



**MARÍA TERESA ARMÚA  
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### SNI

Ciencias Agrícolas /  
Ciencias Veterinarias  
Categorización actual: Inicia  
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## Datos Generales

### INSTITUCIÓN PRINCIPAL

Universidad de la República/ Regional Norte - UDeLaR / Laboratorio de Vectores y Enfermedades transmitidas / Uruguay

### DIRECCIÓN INSTITUCIONAL

Institución: Universidad de la República / Regional Norte - UDeLaR / Sector Educación Superior/Público

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## Formación

### Formación académica

#### CONCLUIDA

#### DOCTORADO

(2007 - 2011)

Hokkaido University, Graduate School of Veterinary Medicine, Japón

Título de la disertación/tesis: Development of molecular diagnostic tools for canine taeniosis

Tutor/es: Ken Katakura

Obtención del título: 2011

Institución financiadora: Ministry Of Education Science And Culture, Japón, Japón

Palabras Clave: molecular diagnostic tools canine taeniosis

Áreas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas / Desarrollo de técnicas moleculares

#### GRADO

#### Doctor en Medicina y Tecnología Veterinaria\* (1995 - 2005)

Universidad de la República - Facultad de Veterinaria - UDeLaR, Uruguay

Título de la disertación/tesis:

Obtención del título: 2005

Palabras Clave: Medicina Veterinaria

Áreas de conocimiento:

Ciencias Médicas y de la Salud / Otras Ciencias Médicas / Otras Ciencias Médicas / Veterinaria

### Formación complementaria

#### CONCLUIDA

#### CURSOS DE CORTA DURACIÓN

#### Curso Filogenia Molecular: Inferencia y Aplicaciones (01/2015 - 01/2015)

Sector Gobierno/Público / Ministerio de Educación y Cultura / MEC. Instituto de Investigaciones Biológicas «Clemente Estable», Uruguay

50 horas

Palabras Clave: Máxima verosimilitud Inferencia bayesiana Filogenia Molecular

Áreas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Biología y Biología de la Evolución /

#### **Sistemática biológica: métodos y principios (01/2015 - 01/2015)**

Sector Educación Superior/Público / Universidad de la República / Facultad de Ciencias - UDeLaR ,  
Uruguay  
90 horas  
Palabras Clave: Máxima Parsimonia Filogenia  
Áreas de conocimiento:  
Ciencias Naturales y Exactas / Ciencias Biológicas / Biología y Biología de la Evolución /

#### **Expert in Zoonosis control (01/2009 - 01/2011)**

Sector Extranjero/Internacional/Otros / Hokkaido University , Japón  
Palabras Clave: zoonosis control  
Áreas de conocimiento:  
Ciencias Médicas y de la Salud / Ciencias de la Salud / Salud Pública y Medioambiental / Control de Zoonosis

#### **Control Measures against Echinococcosis (01/2004 - 01/2004)**

Sector Extranjero/Internacional/Otros / Hokkaido Institute of Public Health , Japón  
Palabras Clave: Echinococcosis

## **Idiomas**

### **Inglés**

Entiende muy bien / Habla muy bien / Lee muy bien / Escribe muy bien

### **Japonés**

Entiende regular / Habla regular / Lee regular / Escribe regular

### **Portugués**

Entiende muy bien / Habla bien / Lee muy bien / Escribe regular

### **Español**

Entiende muy bien / Habla muy bien / Lee muy bien / Escribe muy bien

## **Áreas de actuación**

### **CIENCIAS MÉDICAS Y DE LA SALUD**

Biotecnología de la Salud /Tecnologías que involucran la identificación de ADN, proteínas y enzimas  
/Biología molecular

### **CIENCIAS MÉDICAS Y DE LA SALUD**

Otras Ciencias Médicas /Otras Ciencias Médicas /Veterinaria

### **CIENCIAS AGRÍCOLAS**

Ciencias Veterinarias /Ciencias Veterinarias /Parasitología

## **Actuación profesional**

**SECTOR EDUCACIÓN SUPERIOR/PÚBLICO - UNIVERSIDAD DE LA REPÚBLICA - URUGUAY**

Regional Norte - UDeLaR

### **VÍNCULOS CON LA INSTITUCIÓN**

#### **Funcionario/Empleado (02/2015 - a la fecha)**

Asistente ,40 horas semanales  
Escalafón: Docente  
Grado: Grado 2

Cargo: Efectivo

## ACTIVIDADES

### LÍNEAS DE INVESTIGACIÓN

**Detección de patógenos de enfermedades transmitidas por vectores de la región noroeste de Uruguay (02/2015 - a la fecha)**

10 horas semanales , Integrante del equipo

Equipo:

Palabras clave: Ixódidos vectores

Áreas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

**Caracterización molecular y estudios filogenéticos de las especies de Lymnaea presentes en el Uruguay (02/2015 - a la fecha)**

