

生命科学専攻 英語

英語 第1問

下記の英文を和訳せよ。

One of the most important tasks of the teacher is to help his students. This task is not quite easy; it demands time, practice, devotion, and sound principles.

The student should acquire as much experience of independent work as possible. But if he is left alone with his problem without any help or with insufficient help, he may make no progress at all. If the teacher helps too much, nothing is left to the student. The teacher should help, but not too much and not too little, so that the student shall have a reasonable share of the work.

If the student is not able to do much, the teacher should leave him at least some illusion of independent work. In order to do so, the teacher should help the student discreetly, unobtrusively.

The best is, however, to help the student naturally. The teacher should put himself in the student's place, he should see the student's case, he should try to understand what is going on in the student's mind, and ask a question or indicate a step that could have occurred to the student himself.

(George Polya 著 「How to solve it」 から引用)

(注) unobtrusively (控えめに)

生命科学専攻 英語

英語 第2問

下記の英文を和訳せよ。

This account of the events which led to the solution of the structure of DNA, the fundamental genetical material, is unique in several ways. I was much pleased when Watson asked me to write the foreword.

The discovery of the structure by Crick and Watson, with all its biological implications, has been one of the major scientific events of this century. The number of researches which it has inspired is amazing; it has caused an explosion in biochemistry which has transformed the science. I have been amongst those who have pressed the author to write his recollections while they are still fresh in his mind, knowing how important they would be as a contribution to the history of science. The result has exceeded expectation. The latter chapters, in which the birth of the new idea is described so vividly, are drama of the highest order; the tension mounts and mounts towards the final climax. I do not know of any other instance where one is able to share so intimately in the researcher's struggles and doubts and final triumph.

(James D. Watson 著「The Double Helix」の序文から引用)

生命科学専攻 英語

英語 第3問

問題1 以下の文章を読み、問(1) - (5)に解答せよ。

Congress passed the Orphan Drug Act in 1983 in an attempt to deal with the unique commercial and regulatory challenges posed by 'orphan' diseases, defined as those that affect fewer than 200,000 Americans. For industry, there is little appeal in pursuing a drug that will be required by only a small number of patients. For regulators accustomed to the clinical trials typically performed for common diseases, it can be difficult to ascertain the safety of a drug that, by necessity, can be tested in only a tiny cohort of patients.

The act aimed to incentivize orphan-drug development by rewarding drug-makers with a seven-year period of market exclusivity for such compounds. The FDA also created the Office of Orphan Products Development to shepherd companies through the approval process. Ten years later, Japan enacted similar legislation, and Europe followed suit in 2000.

In many ways the act was a success. In the decade before its passage, the FDA approved fewer than a dozen drugs for rare diseases; since then, the agency has approved 358. Nevertheless, the vast majority of the 7,000 known rare diseases remain without treatment.

(Nature 2010年7月8日号から引用)

(注) FDA (Food and Drug Administration 食品医薬品局)  
cohort (集団)

- (1) 本文中に述べられている"orphan diseases"とは、どのようなものと定義されているか。本文中に書かれていることを1行以内で説明せよ。具体的な数字もあげること。
- (2) orphan diseases に対する製薬業界の態度はどのようなものか。本文中に書かれていることを2行以内で説明せよ。
- (3) 医薬品の許認可を行う管轄省庁の orphan diseases に対する態度はどのようなものか。本文中に書かれていることを3行以内で説明せよ。
- (4) 上記のような状況を打破し、orphan drug の開発を促進するために、アメリカ合衆国政府はどのような対策をたてたか。本文中に書かれていることを5行以内で説明せよ。
- (5) このような対策の結果、orphan drug の数は増えたか減ったか。本文中に書かれている具体的な数(必ずしもアラビア数字とは限らない)をあげて2行以内で説明せよ。

## 生命科学専攻 英語

## 英語 第4問

次の文章を読み、問1～問5に答えよ。

Protein folding is characterized by two major steps *in vitro* (Fig. 1). In the first steps, most of the secondary structure is already formed. ① Folding usually starts with the formation of  $\alpha$ -helices, since  $\beta$ -sheet formation requires hydrogen bonds between amino acids, which are far from each other in the primary sequence. In this step, the unfolded protein is collapsed and a (more or less) stable intermediary, the ② molten globule, is formed. The partially folded state of molten globules can be characterized by a developed secondary structure that is mostly unorganized, showing almost no tertiary structure. Molten globules still have large hydrophobic surfaces and therefore are subjects of extensive aggregation. The volume of molten globules, however, is almost as small as that of the native, folded protein.

③ The last steps of protein folding are the slow, rate-limiting steps. In these steps the inner, hydrophobic core of the protein becomes tightly packed and unique, high-energy bonds are formed, such as disulfide bridges or ion pairs. The free energy gain of these latter processes ④ enables the formation of local, unstable protein structures, which are stabilized by the favorable conformation of the rest of the protein. These unstable protein segments can stabilize themselves by forming complexes with another molecule. Thus ⑤ they often serve as active centers of enzymes or as contact surfaces between various proteins involved, e.g., in signal transduction.

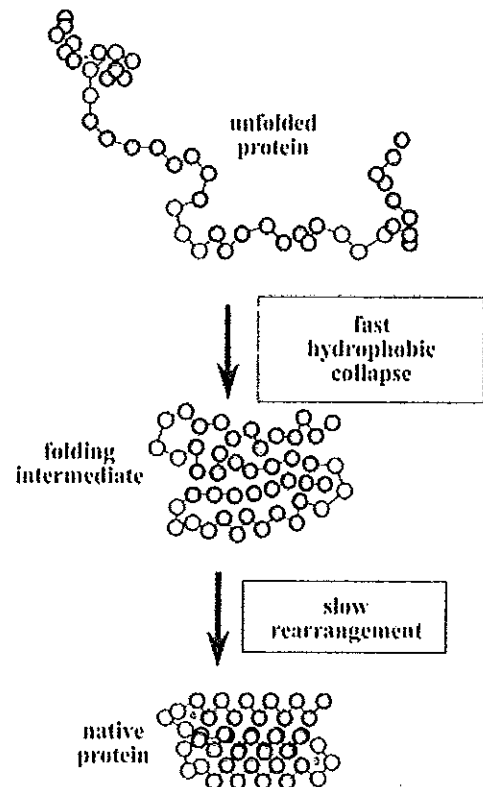


Fig. 1

生命科学専攻 英語

英語 第4問 つづき

問1. 下線①について、「タンパク質の二次構造形成において、 $\alpha$ -ヘリックスの形成が先に起こる」理由についてどのように説明されているか日本語で答えよ。

問2. 下線②について "molten globule" の特徴として、以下の (ア) ~ (オ) のうち正しい文章を選択せよ。ただし、正解は1つとは限らない。

(ア) Molten globules are intermediates in the folding pathways of proteins.

(イ) Molten globules are usually more tightly packed than the native protein.

(ウ) Molten globules have no secondary structure.

(エ) Only a few hydrophobic amino acids are exposed to the protein surface in the molten globule state.

(オ) Molten globules tend to aggregate compared with the native protein.

問3. 下線③を和訳せよ。

問4. 下線④について、「局所的に不安定な構造が可能となる」理由についてどのように説明されているか日本語で答えよ。

問5. 下線⑤が指している語句を文章中から抜き出せ