

Food Parasitology

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
	Food parasitology	2	2	6	Obligatory
LECTURER(S)			Postal address, telephone nº, e-mail address		
Gr. A: Dr. Rocío Benítez Rodríguez, PhD. (rbenitez@ugr.es) Gr. E: Dr. Victoriano Díaz Saez, PhD. (diazsaez@ugr.es)			Department of Parasitology (4 th floor). Faculty of Pharmacy. University of Granada. Tlf: +34-958243857		
DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT					
Human Nutrition and Dietetics					
PREREQUISITES and/or RECOMMENDATIONS (if necessary)					
<ul style="list-style-type: none"> • Have studied the subjects: Biology • Have adequate knowledge of: Scientific English, basic computer skills 					
BRIEF ACCOUNT OF THE SUBJECT PROGRAMME					
<ul style="list-style-type: none"> • Basic concepts of Parasitology. Current importance of parasites in developed and developing countries: immunodepression, tourism, immigration and adoptions. Parasites and nutrition. • Main diseases producing parasites in man and their relationship with food. • Parasites that deteriorate food: General techniques of detection, identification and control. 					
GENERAL AND PARTICULAR ABILITIES					
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)					
<ul style="list-style-type: none"> • 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 Cestodes and Trematodes.
- 3.- Identification of Nematodes.
- 4.- Identification and observation of adults and larvae of *Trichinella*.
- 5.- Collection 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 ed. 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. 3rd edn. 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 edn, 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: 1233-1254.
- 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. Parasitologia 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 Parasitol. 30: 37-52

- Slifko, T.R.; Smith, H.V.; Rose, J.B. 2000. Emerging parasite zoonoses associated with water and food. Int. J. Parasitol. 30: 1379-1393.
- 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. 126: 195-217.

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>