20 horas semanales

Laboratorio de Vectores y Enfermedades transmitidas , Coordinador o Responsable

Equipo:

Palabras clave: Lymnaea sp. caracterización molecular estudios filogenéticos

Áreas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

### DOCENCIA

**Ciclo inicial optativo ciencia y tecnología (03/2015 - 08/2015 )**

Pregrado

Organizador/Coordinador

Asignaturas:

Introducción a la Biología 2, 2 horas, Teórico-Práctico

Áreas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Otros Tópicos Biológicos /

### SECTOR EXTRANJERO/INTERNACIONAL/OTROS - SUIZA

Universidad de Zurich

## VÍNCULOS CON LA INSTITUCIÓN

**Funcionario/Empleado (10/2011 - 04/2015)**

postdoc ,42 horas semanales / Dedicación total

## ACTIVIDADES

### LÍNEAS DE INVESTIGACIÓN

**Animal models for intestinal Echinococcus multilocularis infections and Alveolar Echinococcosis (AE) in aberrant hosts (10/2011 - 03/2015)**

30 horas semanales , Integrante del equipo

Equipo:

Áreas de conocimiento:

Ciencias Médicas y de la Salud / Otras Ciencias Médicas / Otras Ciencias Médicas /

### PROYECTOS DE INVESTIGACIÓN Y DESARROLLO

**Development of a rat model for the study of E. multilocularis oncospheres invasion (10/2011 - 03/2015 )**

25 horas semanales

Investigación  
Coordinador o Responsable  
Concluido  
Financiación:  
Universidad de Zurich, Suiza, Apoyo financiero  
Equipo:  
Palabras clave: rat model Echinococcus multilocularis oncospheres  
Areas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la manipulación de células, tejidos, órganos o todo el org /

**Study of the mucosal adjuvant effect of Cholera toxin for Echinococcus granulosus infection in dogs (10/2011 - 03/2015 )**

20 horas semanales  
Investigación  
Integrante del Equipo  
Concluido  
Financiación:  
Universitat Zurich, Suiza, Cooperación  
Equipo:  
Palabras clave: Echinococcus granulosus dog infection Cholera toxin  
Areas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Biotecnología relacionada con la Salud /

**CAPACITACIÓN/ENTRENAMIENTOS DICTADOS**

**(10/2011 - 03/2015)**

Parasitological necropsy in canids  
20 horas semanales  
Molecular tools for the diagnosis of taeniids in definitive hosts  
20 horas semanales

Areas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

**SECTOR EXTRANJERO/INTERNACIONAL/OTROS - JAPÓN**

Hokkaido University

**VÍNCULOS CON LA INSTITUCIÓN**

**Becario (04/2007 - 03/2011)**

estudiante de doctorado ,50 horas semanales

**ACTIVIDADES**

**LÍNEAS DE INVESTIGACIÓN**

**Desarrollo de tecnicas moleculares de diagnostico parar cestodiosis caninas (04/2007 - 03/2011 )**

50 horas semanales , Otros  
Equipo:  
Palabras clave: PCR hibridación ADN-ADN  
Areas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas / Desarrollo de tecnicas moleculares de diagnostico parar cestodiosis caninas

**PROYECTOS DE INVESTIGACIÓN Y DESARROLLO**

**Desarrollo de tecnicas moleculares para diagnostico de cestodiosis canina (04/2007 - 03/2011 )**

50 horas semanales  
Universidad de Hokkaido/Facultad de Medicina Veterinaria , Laboratorio de Parasitología  
Investigación  
Integrante del Equipo  
En Marcha  
Alumnos encargados en el proyecto:  
Doctorado:1  
Financiación:  
Institución del exterior, Beca  
Equipo:  
Palabras clave: taeniid eggs fecal samples molecular tools  
Areas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

## **DOCENCIA**

### **Clases prácticas del curso curricular de Parasitología (04/2007 - 03/2011 )**

Pregrado  
Asistente  
Asignaturas:  
Parasitología, 4 horas, Práctico  
Areas de conocimiento:  
Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

## **CARGA HORARIA**

Carga horaria de docencia: 10 horas  
Carga horaria de investigación: 25 horas  
Carga horaria de formación RRHH: 5 horas  
Carga horaria de extensión: Sin horas  
Carga horaria de gestión: Sin horas

