2023年度東京海洋大学海洋生命科学部食品生産科学科
編入学試験「英語」問題用紙（1/4）

※解答は解答用紙の所定の欄に記入すること
問題用紙は持ち帰らないこと

受験番号	氏　名

第1問 以下の英文を読み、問1から問5に答えなさい。

Chub mackerel represents one of the most important fishery resources and is a mass-caught fish in Japan. In recent years, establishing the brand of chub mackerel has progressed in each area, including Hokkaido. (a) Fish with good freshness and quality for sashimi (sliced raw fish) are very popular and highly valued because Japanese consumers prefer sashimi. Therefore, there are many branded chub mackerel sashimi products.

To supply sashimi safely and stably to consumers, fish fillets are often frozen. However, the influence of freeze–thawing on fish fillet quality is well known. Therefore, the development of frozen fish fillets with better quality for sashimi is required. With recent technological developments, migratory red fish, such as chub mackerel, which could not previously be commercialized as a frozen product destined for use in sashimi due to the rapid deterioration of freshness, now can be.

(b) The quality of frozen fish fillets varies depending on the freshness of the fish before freezing. In other words, the storage period and temperature before freezing influence the quality of frozen fish fillets. Fish such as Atlantic salmon and chub mackerel that are frozen in the pre-**rigor** stage produce a better quality of fillet than fish that are frozen in the post-rigor stage. Frozen fish meat, when frozen in the pre-rigor stage, with high concentrations of adenosine 5'-triphosphate (ATP), high pH level (pH 6.5–7.0), and low concentrations of lactic acid, has high tolerance to dark meat discoloration and protein denaturation during frozen storage. In **spotted mackerel** with low freshness, relatively large-sized ice crystals are observed and drip loss increases. The sensory quality of frozen mackerel products for sashimi is affected by lipid concentration and freshness. However, previous papers have not offered an objective assessment of the quality of frozen products for sashimi preferred by consumers. Additionally, the level of freshness before freezing that is required to achieve sashimi of sufficient quality using the best conditions of catching, killing, freezing, and frozen storage remains unknown. (c) Therefore, further clarification of the influence of freshness before freezing on the biochemical, quality characteristics, and sensory evaluation is required to manufacture frozen sashimi products of sufficient quality.

The aim of the present study is to obtain high-quality frozen sashimi products and clarify the influence of freshness before freezing on the biochemical and quality characteristics and sensory evaluation, which could offer an objective strategy for classifying the quality of frozen sashimi products.

(Moriya *et al.*, *Fisheries Science*, 87, 905–913, 2021 より一部改変)

Chub mackerel；マサバ　**Rigor**；硬直　**Spotted mackerel**；ゴマサバ

2023年度東京海洋大学海洋生命科学部食品生産科学科
編入学試験「英語」問題用紙（2/4）

※解答は解答用紙の所定の欄に記入すること
問題用紙は持ち帰らないこと

受験番号	氏　名

問 1 下線部(a) を和訳しなさい。

問 2 下線部(b) を和訳しなさい。

問 3 下線部(c) の文章のとおり、冷凍前の鮮度は冷凍魚の品質に大きく影響する。冷凍前の鮮度の違いはどのような指標で判断できるか、本文中から読み取り答えなさい。

問 4 この本文の研究題目(英語)を類推し答えなさい。

問 5 この本文中の表現や単語を参考にして、以下の文章を英訳しなさい。
「刺身は日本の伝統的水産食品であるが、近年は世界的にその人気が高まっている」

2023年度東京海洋大学海洋生命科学部食品生産科学科
編入学試験「英語」問題用紙（3/4）

※解答は解答用紙の所定の欄に記入すること
問題用紙は持ち帰らないこと

受験番号	氏　　名

第2問 以下の英文を読み、問1から問4に答えなさい。

A key challenge for the years to come is feeding a rapidly growing human population while lowering the impact of food production on the environment. This is particularly true for low- and middle-income countries (LMICs) where the demand for animal protein is likely to rise and where existing environmental changes (e.g. droughts, floods, extensive wildfires) have in recent years led to major food crises. As such, food security is central to the 2030 UN Agenda of Sustainable Development Goals, which aim to end poverty and to protect the planet from degradation. To achieve (a) these goals, food production not only needs to be increased, but most of all, good husbandry practice must follow to reduce its negative impacts on the environment. Currently, the typical response to this increased food demand is the intensification of production, underpinning environmental and health hazards such as increased water needs or overuse of antimicrobials.

