平成１７年１月期論文博士外国語試験 問題・解答用紙　　　（日本人）1/2	受験番号 論

次の文章を読み、下記の質問に答えなさい。

Burning issues

The Kyoto Protocol is just a small first step in restricting man's influence on climate. If we can't prevent fires in Indonesia, such international efforts to limit the effects of climate change could be in vain.

The engagement of society's upper echelons with the problems of climate change reached a peak last week, when Queen Elizabeth II, accompanied in Berlin by ministers from Britain and Germany, launched a bilateral collaboration of the two countries' climatologists, business and investment communities.

While recognizing the newly energized Kyoto Protocol as a crucial first step in international collaboration, the meeting that followed focused on its limitations (see www.britischebotschaft.de/statevisit/en/press/climate_change_conference.htm). As one participant said, the world cannot wait for a ponderous succession of interminably negotiated increments to treaties to be achieved: we have years, not decades, to take steps that might prevent the worst possible consequences of current trends in greenhouse-gas emissions later this century. As a UK House of Lords report emphasized this week, emissions trading needs to take aviation into account. Two other essential goals include protecting carbon sinks and integrating southern countries into the framework.

For a stark example of the latter challenges, consider the peatlands of Indonesia. Under the Kyoto Protocol, it is technically possible for investors to back projects that increase the capacity of ecosystems to absorb carbon dioxide from the atmosphere, and to sell the resulting 'carbon credits' to polluters who need more time to control their emissions — though no such projects have yet been approved by the United Nations. The idea, which will be explored in detail in a News Feature in *Nature* next week, is to harness market forces to help limit atmospheric levels of CO_2. But success is far from guaranteed, and ecologists who study the world's peatlands are already pointing to a major gap in the Kyoto Protocol's carbon-trading provisions.

As soon as peat is drained, microbial activity previously held in check by waterlogging causes it to start releasing CO_2. If large expanses of drained swamp catch fire, the gas belches into the atmosphere in staggering quantities. Yet until 2012 at the earliest, no one can claim carbon credits under Kyoto for restoring the hydrology of a damaged peatland ecosystem — unless the project can somehow be shoehorned under the headings of forestry or agriculture.

Anyone who doubts the seriousness of this oversight should consider what happened in 1997, when El Niño conditions brought months of drought to southeast Asia. Millions of hectares of drained Indonesian peat swamps went up in smoke, releasing perhaps as much CO_2 as Europe emits each year by burning fossil fuels. The next time a severe El Niño hits, this catastrophe will be repeated (see page 145).

Negotiators considering the shape of the Kyoto Protocol after 2012 clearly should include peatland restoration under its carbon-trading arrangements. But we can act before then. The onus lies with Indonesia itself and the nine other members of ASEAN, the Association of Southeast Asian Nations. They collectively lost billions of dollars in the choking haze that smothered the region in 1997, and have set up a task force to consider the issue. But ASEAN has been slow to turn its concern into practical projects designed to prevent fires in Indonesia's peatlands.

As for the rest of the international community, little action has been taken, save for some tiny pilot projects to block the drainage canals that created the tinderbox in the first place. There is a real opportunity here to spend development aid money in a way that will legitimately benefit both recipient and donor. This would be a highly cost-effective way to simultaneously fix an ecological disaster and limit global warming.

平成１７年１月期論文博士外国語試験 問題・解答用紙　　　（日本人）2/2	受験番号 論

問１　本文のタイトルに適当な日本語訳をつけなさい。

問２　we have years, not decades, to take steps that might prevent the worst possible consequences of current trends in greenhouse-gas emissions later this century　を日本語に訳しなさい。

問３　"carbon credits"とはどういうことを意味しますか？　また、それはうまく機能してますか？

問４　最大の課題は何と考えられますか？

平成１７年１月期論文博士外国語試験 問題・解答用紙　　　（日本人）1/2	受験番号
	論

以下の文を読み、設問に答えよ。

Everybody knows that liquid water is necessary for life, at least as we know it. But just why exactly is it?

