1. Please translate the following paragraph into Chinese (25%)

Life on Earth has existed for over 3.5 billion years and has caused fundamental changes in Earth's biogeochemistry. However, the timing and impact of major events in the evolution of the biosphere are hotly contested, owing partially to the inherent difficulty in studying events that occurred in deep time. We discuss the evolving structure of Earth's biosphere and major changes in its capacity to alter geochemical cycles. We describe evidence that oxygenic photosynthesis evolved relatively early, but contend that marine primary productivity was low, surface oxygen was scarce and marine anoxia was prevalent for the majority of Earth's history. Furthermore, we argue that terrestrial primary productivity was a substantial mode of biological carbon fixation following the widespread emergence of continental land masses, even before the rise of land plants, impacting carbon cycling on a global scale. (Adapted from Nature Reviews Earth & Environment, 2021)

2. Please translate the following paragraph into Chinese (25%)

The nitrogen cycle has been radically changed by human activities. China consumes nearly one third of the world's nitrogen fertilizers. The excessive application of fertilizers and increased nitrogen discharge from livestock, domestic and industrial sources have resulted in pervasive water pollution. Quantifying a nitrogen 'boundary' in heterogeneous environments is important for the effective management of local water quality. The amount of reactive nitrogen entering the global environment increased from around 15 megatonnes (Mt) in 1860 to 185 Mt in 2010, while agricultural use of nitrogen fertilizers increased from 12 Mt in 1961 to 110 Mt in 2014. Although it is a critical nutrient for crop yields and food production, human inputs of reactive nitrogen into terrestrial and freshwater ecosystems cause water pollution (for example nitrate, ammonium) and air pollution (ammonia, nitrogen oxides), as well as global warming and stratospheric ozone depletion (nitrous oxide). (Adapted from Nature, 2019)

3. Please translate the following paragraph into Chinese (25%)

One of the main bottlenecks in the biosynthesis of natural products is limited enzyme activity. Integrating heterologous enzymes into microbial chassis may decrease their catalytic activities or even result in loss of function. Enhancing enzyme activity to accelerate production processes is a major goal in this area. Improving the catalytic activity of enzymes towards specific substrates through random mutagenesis is a typical strategy used in protein engineering. A yeast-active tyrosine hydroxylase was identified and randomly mutated by error-prone PCR to improve its catalytic activity by 4.3-fold. Further coexpression of L-3,4-dihydroxyphenylalanine (L-DOPA) decarboxylase and the engineered tyrosine hydroxylase enabled de novo dopamine production in yeast. Similarly, the catalytic activity of isopentenyl diphosphate isomerase (IDI) from Saccharomyces cerevisiae was enhanced by 2.53-fold through PCR-based random mutagenesis. The IDI with enhanced activity resulted in a 2.1-fold increase in lycopene titer (1.24 g/l) compared with the wild type. (Adapted from Trends in Biotechnology, 2020)

4. Please translate the following paragraph into Chinese (25%)

Ofloxacin (OFLX), an antibacterial drug that belongs to the fluoroquinolone class, has been widely used in the veterinary industry to treat and prevent various infectious diseases. Residues of drugs that enter the food chain and environment present various potential dangers to human health because they can lead to toxic effects, antibody-resistant strains of bacteria, and allergic reactions. For this reason, OFLX should be strictly monitored and controlled. In recent years, governmental agencies have set limitations on the acceptable levels of OFLX residues. Several traditional methods for the detection of OFLX residues, such as spectrophotometry, high-performance liquid chromatography (HPLC), capillary electrophoresis, and microbiological assay, are well-proven and widely accepted, but these methods are often viewed as laborious and time intensive for sample pretreatment. Moreover, implementation of these methods involves a significant investment in equipment. Immunoassays, which are based on antigen–antibody interactions, can avoid the drawbacks of chromatographic techniques and present high specificity, sensitivity, and simplicity. Moreover, immunoassays can be implemented at a low cost in a high-throughput configuration and are suitable for performing on-site analyses. This technique has been successfully developed to detect toxic compounds with low molecular weights, including pesticide residues, veterinary drug residues, environmental hormones, toxins, and prohibited food additives. (Adapted from Journal of Agricultural and Food Chemistry, 2016)

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