(b) Several studies have suggested that shifting human diet towards increased consumption of fish and seafood could be a solution to the need for protein that would sustain human and environmental health. In fact, fish and seafood consumption is forecast to increase by 27% on the horizon of 2030, mostly sustained by the aquaculture sector, which is expected to grow by 62% during the same period. The aquaculture industry contributes significantly to the livelihood of many households, with over 100 million people estimated to rely on aquaculture for their living. As such, aquaculture plays a significant role in food security and poverty alleviation. However, fish farming relies heavily on the use of antibiotics to combat infectious diseases that threaten production, with emerging infectious diseases (EIDs) forecast to increase with warmer temperatures. For example, outbreaks of **streptococcosis** and **acute hepatopancreatic necrosis disease** are often observed when temperature rises. In this context, antimicrobial use is expected to rise in coming years, especially in LMICs, with the shift towards more intensified production systems to meet economic requirements and the demand for animal products. However, the combined use of antimicrobial drugs in aquaculture and land-derived contamination into watercourses, contribute to the selection, emergence and spread of drug-resistant pathogens, posing an important public health threat.

Antimicrobial resistant (AMR) bacteria cause over 35,000 human deaths annually in the USA, 33,000 in the European Economic Area, 58,000 in India and probably more in SE Asia and these numbers are expected to rise due to rapid socioeconomic development and population growth. (c) Although the precise

2023年度東京海洋大学海洋生命科学部食品生産科学科
編入学試験「英語」問題用紙（4/4）

※解答は解答用紙の所定の欄に記入すること
問題用紙は持ち帰らないこと

受験番号	氏　名

quantities of antimicrobials used in aquaculture are mostly unknown (especially in LMICs), antibiotic residues and AMR bacteria are often found in aquaculture environments. Since aquatic environments are effective reservoirs of AMR bacteria from different sources (e.g. human waste water, hospital effluents and animal and plant agricultural run-off), the direct contribution of aquaculture to this pool of AMR remains extremely hard to untangle. The aquaculture sector contributes to the AMR reservoir mainly by administering **therapeutic** and **prophylactic** antimicrobial treatments to animals but also to a minor extent with the use of non-antibiotic chemicals (e.g. disinfectants), which has been shown to increase AMR. The presence of AMR in aquaculture production systems may not only pose a direct threat to human health, but could also impact production itself by lowering drug efficacy, decreasing the animal's immune system as seen in rats and selecting more virulent strains (i.e. faster growth and higher transmission rates of pathogens). Recent research has shown that antimicrobial use might not be the only factor behind selection and emergence of AMR and warmer temperatures have been associated with higher AMR rates in terrestrial bacteria, establishing a **sombre prospect** in light of global climate warming.

(Reverter *et al.*, *Nature Communications*, 11, 1870, 2020 より一部改変)

Streptococcosis; レンサ球菌症　**Acute hepatopancreatic necrosis disease;** 急性肝膵臓壊死症　**Therapeutic;** 治療の
Prophylactic; 予防の（ための）　**Sombre prospect;** 暗い見通し

問 1　下線部(a) のゴールとは何か日本語で簡単に説明しなさい。

問 2　水産養殖における特に中、低所得国において起こりうる問題を簡潔に説明しなさい。

問 3　下線部(b) を和訳しなさい。

問 4　下線部(c) を和訳しなさい。