

大葉大學 九十二 學年度 研究所博士班 招生考試試題紙					
系 所 別	組 別	考 試 科 目 (中 文 名 稱)	考 試 日 期	節 次	備 註
生物產業科技學系		專業英文論文閱讀能力測驗	6 月 27 日	第 1 節	共 3 頁, 第 1 頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

P3-1

1. 筆試題目共有十題，任選五題作答。每題 20 分，合計 100 分。
2. 作答方式：將英文摘要改寫成中文（不必抄題）。
3. 人名、專有名詞及無適當中文翻譯之名詞，如菌種、酵素名稱等，可依原文寫出。
4. 作答題數超過五題者，將按作答順序取前五題計分，其餘答案不予計分。
5. 一律橫式作答。

題目：

1. The growth of 24 strains of lactic acid starter bacteria (*Streptococcus thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Lactococcus lactis*) and 24 strains of probiotic bacteria (*Lactobacillus acidophilus*, *Lactobacillus casei*, *Lactobacillus paracasei*, *Lactobacillus rhamnosus* and *bifidobacteria*) in liquid media containing different substances was assessed. The substances used were salts (NaCl and KCl); sugars (sucrose and lactose); sweeteners (acesulfame and aspartame); aroma compounds (diacetyl, acetaldehyde and acetoin); natural colorings for fermented milk (red, yellow and orange colorings); flavoring agents (strawberry, vanilla, peach and banana essences); flavoring-coloring agents (strawberry, vanilla and peach); nisin, natamycin and lysozyme. Bacterial growth in the presence of natural fruit juices (green apple, kiwi, pineapple, peach and strawberry) with or without neutralization and cell viability in lactic acid acidified (pH 4 and 5) milk for 4 weeks at 51°C were also studied. Some compounds (KCl, sweeteners, aroma compounds, natamycin, flavoring agents and the peach flavoring-coloring agent) did not influence the growth of the strains in the concentrations commonly used in the dairy industry. The effect of other substances (especially flavoring-coloring agents) on the growth of lactic acid starters and probiotic bacteria was strain-dependent. Natural fruit juices weakly inhibited mainly *S. thermophilus* strains. Cell viability during cold storage in acidified milk was satisfactory for *L. delbrueckii* subsp. *bulgaricus* and *L. casei* group strains. For *L. acidophilus* and *Bifidobacterium*, the decreases in cell counts at pH 5 were negligible. Nevertheless, decreases from 1.6 to 6.2 and from 0.1 to 7.6 log orders, respectively were observed at pH 4.
2. A series of 24-h cultivations was performed to establish the impact of specific growth rate on sterol biosynthesis in *Saccharomyces cerevisiae*. Ergosterol is a major sterol in yeast cells, but intermediates of its synthesis and products of its transformation are also detected. In the cultivations, flow of synthetic medium into the bioreactor was controlled by means of a profile of CO₂ concn. in outlet gases. This profile was acquired by simulation according to a mathematical model of cultivation. The profile of CO₂ concn. corresponded to a precalculated profile of specific growth rate. Cultivation was divided into 2 phases with different growth rate values. A constant value of specific growth rate was maintained in the 1st phase. Specific growth rate was decreased by controlling the inflow in the 2nd phase, beginning after 12 h of cultivation. Other cultivations were carried out using "physiological control", which consisted of determining the immediate physiological state, e.g. respiratory quotient, and selecting the control strategy according to metabolic state. Selected control strategy ensured an immediate action-inflow of medium. Where specific growth rate decreased in the 1st phase, total sterol content in the yeast dry biomass increased less than or equal 2.7%, but ergosterol purity decreased, contaminants increasing less than or equal 23.3% in the sterol fraction. When a constant value of respiratory quotient was maintained at approx. 1.1, total sterol level in yeast dry biomass and ergosterol purity were constant. Changes in respiratory quotient in the growth and final phases of cultivation led to increased total sterol concn. of less than or equal 2.83% in yeast dry biomass. However, the purity of ergosterol decreased, the amount of sterol contaminants increasing less than or equal 21.2% in the sterol fraction.

