

SEMESTER V**ZY5B07U CORE COURSE 7****EVOLUTION, ZOOGEOGRAPHY AND ETHOLOGY****54 hrs****Credits 3****Objectives:**

- To acquire knowledge about the evolutionary history of earth (living and non living)
- To learn various tools and techniques for evolutionary studies
- To study the distribution of animals on earth, its pattern, evolution and causative factors
- To impart basic knowledge on animal behavioural patterns and their role

Prerequisite:

- Basic knowledge on principles of inheritance and variation
- Knowledge on molecular basis of inheritance
- Basic understanding on the mechanism and factors affecting evolution
- Knowledge on origin and evolution of man, Evidences of Evolution.

PART I – EVOLUTION (30 hrs)**Module I – Origin of life (5 hrs)**

Introduction

Origin of universe

Chemical evolution

Miller-Urey experiment

Haldane and Oparin theory

Module II – Theories of organic evolution (7 hrs)

Lamarckism

Critical analysis of Lamarck's propositions

Weisman's germplasm theory

Mutation theory.

Darwinism.

Critical analysis of Darwinism

Modern Synthetic theory(Neo Darwinism)

Neutral theory of molecular evolution

Module III – Population genetics and evolution (6 hrs)

Genetic basis of variation

Hardy Weinberg equilibrium

Change in gene frequencies

Factors affecting gene frequencies (brief account only)

Module IV – Evolution above species level (8 hrs)

Adaptive radiation

Microevolution

Macroevolution

Evolution of horse

Mega evolution

Punctuated equilibrium

Speciation -Phyletic and True- Sympatric and Allopatric.

Evolution of horse.

Module V – Geological time scale (4 hrs)

Geological dating with radioactive elements

Mass extinction

Core Readings (Modules 1-5)

Barnes, C.W. 1988. *Earth, Time and Life*. John Wiley & Sons, New York (Module 2 & 3)

Bendall, D. S. (ed.) 1983. *Evolution from Molecules to Man*. Cambridge University Press, U.K. (Module 2, 3 and 5)

Bull J.J and H.A. Wichman. 2001. Applied Evolution. *Annu. Rev. Ecol. Syst.* 32:183-217 (Visit the Annual Reviews home page at www.AnnulReviews.org.)

Chattopadhyay Sajib. 2002. *Life Origin, Evolution and Adaptation*. Books and Allied (P) Ltd. Kolkata, India.

- Goodwin,B. 1996. *How the Leopard Changed its Spots: The Evolution of Complexity*. Simon &Schuster, NY,USA. (Module 4 & 5)
- Jerry A.Coyne and H.Allen Orr.2004. *Speciation*. Sinauer Associates (Module 4)
- Rob Desalle and Ian Tattersall 2008.*Human Origins: What Bones and Genomes Tell Us about Ourselves*. Texas A&M University Press, USA. (Module 3 & 4)
- Sean B. Carroll and David M. Kingsley .2005 *Evolution: Constant Change and Common Threads*. Holiday Lectures on Science. Webcast or DVD available at www.hhmi.org/biointeractive/evolution. (Module 3 & 4)
- Strickberger, M.W.2000. *Evolution*. Jones and Bartlett, Boston. (Module 1-5)
- Verma P.S. and Agarwal V.K 2007 *Cell biology, Genetics, Molecular Biology, Evalution and Ecology*, S. Chand & Company New Delhi (Moldule 1-5)

PART II – ZOOGEOGRAPHY AND ETHOLOGY (24 hrs)

Module VI – Zoogeography: Introduction (5 hrs)

Origin of oceans and continents

Platetectonics – continental drift

Zoogeographical realms

Insular fauna-Continental Islands eg Madagascar.

Oceanic Islands eg Galapagoes.

Biogeography of India – with special reference to Western Ghats

Module VII – Animal distribution (5 hrs)

Types and means of animal distribution

Barriers in animal distribution.

Core Readings

Zoogeography

Andrews. M.I and Joy, K.P. 2003. *Environmental biology, evolution, ethology and Zoogeography*. St.Mary's press and book dept. (Module Vi, VII, VIII and IX)

Briggs, J.C. 1996. *Global Biogeography*. Elsevier Publishers. (Module VI and VII).

