

## Food Parasitology

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
	<b>Food parasitology</b>	2	2	6	Obligatory
<b>LECTURER(S)</b>			<b>Postal address, telephone nº, e-mail address</b>		
Gr. A: Dr. Rocío Benítez-Rodríguez (rbenitez@ugr.es) Gr. E: Dr. Victoriano Díaz-Saez (diazsaez@ugr.es) Gr. E: Dr. M <sup>a</sup> Desamparados Soler-Cruz (mdsoler@ugr.es )			Departamento de Parasitología (4 <sup>th</sup> floor). Facultad de Farmacia. Universidad de Granada. Telephone: +34-958243857		
<b>DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT</b>					
Human Nutrition and Dietetics					
<b>PREREQUISITES and/or RECOMMENDATIONS</b>					
<ul style="list-style-type: none"> <li>• Have studied the subjects Biology</li> <li>• Have adequate knowledge of: Scientific English, Basic Computer skills</li> </ul>					
<b>BRIEF ACCOUNT OF THE SUBJECT PROGRAMME</b>					
<ul style="list-style-type: none"> <li>• Basic concepts of Parasitology. Current importance of parasites in developed and developing countries: immunodepression, tourism, immigration and adoptions. Parasites and nutrition.</li> <li>• Main diseases producing parasites in man and their relationship with food.</li> <li>• Parasites that deteriorate food: General techniques of detection, identification and control.</li> </ul>					
<b>GENERAL AND PARTICULAR ABILITIES</b>					
CG1.1, CG1.2, CG1.3, CG2.1, CG2.2, CG3.4, CG5.4, CG7.4, CG8.1, CEM2.6, CEM3.1, CEM3.7, CEM3.8					



## OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

- Understand the current importance of parasites and their relationship to food / nutrition.
- Know the main parasites that produce diseases in man transmitted by food. Prevention and control of parasitic diseases.
- Know the main parasites that deteriorate food. Techniques of sampling and identification of parasites in food.

## DETAILED SUBJECT SYLLABUS

**UNIT 1.** Parasitology: Definition. Parasitism. Types of parasites and hosts.

**UNIT 2.** Geographical distribution of parasites: Factors that influence. Current importance of parasitic diseases in developed and developing countries: Immunodepression, tourism, immigration, adoptions and food customs.

**UNIT 3.** Effects of parasites on human health. Parasites and nutrition. Importance of Parasitology in the Degree of Human Nutrition and Dietetics. Parasitic foodborne diseases.

**UNIT 4.** Main groups of parasites that affect man. General characteristics of the parasitic protozoa. Amoebas of the digestive tract. *Entamoeba histolytica*. Other amoebas of interest transmitted by food. Study of the morphology, biological cycle, transmission mechanisms, main symptoms.

**UNIT 5.** Flagellates of the digestive tract. *Giardia lamblia*. Other flagellates of interest transmitted by food. Study of the morphology, biological cycle, transmission mechanisms, main symptoms. Malabsorption syndrome and steatorrhea.

**UNIT 6.** Apicomplexes of the digestive tract. Morphology and general biological cycle. *Cryptosporidium* spp. *Cyclospora cayetanensis*. *Isospora belli*. Study of the morphology, biological cycle, transmission mechanisms, main symptoms. Importance in immunosuppressed patients. *Sarcocystis* spp.

**UNIT 7.** Ciliates of the digestive tract. *Balantidium coli*. Study of the morphology, biological cycle, transmission mechanisms, main symptoms. Dysentery.

**UNIT 8.** Epidemiology, prophylaxis and control of fecal-oral transmission protozoa. Drugs against these diseases.

**UNIT 9.** *Toxoplasma gondii*. Study of the morphology and biological cycle. Acquired toxoplasmosis and congenital toxoplasmosis. Mechanisms of transmission, prophylaxis and control of



toxoplasmosis. Drugs against toxoplasmosis.