Liquid water may sound redundant, but planetary scientists insist on using the qualifier, for solid or vaporous water won't do. The biochemical reactions that sustain life need a fluid in order to operate. In a liquid, molecules can dissolve and chemical reactions occur. And because a liquid is always in flux, it effectively conveys vital substances like metabolites and nutrients from one place to another, whether it's around a cell, an organism, an ecosystem, or a planet. Getting molecules where they need to go is difficult within a solid and all too easy within a gas—vapor-based life would go all to pieces.

And why is water the best liquid to do ①the job? For one thing, it dissolves just about anything. "Water is probably the best solvent in the universe," says Jeffrey Bada, a planetary scientist at the Scripps Institution of Oceanography in La Jolla, Calif. "Everything is soluble in water to some degree." Even gold is somewhat soluble in seawater. (Before you get any ideas about extracting gold from the oceans, I should add that, according to Bada, the value of dissolved gold in a metric ton of seawater comes to about $0.0000004).

Water plays another key role in the biochemistry of life: ②bending enzymes. Enzymes are proteins that catalyze chemical reactions, making them occur much faster than they otherwise would. To do their handiwork, enzymes must take on a specific three-dimensional shape. And it is water molecules that facilitate this.

Water may be a black sheep of the liquids. Water's ability to so successfully further the processes of life has a lot to do with just how unusual a fluid it is. Despite its ubiquity and molecular simplicity, H_2O is abnormal in the extreme.

For starters, while other substances form liquids, precious few do so under the conditions of temperature and pressure that prevail on our planet's surface. In fact, next to mercury and liquid ammonia, water is our only naturally occurring inorganic liquid, the only one not arising from organic growth. It is also the only chemical compound that occurs naturally on Earth's surface in all three physical states: solid, liquid, and gas. ③Good thing, otherwise the hydrological cycle that most living things rely on to ferry water from the oceans to the land and back again would not exist. This cycle of evaporation and condensation has come to seem so perfectly natural that we never think to remark on why no other substances display such transformations.

Compared to most other liquids, water also has an extremely large liquid range. Pure water freezes at 0°C and boils at 100°C. Add salt and you can lower the freezing temperature; natural brines are known with freezing points below -46°C. Add pressure and you can raise the boiling temperature; deep-sea vent waters can reach over 343°C. Water also has one of the highest specific heats of any substance known, meaning it takes a lot of energy to raise the temperature of water even a few degrees.

Water's broad liquid range and high heat capacity are good things, too. ④They mean that temperatures on the Earth's surface, which is more than two-thirds water, can undergo extreme variations—between night and day, say, or between seasons—without its water freezing or boiling away, events that would throw a big wrench into life as we know it. As it is, the oceans serve as a powerful moderating influence on the world's climate.

Liquid water has yet another unusual property that means the difference between life and essentially no life in cold regions of the planet. Unlike most other liquids when they freeze, water expands and becomes less dense. Most other frozen liquids are denser than their melted selves and thus sink. If it sank, ice, being unable to melt because of the insulating layer of water above it, would slowly fill up lakes and oceans in cold climates, making sea life in those parts of the world a challenging prospect.

(from Life's Little Essential by Peter Tyson; NOVA Science Programming on Air and Online)

平成１７年１月期論文博士外国語試験 問題・解答用紙　　　（日本人）2/2	受験番号 論

設問 1. ①の the job とは、どのようなことか。

設問 2. ②の bending enzyme に当たる生化学用語に○をつけよ。

(　　) conformation
(　　) remodeling
(　　) restructuring
(　　) transcription
(　　) transformation

設問 3. ③の文をわかりやすく日本語に翻訳せよ。

設問 4. ④の文をわかりやすく日本語に翻訳せよ。

設問 5. アンモニアの沸点と融点の差は 34.3℃、固体アンモニアは液体アンモニアより比重が高い。地球の海が水ではなく液体アンモニアであった場合、この文章で述べられている地球の物理的生命環境の特性にどのようなことが起こると考えられるか。