受験番号：28IPB001

問１

Insects are broadly divided into *Holometabola* and *Hemimetabola* according to the form of development. The morphogenesis of *Holometabola* such as *Drosophila* has been well studied, while the morphogenesis of *Hemimetabola* has been little studied. However, some of the pests are hemimetabolous insects such as grasshoppers, locusts and cockroaches, and thus the genetic recombination techniques are requisite to control the hemimetabolous insects. The genetic recombination techniques are also requisite when hemimetabolous insects are used as natural enemy insects.

In one of the techniques of genetic recombination, transgenesis, in which a specific exogenous gene is introduced, the efficiency of incorporation of the exogenous DNA into genomic DNA is low. Therefore, a special means is required in order to increase the efficiency. DNA transposons are currently spread as the means therefore. DNA transposons are excised from DNA by transposases and inserted to target sequences in different DNA.

問２

After extraction, a mixture of the pulverized material and the solvent may be subjected to solid-liquid separation according to a well-known method, and only the extraction solution may be recovered.

An extract containing ergosterol peroxide may be obtained by optionally dehydrating the extraction solution with a dehydrating agent such as anhydrous sodium sulfate and then distilling off the solvent. The thus obtained extract may be further appropriately fractionated and separated by column chromatography such as liquid chromatography, extraction, fractional precipitation and the like. The fraction thus having an increased purity may be used instead of the extract.

The neuronal cell activating agent contains a peroxide of ergosterol as an active component. The content of the active component may vary according to the age and body weight of the subject taking the agent. It is preferable that the content is such that 0.1 to 1000 mg/kg, more preferably 1 to 100 mg/kg and most preferably 5 to 50 mg/kg of the peroxide of ergosterol can be taken per day by an adult.

問３

<Juvenile blowfish estrogen administration test 1>

An effect on gonads of administration of estrogen to blowfish during a period when gonads are sexually plastic is examined. The estrogen used was synthetic estradiol and the blowfish used was *Fugu rubripes*. Estradiol in the form of an ethanol solution dissolved in ethanol was periodically added to the breeding water. More than one test section was established to which variously different amounts of estrogen were added. Specifically, 8 sections in total were established including test section 1 with the estrogen concentration in the breeding water of 1 ppb by weight (1 ng/g); test section 2 with 5 ppb by weight (5 ng/g); test section 3 with 10 ppb by weight (10 ng/g); test section 4 with 25 ppb by weight (25 ng/g); test section 5 with 50 ppb by weight (50 ng/g); and test section 6 with 100 ppb by weight (100 ng/g); non-treatment control section 1 with no addition; and control section 2 with addition of ethanol only (estradiol concentration: 0 ppb by weight). The amounts of ethanol in all sections were the same.

問４

What Is Claimed Is:

1. A method for inducing cataract, comprising:

a damaging step for damaging a DNA of a collected lens or a lens of a non-human organism.

3. The method for inducing cataract according to claim 1 or 2, wherein:

the damaging step is a step for damaging a DNA by applying a stimulus with a predetermined intensity to the collected lens or the lens of the non-human organism, and

the intensity of the stimulus is in an extent that only a part of a cross-section of the lens is opacified after application of the stimulus.

4. The method for inducing cataract according to any one of claims 1 to 3, wherein the damaging step comprises (i) and/or (ii) indicated below:

(i) delivering ultraviolet or radiation to the collected lens or the lens of the non-human organism;

(ii) bringing the collected lens or the lens of the non-human organism into contact with a substance inducing DNA damage.

5. A cataract model organism obtained by the method according to any one of claims 1 to 4.