**UNIT 10.** Other protozoa of interest. *Plasmodium* spp. Current importance of malaria. *Trypanosoma cruzi*: Food transmission.

**UNIT 11.** Generalities of helminths. Classification.

General characteristics of the flukes. Hepatic flukes: *Fasciola hepatica*. *Dicrocoelium dendriticum*. *Clonorchis sinensis*. *Opisthorchis* spp. Study of the morphology, biological cycle, main symptoms, epidemiology, prevention and control measures.

**UNIT 12.** Lung and intestinal flukes of man. Study of the morphology, biological cycle, main symptoms, epidemiology, prevention and control measures. Drugs against trematodes.

**UNIT 13.** General characteristics of the cestodes. Classification. Major cestodes of the digestive tract. *Diphyllobothrium* spp. Study of the morphology and biological cycle. Main symptoms: megaloblastic anemia and factors involved. Epidemiology. Prevention and control measures. Sparganosis.

**UNIT 14.** *Taenia saginata* and *Taenia solium*. Study of the morphology, biological cycle, main symptoms, epidemiology, prevention and control measures. Cysticercosis. Other species of interest.

**UNIT 15.** *Echinococcus* spp: Hydatidosis. Morphology of the cyst. Main symptoms. Mechanisms of transmission. Prevention and control measures. Treatment against adults and cestode larvae.

**UNIT 16.** *Hymenolepis* spp. Study of the morphology, biological cycle, main symptoms, epidemiology, prevention and control measures.

**UNIT 17.** General characteristics of nematodes. Tissue nematodes. *Trichinella* spp. Morphology and biological cycle. Main symptoms. Mechanisms of transmission. Prevention and control measures of trichinellosis.

**UNIT 18.** Major nematodes of the digestive tract. *Trichuris trichiura*. Morphology and biological cycle. Main symptoms. Epidemiology, prevention and control measures.

**UNIT 19.** Hookworms parasitic of man. Morphology and biological cycle. Main symptoms. Epidemiology, prevention and control measures.

*Strongyloides stercoralis*. Morphology and biological cycle. Main symptoms. Importance in immunosuppressed patients. Epidemiology. Prevention and control measures.



**UNIT 20.** *Enterobius vermicularis*. Morphology. Biological cycle. Main symptoms. Epidemiology. Prevention and control measures.

**UNIT 21.** *Ascaris lumbricoides*. Morphology and biological cycle. Main symptoms. Eosinophilia and obstructive condition. Epidemiology, prevention and control.

**UNIT 22.** Emerging nematodes in our environment. Anisakids: *Anisakis* spp. Morphology. Biological cycle. Main symptoms. Allergies by Anisakids . Epidemiology. Prevention and control measures of anisakids.

**UNIT 23.** Other human interest helminths transmitted by water and / or food.

**UNIT 24.** Insects producing disease and / or deterioration of food. Myiasis produced by sarcophagidae and calliphoridae. Coleoptera: *Tribolium* spp. Other insects of interest.

**UNIT 25.** Major mites that cause disease in man and deteriorate foods: *Acarus*, *Tyrophagus* and *Glycyphagus*. Other mites of interest.

**UNIT 26.** Control of arthropods food spoilage.

**UNIT 27.** Methods of detection of parasites in water and food.

#### **PRACTICAL SYLLABUS:**

##### **Seminars / Workshops**

- Exercises, clinical cases and their resolution on programme topics.
- Epidemiology, prevention and control of diseases caused by protozoa of oral-fecal transmission.
- Epidemiology, prevention and control of toxoplasmosis.
- Mechanisms of transmission, prevention measures and control of trichinellosis.
- Prevention measures and control and anisakids.
- Control of arthropods food spoilage.
- Methods of detection of parasites in water and food.

##### **Laboratory practices**

- 1.- Identification of Protozoa.
- 2.- Identification of Cestodos and Trematodos.
- 3.- Identification of Nematodes.
- 4.- Identification and observation of adults, larvae of *Trichinella*.
- 5.- Obtention and observation of larvae of anisakids.
- 6.- Identification of insects and mites.



