

Escuela de Biología
Universidad de Costa Rica
Problemas especiales en Zoología 14 (B-0673)
Cambios fenotípicos producto de alteraciones ambientales

Ciclo: II - 2010

Créditos: 4

Horas lectivas: 4 horas de teoría

Requisitos: Ecología general (B-0304, B-0305)

Profesor: Dr. Edgar Rojas

Descripción: La evolución biológica moderna se basa en el modelo de la herencia genética de Mendel. Actualmente, este modelo está incompleto. La evidencia empírica muestra que el medio ambiente (incluidas todas las influencias exteriores sobre el genoma) pueden imponer efectos transgeneracionales y generar variación heredable para una amplia gama de rasgos en animales, plantas y otros organismos. Tal efecto pueden estar mediados por la transmisión de la epigenética, citoplasmática, somáticos, variaciones nutricionales, ambientales y de comportamiento. El peso de la teoría y la evidencia empírica indica que la herencia no genética es un factor poderoso en la evolución, el cual puede generar resultados no previstos en el modelo genético-mendeliano.

Objetivos: Aprender el significado y consuetudiar un marco general de la herencia no genética y sus implicaciones evolutivas.

Objetivos específicos.

- Conocer la plasticidad de la expresión de los fenotipos en diferentes organismos
- Aprender acerca del efecto del medio ambiente en la expresión de los genes.
- Aprender acerca de la herencia no heredable y su impacto en los procesos evolutivos
- Aprender la interacción genes y medio ambiente en el desarrollo biológico de diferentes organismos.
- Aprender acerca de las limitaciones de la herencia genética y la variabilidad de los fenotipos.
- Poner en perspectiva los conceptos evolutivos y los nuevos descubrimientos en la herencia donde genes no intervienen en la expresión fenotípica.

Contenidos

1. Introducción: Nueva definición del concepto de gene y genoma.
2. La expresión y regulación de genes, función y diferentes tipos de ARN.
3. Interacción de genes y el medio ambiente.
4. Postulados de Lamarck, y los efectos ambientales.
5. Plasticidad de los fenotipos y su relación con la diversidad de organismos y efectos ambientales.
6. Desarrollo poligenismo (Polyphenism) y las interacciones con el medio ambiente .
7. Desarrollo embrionario, regulación de genes, Genes HOX box, y la interacción con el medio ambiente.

8. Concepto de S. J. Gould y R. C. Lewontin, programas de adaptación no solamente actúan por medio de la selección natural, y la visión centrista de los procesos evolutivos de acuerdo al concepto de genes.
9. Evolución y desarrollo un nuevo concepto (Evo-devo).
10. Herencia no genética y sus implicaciones evolucionarias.
11. Teoría de la formación de nuevas especies de manera gradual por cambios mutaciones y la actuación de la selección natural en estos.
12. Postulados de Richard Goldschmidt, la aparición de nuevas especies súbitamente y su conexión con el desarrollo embrionario y control de genes.
13. El concepto de ecología, desarrollo y evolución (eco-devo-evo) como nueva alternativa para explicar la evolución de la diversidad de especies y la plasticidad de los fenotipos.
14. Plasticidad y variabilidad del genoma humana, y su posible interpretación para la cura de enfermedades. Interacción de genes medio ambiente en la expresión de enfermedades.
15. Conclusiones.

Metodología

La teoría consiste en clases magistrales y discusiones de lecturas asignadas. Cada estudiante llevará a cabo un proyecto individual sobre un tema en particular y al final del curso lo presentará por escrito.

Cronograma

Semana 1	Introducción. Nueva definición del concepto de gene y genoma.
Semana 2 y 3	La expresión y regulación de genes, función y diferentes tipos de ARN
Semana 4 y 5	Interacción de genes y el medio ambiente
Semana 6	Postulados de Lamark, y los efectos ambientales. Plasticidad de los fenotipos y su relación con la diversidad de organismos y efectos ambientales
Semana 7 y 8	Desarrollo poligenismo (Polyphenism) y las interacciones con el medio ambiente. Desarrollo embrionario, regulación de genes, Genes HOX box, y la interacción con el medio ambiente
Semana 9	Concepto de S. J. Gould y R. C. Lewontin, programas de adaptación no solamente actúan por medio de la selección natural, y la visión centrista de los procesos evolutivos de acuerdo al concepto de genes. Teoría de la formación de nuevas especies de manera gradual por cambios mutaciones y la actuación de la selección natural en estos.
Semana 10	Postulados de Richard Goldschmidt, la aparición de nuevas especies súbitamente y su conexión con el desarrollo embrionario y control de genes
Semana 11 y 12	Evolución y desarrollo un nuevo concepto (Evo-devo). Herencia no genética y sus implicaciones evolucionarias.
Semana 13 y 14	El concepto de ecología, desarrollo y evolución (eco-devo-evo) como nueva alternativa para explicar la evolución de la diversidad de especies y la plasticidad de los fenotipos.
Semana 15	Plasticidad y variabilidad del genoma humana, y su posible interpretación para la cura de enfermedades. Interacción de genes medio ambiente en la expresión de enfermedades.

Semana 16

Presentación de proyectos individuales

Evaluación

3 exámenes parciales, cada uno 25% de la nota final.

Proyecto final 25%.

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