

平成21年度

大学院理学系研究科生物科学専攻

博士前期課程

秋募集 入学試験問題

英 語

試験時間：10:30～12:00

配点： 150点

注意

- (1) 問題Ⅰ～問題Ⅲに解答しなさい。問題用紙はこの表紙を含めて6枚ある。
- (2) 解答用紙は3枚ある。問題ごとに、各々1枚の解答用紙を使用しなさい。
- (3) それぞれの解答用紙に、受験番号、氏名、問題番号（問題Ⅰ～問題Ⅲ）を記入しなさい。
- (4) 解答用紙の表面に書ききれない場合には、裏面の指定された部分を使用しなさい。
- (5) 配付された解答用紙は、3枚とも提出しなさい。

問題 I . 次の英文を読んで、下の問 1 ～問 5 に答えなさい。

In a study, published in October's British Medical Journal, of 97,000 deliveries in 410 American hospitals, perinatal specialist Dr. Jose Villar found the risk of death for mothers who had Caesareans, while slight (0.01 percent of the women who delivered vaginally died vs. 0.04 percent who had elective C-sections), was triple (ア) that of those who delivered vaginally. "The C-section increases risk because it's major surgery," Villar says. Mothers who had undergone a Caesarean were also more likely to need blood transfusions and stay in the hospital more than a week after delivery. The risk of death for infants delivered via C-section—who are more likely to have a low birth weight—was double that of vaginal births, and C-section babies were more likely to have respiratory problems. According to a study published in the journal Birth, labor clears liquid from the infant's lungs, preparing the baby to breathe outside the womb. Caesareans impede this process. (イ) Yet the rate of Caesareans is rapidly increasing: in 2006, C-sections accounted for 31.1 percent of births nationwide, a 50 percent increase over the past 10 years. Natural birth—without drugs or interventions—whether at home or in a hospital, remains a rarity (despite the fact that home births do not have an appreciably higher risk rate than hospital births).

Among the controversy over what constitutes an ideal birth experience, doctors, researchers and natural-birth advocates agree that Caesareans save lives when medically necessary. But defining medical necessity is complicated. Natural-birth advocates refer to a "cascade of interventions" caused by hospitals' practice of using the drug Pitocin to stimulate labor. The drug can cause painful contractions, which doctors treat with an epidural painkiller. The epidural can then retard contractions and lead to more drugs, fetal stress and the doctor's recommendation of a Caesarean.

Some doctors say the increased rate of Caesareans is partially attributable to maternal demand: busy mothers may want to schedule their deliveries. Reports that celebrities such as Victoria Beckham and Britney Spears had Caesareans have popularized the procedure, some doctors say. And some women are scheduling them early. According to the March of Dimes, a leading nonprofit organization for pregnancy and baby health, late preterm delivery (34 to 36 weeks) increased from 7.3 percent to 8.9 percent between 1990 and 2004 in the United States. "No one knows how much of (ウ) that is maternal choice", says Ann Stark, head of Texas Children's Hospital. "There are certainly women who want timed, elective delivery surgically". (エ) According to a recent study, attendance at Lamaze classes, which teach women how to manage labor pain without drugs, dropped 14 percent between 2000 and 2005. Although the United States has one the highest rates of Caesareans and of infant mortality,

Villar says, the rest of the developed world is catching up.

(Newsweek, February 4, 2008 の記事より抜粋, 一部改変)

注) delivery, 分娩; perinatal, 周産期の; Caesarean, C-section, 帝王切開;
elective, 随意の; respiratory, 呼吸の; labor, 陣痛; womb, 子宮;
intervention, 治療措置; advocate, 支持者; practice, 診療; contraction, 子宮収縮;
epidural, 硬膜外注射 (の); Victoria Beckham, Britney Spears, 女性セレブの名前;
Lamaze, ラマーズ法; mortality, 死亡率

問 1. 下線部 (ア) と (ウ) の that はそれぞれ何を指すかを英語で述べなさい。

問 2. 文中に述べられている, 新生児にとっての帝王切開のリスクとは何かを日本語で述べなさい。

問 3. 帝王切開による出産が増えていることについて, 措置する医師側の理由と母親側の理由が述べられている。それぞれについて日本語で簡単に説明しなさい。

問 4. 下線部 (イ) (エ) をそれぞれ和訳しなさい。

問 5. この英文に適する表題を英単語 6 語以内で付けなさい。

問題Ⅱ. 次の英文を読んで、下の問1～問6に答えなさい。

A century ago, Henry Ford's first car ran on alcohol, while Rudolf Diesel fired his namesake engine with peanut oil. But both inventors soon discovered that "rock oil," when slightly refined, held far more bang per gallon than plant fuel, and was cheap to boot. Oil soon left plant fuels in the dust. Recently, with the Middle East in turmoil and oil security once again a hot issue, the U.S. Congress gave the ethanol industry another boost, extending the tax credits and tariffs while requiring that 7.5 billion gallons (28 billion liters) of the nation's fuel come from ethanol or biodiesel by 2012. (ア) The biofuels boom was on.