## READING

- Ash, L.; Orihel, T. 2010. Atlas de Parasitología Humana. Editorial Médica Panamericana., 5ª Edic. España.
- Cordero del Campillo, M.; Rojo Vázquez, F.A. (coord.). 2000. Parasitología Veterinaria. MacGraw-Hill Interamericana de España.
- Doyle, M.P., Beuchat, L.R. (eds). 2007. Food Microbiology: Fundamentals and Frontiers. 3er ed. ASM Press, Washington, D.C.
- Gállego Berenguer, J. 2003. Manual de Parasitología. EUB. Barcelona.
- Goddard, J. 2000. Physician's Guide to Arthropods of Medical Importance. CRC Press. Boca Raton.
- Hui, Y.H.; Sattar, S.A.; Murrell K.D.; Nip W-K.; Stanfield, P.S. 2000. Foodborne Disease Handbook. Vol. 2. Viruses, parasites, pathogens and HACCP, 2nd ed, Marcel Dekker Inc. New York.
- Motarjemi, Y. (ed). 2014. Encyclopedia of Food Safety. Vol.1-4. Academic Press
- Romero Cabello, R. 2007. Microbiología y Parasitología Humana. Bases etiológicas de las enfermedades infecciosas y parasitarias. Editorial Médica Panamericana., 3ª Edic. España.

## COMPLEMENTARY BIBLIOGRAPHY

- Broglia, A.; Kapel, C. 2011. Changing dietary habits in a changing world: Emerging drivers for the transmission of foodborne parasitic zoonoses. Vet. Parasitol. 182: 2-13.
- Chai, J.; Murrell, K.D.; Lymbery, A.J. 2005. Fish-borne parasitic zoonoses: Status and issues. Int. J. Parasitol. 35: 1233-54.
- Dorny, P.; Praet, N.; Deckers, N.; Gabriel, S. 2009. Emerging food-borne parasites. Vet. Parasitol. 163: 196-206.
- Frutos Garcia, J. 1994. Biología y control de plagas urbanas. Interamericana. McGraw-Hill, Madrid.
- Pozio, E. 2008. Epidemiology and control prospects of foodborne parasitic zoonoses in the European Union. Parasitol. 50: 17-24.



- Robertson, L.J.; Sprong, H.; Ortega, Y.R.; van der Giessen, J.W.; Fayer, R. 2014. Impacts of globalisation on foodborne parasites. Trends Parasitolol. 30 (1): 37-52
- Slifko, T.R.; Smith, H.V.; Rose, J.B. 2000. Emerging parasite zoonoses associated with water and food. Int. J. Parasitol. 30: 1379-93.
- Stephenson, L.S.; Latham, M.C.; Ottesen, E.A. 2000. Malnutrition and parasitic helminth infections. Parasitol. 121: S23-S38.
- Subramanyan, B.; Hagstrum, D.W. ed. 1996. Integrated management of insects in stored products. Marcel Dekker Inc. New York.
- Ubeira, F.M.; Valiñas, B.; Lorenzo, S.; Iglesias, R.; Figueiras, A.; García-Villaescusa, R. 2000. Anisakidosis y alergia. Un estudio seroepidemiológico en la Comunidad Autónoma Gallega. Documentos Técnicos de Salud Pública, Serie B, nº 24. Ed. Cosellería de Sanidade e Servicos Sociais (Xunta de Galicia, España).
- Zarlenga, D.S.; Trout, J.M. 2004. Concentrating, purifying and detecting waterborne parasites. Vet. Parasitol.

#### RECOMMENDED INTERNET LINKS

- <http://www.ugr.es/~parasito/>
- <http://www.dpd.cdc.gov>
- <http://www.who.int/>
- <http://www.fda.gov/default.htm>
- <http://www.aesa.msc.es/aesa/web/AESA.jsp>
- <http://www.fao.org/inicio.htm>