3. Maitake (*Grifola frondosa*) is the Japanese name for an edible fungus with a large fruiting body characterized by overlapping caps. It is a premier culinary as well as medicinal mushroom. Maitake is increasingly being recognized as a potent source of polysaccharide compounds with dramatic health-promoting potential. The most recent development is the MD-fraction, a proprietary maitake extract. Its Japanese inventors consider to be a notable advance upon the preceding D-fraction. The D-fraction, the MD-fraction, and other extracts, often in combination with whole maitake powder, have shown particular promise as immunomodulating agents, and as an adjunct to cancer and HIV therapy. They may also provide some benefit in the treatment of hyperlipidemia, hypertension, and hepatitis.
4. Experimental rat models (5-week-old Sprague-Dawley rats) with hyperlipemia were prepared by feeding high-cholesterol feed containing sodium cholate and casein as a protein source. Dried maitake (*Grifola frondosa*) powder was mixed with the basic high-cholesterol feed and the serum lipids were periodically measured. Values of cholesterol, triglyceride and phospholipid in serum of rats in the maitake-feed group were suppressed by 0.3-0.8 times those in animals fed the basic feed, the latter values being close to those in rats given normal feed. The value of high density lipoprotein (HDL)-cholesterol in serum which is generally reduced by the ingestion of high-cholesterol feed remained the level it was at the beginning of the experiment. Weights of extirpated liver and epididymal fat-pads were significantly less (0.6-0.7 times) than those in the basic feed group, indicating that maitake inhibits lipid accumulation in the body. Liver lipids were also measured and the values were found to be decreased by maitake administration as true of serum lipid, suggesting maitake has an anti-liver lipid activity. Measurement of the amount of total cholesterol and bile acid in feces showed, the ratio of cholesterol-excretion had increased 1.8 times and bile acid-excretion 3 fold by maitake treatment. From these results, it is believed that maitake helps to improve the lipid metabolism as it inhibits both liver lipid and serum lipid which are increased by the ingestion of high-fat feed.
5. This study examines the potential of a continuous countercurrent supercritical carbon dioxide fractionation technique for deacidification of crude rice bran oil. A pilot scale packed column was utilized for the experiments. It was shown that fractionation at low pressure, 138 Bar, and high temperature, 80°C, effectively removed free fatty acids from crude rice bran oil without any oryzanol loss in the extract fraction. Oryzanol content of the raffinate fraction was three times higher than that of the feed material. Phytosterol fatty acid ester content of the raffinate fraction was also increased during the deacidification process, however the enrichment of these moieties was not as high as that found for oryzanol.
6. Raw rice bran oil contains free fatty acids, unsaponifiable matter, phosphatides and wax as the main constituents. The wax portion of the oil contains phenols such as tocopherol, oryzanol etc. in reasonable quantity. A higher fatty acid like stearic acid and a processing oil are generally added during the compounding of rubber as a co-activator and a processing aid respectively. Phenol derivatives are used in rubber compounding as antioxidants. In the present study the above compounding ingredients were replaced by raw rice bran oil in carbon black and silica filled systems in NR compounding and the results obtained are compared with reference systems. In sulphur accelerated system of NR presently studied, it was found that raw rice bran oil can substitute for the process oil, antioxidant and fatty acid without much affecting the cure characteristics of the mixes and physical properties of the vulcanizates. Apart from the low cost of the product, it will be helpful in also saving energy during mixing. The high free fatty acid content and non-toxic nature of this non-edible natural oil could therefore be an added advantage in the rubber product manufacturing industry.
7. The inhibitory effects of the dormant spores, the germinating spores, the sporoderm-broken germinating spores (SBGS), and the lipids extracted from the germinating spores of *Ganoderma lucidum* on the growth of mouse hepatoma, sarcoma S-180, and reticulocyte sarcoma L-II cells were investigated, respectively. The dormant spores could be activated by germination, and thus the bioactivities of the spores might be enhanced. The sporoderm-broken spores could show much higher bioactivities than the whole spores. Both the lipids extracted from the germinating spores and the SBGS of *G. lucidum* had remarkable antitumor effects in a dose-dependent manner, and could significantly inhibit three tumors with an inhibition of 80 - 90%.

8. In higher plants, a *cis*-acting element, DRE/CRT, is involved in gene expression responsive to drought and low-temperature stress. To understand signal transduction pathways from the cold stress signal to gene expression, we characterized a gene family for DRE/CRT-binding proteins DREB1A and CBF1 in *Arabidopsis thaliana*. DREB1A and CBF1 were shown to be involved in low-temperature-responsive gene expression. We screened an *Arabidopsis* genomic DNA library with the cDNA fragment of DREB1A as a probe and isolated *DREB1A* and 2 related genes, *DREB1B* (=CBF1) and *DREB1C*. These were arrayed in the order B, A, C in an 8.7 kb region of *Arabidopsis* chromosome 4. Northern blot analysis using gene-specific probes showed that the 3 *DREB1* genes are induced mainly by cold stress but not by osmotic stress in leaves, roots, and stems. Several conserved sequences were found in the promoter regions of all 3 genes. The β -glucuronidase (GUS) reporter gene driven by the *DREB1* promoters was induced at transcriptional level by low temperature in transgenic *Arabidopsis* plants.
9. The purpose of this study was to examine variations in learning and memory and brain spongy degeneration with age in senescence-accelerated mice (SAM). Senescence-accelerated mice (P8 strain) were divided into five age groups (containing mice at 3, 6, 9, 12, and 15 months old), and each group included 20 male and 20 female mice. Animals were fed a general solid diet; body weight and food intake were recorded and open field activity test and single-trial passive avoidance were evaluated during the experiment. After the experiment, mice were sacrificed to evaluate the brain histopathology of spongy degeneration. The results show that the 9-month-old group had the highest food intake ($p < 0.01$). Body weights of the 12- and 15-month-old mice decreased after the experiment. In the open field activity test, locomotion decreased with time in each group. In learning and memory, 15-month-old mice had significantly lower memory ability than did 6-month-old mice in the single-trial passive avoidance test ($p < 0.05$) for males. However, in female groups, 15-month-old mice had significantly lower learning ability and memory ($p < 0.05$). Spongy degeneration of the brain became more serious with age. Vacuoles were mainly observed in the brain stem and spinal cord section, and increased from front to back. To sum up, the results indicate that learning and memory abilities decreased and brain spongy degeneration became more serious with age. Therefore, we conclude that the results of this study may serve a model for future aging studies.
10. Hot air, microwave and hot air-microwave drying characteristics of kiwifruits (5.03p 0.236 mm thick) were investigated. Drying rates, shrinkage and rehydration capacities of these drying regimes were compared. The drying took place in the falling rate drying period regardless of the drying method. Drying with microwave energy or assisting hot air drying with microwave energy resulted in increased drying rates and substantial shortening of the drying time. Shrinkage of kiwifruits during microwave drying was greater than hot air drying. Less shrinkage was observed at hot air-microwave drying. Microwave dried kiwifruit slices exhibited lower rehydration capacity and faster water absorption rate than the other drying methods studied.