By this summer, with Nebraska's 16 (イ) ethanol plants gearing up to consume a third of the state's crop, corn prices had doubled, briefly topping four dollars a bushel, and growers were looking forward to the best profits in memory. "This is the first year I've planted all corn and no beans," says Roger Harders, a farmer in Nebraska. He also has cattle that this year will eat a lot more grass than four-dollar corn. (ウ) "You're almost tempted to get out of the cattle business and sell your corn outright."

Christine Wietzki, a former farm kid from western Nebraska, is technical manager for one of the newest and most advanced ethanol plants in the country, the BioFuels plant in tiny Mead, Nebraska, population 564. She's spent much of her young career turning food into fuel and believes it's a good deal all around. Wietzki shows off the plant, a cluster of new white buildings, tanks, and a grain bin rising from thick gray mud next to a pungent, 30,000-cow feedlot. Much of what happens in its tanks and pipes is typical of any large distillery—after all, people have been turning grain into alcohol for eons. The corn is ground, mixed with water, and heated; added enzymes convert the starch into sugars. In a fermentation tank, yeast gradually turns the sugars into alcohol, which is separated from the water by distillation. The leftover, known as distillers' grains, is fed to the cows, and some of the wastewater, high in nitrogen, is applied to fields as a fertilizer. The process also gives off large amounts of carbon dioxide, and that's where ethanol's green label starts to brown. (エ) Most ethanol plants burn natural gas or, increasingly, coal to create the steam that drives the distillation, adding fossil-fuel emissions to the carbon dioxide emitted by the yeast. Growing the corn also requires nitrogen fertilizer, made with natural gas, and heavy use of diesel farm machinery. Some studies of the energy balance of corn ethanol—the amount of fossil energy needed to make ethanol versus the energy it produces—suggest that ethanol is a loser's game, requiring more carbon-emitting fossil fuel than it displaces. Others give it a slight advantage. But however the accounting is done, (オ) corn ethanol is no greenhouse panacea.

But Wietzki and her colleagues in Mead think they can do better. They hope to improve

the energy balance and greenhouse gas benefits of ethanol by creating a closed-loop system—which is where those cows come in. They plan to fire their boilers with methane from two giant four-million-gallon biodigesters fed with cattle manure from the feedlot next door—in effect using biogas to make biofuel. The increased efficiency, she says, isn't only good for the environment, it's also good business, especially if the price of corn keeps rising or oil drops below \$45 a barrel or so, the lowest price at which ethanol backers say the fuel can compete with gasoline in the U.S. "The last people standing," Wietzki says, "will be highly efficient producers like us."

(Joel K. Bourne, Jr. "Green Dreams", National Geographic, Vol. 212, No. 4, 2007 より抜粋, 一部改変)

注) bang, 瞬発力; turmoil, 混乱; tax credit, 税額控除; tariff, 関税;
bushel, 穀物計量の単位; outright, 完全に; Mead, 町の名称;
bin, (穀物などの) 貯蔵所; pungent, (味覚・嗅覚を) 強く刺激する;
feedlot, (家畜を肥育する) 飼養場; distillery, 蒸留精製工場; eon, 非常に長い年月;
leftover, 残り物; fertilizer, 肥料; panacea, 万能薬; manure, (家畜の) 糞

問 1. 下線部 (ア) の理由を本文の内容にもとづいて説明しなさい。

問 2. 下線部 (イ) の意味を説明しなさい。

問 3. 下線部 (ウ) において Roger Harders 氏がこのように述べる理由を説明しなさい。

問 4. 下線部 (エ) を和訳しなさい。

問 5. 下線部 (オ) の理由を本文の内容にもとづいて説明しなさい。

問 6. 本文中に述べられている, トウモロコシからのエタノール生産における問題点の改善策について説明しなさい。

問題Ⅲ. 以下の和文（問1～問2）を英文に訳しなさい。必要に応じて（ ）内の語句を使用してもよい。

問1.

生物は遺伝情報を子孫に伝え、自己複製する。細胞は最小の自己複製単位であり、遺伝情報の運び手である。すべての細胞は、遺伝情報を二重らせんのDNAとして保持している。

子孫 (progeny)

問2.

私は日本の堺市にある大阪府立大学の生物科学科の4年生で、2009年3月に理学士をとる予定です。続けてアメリカで勉強したいので、貴校の大学院に進学したいと思っています。外国人留学生のための経済的援助があるでしょうか。大学4年間在学中の私の成績は大変すぐれています。私はとくに分子生物学に興味を持っています。お返事をお待ちしています。

理学士 (B. S. degree), 経済的援助 (financial assistance)