually all sexual organisms, including metazoan (multicellular animals), as well as metaphyta (multicellular plants).

[引用 “the biology of CANCER”, by Robert A. Weinberg (Garland Science, Taylor & Francis Group, 2007).]

(2)

Despite the breakthrough, the procedure has shortcomings, including a tendency of the newly created stem cells to turn cancerous, a risk with stem cells in general but heightened because Dr. Yamanaka used a known tumor-causing gene. Cancer risk is one reason stem cell therapy still seems a distant possibility; stem cell research shows more immediate promise as a way to pursue basic science. Since announcing the finding last month, Dr. Yamanaka has already taken a step toward reducing cancer risk. In the Nov. 30 issue of Nature Biotechnology, he announced that even without using the cancer gene, he was still able to reprogram cells, and with a much lower incidence of cancer. He says the biggest remaining problem is the procedure's use of retroviruses to insert the genes into the cell's chromosomes. Retroviruses are a type of virus that can also cause mutations in the adult cells, making them cancerous. Dr. Yamanaka said his next research goal was to reprogram without retroviruses.

[引用 “Risk taking is in his genes”, New York Times, December 11, 2007]