- Chandran, Subash M .D.1997. On the ecological history of the Western Ghats.
Current Science, Vol.73, No.2.146-155.
- Chundamannil , Mammen.1993. *History of Forest management in Kerala*. Report number 89. Kerala Forest Research Institute, Peechi, India.
- Daniels, R.J.R and J.Vencatesan .2008. *Western Ghats Biodiversity.People.Conservation*. Rupa &Co.New Delhi.India.
- Mani, M.S. 1974.*Ecology and Biogeography of India*. Dr. W. Junk b..v. Publishers , The Hague.
- Nair, C.S.1991. *The Southern Western Ghats : A Biodiversity Conservation Plan*. INTACH, New Delhi.
- Ramesh,B.R and Rajan Gurukkal., 2007.*Forest Landscapes of the Southern Western Ghats, India Biodiversity, Human Ecology and management Strategies*. French Institute of Pondicherry, India.
- Tiwari, S. 1985. *Readings in Indian Zoogeography*, (Module VI)

Module VIII – Ethology (1 hr)

Definition

History and scope of ethology

Module IX – Learning and imprinting (8 hrs)

Types of learning with examples

Experiments by K. Lorenz

Module X – Ethology of man (5 hrs)

Sociobiology and evolution of human behaviour

Primates and human socio groups

Human pheromones

Core Readings

- Bonner, J.T. 1980. *The Evolution of Culture in Animals*. Princeton University Press..NJ,USA. (Module 10)
- David McFarland. 1999. *Animal Behaviour*. Pearson Education Ltd . Essex, England. (Module 8 and 9)
- Dawkins, M.S. 1995.*Unravelling Animal Behaviour*. Harlow:Longman. (Module 8, 9 and 10)

- Dunbar,R. 1988. *Primate Social Systems*.Croom Helm,London. (Module 10 & 11)
- Manning Aubrey and Marian Stamp Dawkins 1998. *An Introduction to Animal Behaviour*.Cambridge University Press,UK. (Module 8, 9 & 10)
- Paul W. Sherman and John Alcock.,2001 Exploring Animal Behaviour- Readings from American Scientist 3rd Edn. Sinauer Associates Inc. MA,USA. (Module 10 & 11)
- Wilson, E.O. 1975. Sociobiology. Harvard University Press, Cambridge, Mass. USA. (Module 9)
- Zoological Society of Kerala Study material. 2002. *Environmental Biology and Ethology* Published by Zoological Society of Kerala (Module 6, 7, 8 & 9)

Selected Further Readings

Evolution

- Barnes, C.W. 1988. *Earth, Time and Life*. John Wiley & Sons, New York
- Bendall , D. S. (ed.)1983.*Evolution from Molecules to Man*. Cambridge University Press,U.K.
- Bull J.J and H.A.Wichman.2001.Applied Evolution. *Annu.Rev.Ecol.Syst.* 32:183-217 (Visit the Annual Reviews home page at www.AnnulReviews.org.)
- Chattopadhyay Sajib.2002. *Life Origin, Evolution and Adaptation*. Books and Allied (P) Ltd.Kolkata,India.
- Goodwin,B. 1996. *How the Leopard Changed its Spots: The Evolution of Complexity*. Simon & Schuster, NY,USA.
- Jerry A.Coyne and H.Allen Orr.2004. *Speciation*. Sinauer Associates
- Rob Desalle and Ian Tattersall 2008.*Human Origins: What Bones and Genomes Tell Us about Ourselves*. Texas A&M University Press, USA.
- Sean B. Carroll and David M. Kingsley .2005 *Evolution: Constant Change and Common Threads*. Holiday Lectures on Science. Webcast or DVD available at www.hhmi.org/biointeractive/evolution.
- Strickberger, M.W.2000. *Evolution*. Jones and Bartlett, Boston.

Ethology

- Bonner, J.T. 1980. *The Evolution of Culture in Animals*. Princeton University Press.NJ, USA.

- David McFarland. 1999. *Animal Behaviour*. Pearson Education Ltd. Essex, England.
- Dawkins, M.S. 1995. *Unravelling Animal Behaviour*. Harlow: Longman.
- Dunbar, R. 1988. *Primate Social Systems*. Croom Helm, London.
- Manning Aubrey and Marian Stamp Dawkins 1998. *An Introduction to Animal Behaviour*. Cambridge University Press, UK.
- Paul W. Sherman and John Alcock., 2001 *Exploring Animal Behaviour- Readings from American Scientist* 3rd Edn. Sinauer Associates Inc. MA, USA.
- Thomas A P (Editor) 2011 *Evolution, Zoogeography and Ethology*. Green leaf publications TIES Kottayam.
- Wilson, E.O. 1975. *Sociobiology*. Harvard University Press, Cambridge, Mass. USA.

ZY5B07U [P] PRACTICAL 7
EVOLUTION, ZOOGEOGRAPHY AND ETHOLOGY

36 hrs
Credit 1

1. Identification of Zoogeographical realms using map
2. Study on endemic species of each realm
3. Identification of different stages of horse evolution
4. Study on Homology / Analogy
5. Study on connecting links
6. Pheromone traps
7. Skinner box/T Maze
8. Identification of behaviour showing pictures
9. Experiment to demonstrate phototaxis using *Drosophila*/House fly
10. Experiment to demonstrate chemotaxis using *Drosophila*/House fly