## **Producción científica/tecnológica**

Dentro de la familia Taeniidae se encuentran varias especies con gran relevancia médica y veterinaria. A destacar, *Echinococcus multilocularis* y *E. granulosus* son las dos especies zoonóticas más importantes. Varios tipos de cánidos (perros, zorros, lobos, etc.) actúan como hospederos definitivos albergando las formas adultas de dichos cestodos en el intestino delgado pero sin desarrollar enfermedad aparente. Sin embargo, en los hospederos intermediarios (bovinos, ovinos, suinos, roedores e incluso el hombre) la forma larvaria (metacestode) genera un daño grave en los órganos en que se aloja y puede causar la muerte si no es detectada a tiempo. Tanto la echinococosis alveolar (*E. multilocularis*) como la quística (*E. granulosus*) tienen gran importancia económica y en salud pública ya que son zoonosis que afectan millones de humanos y animales de producción alrededor del mundo. El doctorado realizado en la Universidad de Hokkaido (Japón) se enfocó en el desarrollo de técnicas moleculares para el diagnóstico de diferentes taenidos en cánidos. El muestreo no invasivo de los cánidos se lleva a cabo a través de la colecta de materia fecal. Ya que muchas de las muestras fecales son colectadas a campo es esencial identificar de manera eficaz a que tipo de animal pertenece cada muestra. Por lo tanto, durante el doctorado colaboré en el desarrollo de una multiplex PCR capaz de distinguir entre 6 especies diferentes de hospederos definitivos. Allí también desarrollé una técnica de hibridación con sondas específicas (Dot blot) con la cual es posible detectar y diferenciar varios taenidos que pueden estar parasitando un mismo cánido. El postdoctorado realizado en la Universidad de Zúrich dio continuidad a la línea de investigación sobre la biología de *Echinococcus* spp. abordando diferentes aspectos. Algunos de los trabajos que llevé a cabo se enfocaron en el estudio de diferentes modelos animales que incluyeron i) la evaluación in vivo de la resistencia de los huevos de *E. multilocularis* sometidos a diferentes tratamientos térmicos utilizando un modelo murino, ii) el desarrollo de la forma larvaria de *E. multilocularis* en modelos animales alternativos (ratas) y iii) el estudio de la respuesta inmune de perros frente a infecciones reiteradas con *E. granulosus*. Dichos trabajos han contribuido para mejorar el conocimiento del comportamiento de estos parásitos en diferentes hospederos. Por otro lado, colaboré en diferentes estudios epidemiológicos y de distribución geográfica de *E. multilocularis* en Suecia, Portugal, Italia, Kosovo y Bután. En febrero de 2015, surgió la posibilidad de retornar a Uruguay y unirme al equipo del Laboratorio de vectores y enfermedades transmitidas que es uno de los polos de desarrollo universitario (PDU) del Centro Universitario Regional del Litoral Norte (Cenur), sede Salto. En este laboratorio se están desarrollando diferentes líneas de investigación de vectores y hospederos intermediarios con gran relevancia en la región que incluyen estudios filogenéticos del género *Lymnaea* (hospedero intermediario de *Fasciola*

hepática), el cual soy responsable, así como, en el estudio de enfermedades transmitidas por garrapatas (bacterias y protozoarios).

## Producción bibliográfica

### ARTÍCULOS PUBLICADOS

#### ARBITRADOS

##### **Molecular evidence of Babesia species in Procyon cancrivorus (Carnivora, Procyonidae) in Uruguay (Completo, 2018)**

Thompson, C.S., Mangold, A.J., Félix, M.L., CARVALHO L., ARMUA-FERNANDEZ, M. T., VENZAL, J.M.

Veterinary Parasitology: Regional Studies and Reports, v.: 13 p.:230 - 233, 2018

Palabras clave: Babesia sp. Crab-eating raccoon Procyon cancrivorus Amblyomma aureolatum Uruguay

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

ISSN: 24059390

DOI: [10.1016/j.vprsr.2018.07.008](https://doi.org/10.1016/j.vprsr.2018.07.008)

##### **Oral application of recombinant Bacillus subtilis spores to dogs results in a humoral response against specific Echinococcus granulosus paramyosin and tropomyosin antigens (Completo, 2017)**

VOGT, C. M., ARMUA-FERNANDEZ, M. T., TOBLER, K., HILBE, M., AGUILAR, C., ACKERMANN, M., DEPLAZES, P., EICHWALD, C.

Infection and Immunity, v.: IAI -00495, 2017

Palabras clave: Echinococcus granulosus Bacillus subtilis

Areas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

Medio de divulgación: Internet

ISSN: 00199567

DOI: [10.1128/IAI.00495-17](https://doi.org/10.1128/IAI.00495-17)

Bacillus subtilis is known as an endospore- and biofilm-forming bacterium with probiotic properties. We have recently developed a method for displaying heterologous proteins on the surface of B. subtilis biofilms by introducing the coding sequences of the protein of interest into the bacterial genome to generate a fusion protein linked to the C-terminus of the biofilm matrix protein TasA. Although B. subtilis is a regular component of the gut microflora, we constructed a series of recombinant B. subtilis strains that were tested for their ability to immunize dogs following oral application of the spores. Specifically, we tested recombinant spores of B. subtilis carrying either the fluorescent protein mCherry or else selected antigenic peptides (tropomyosin and paramyosin) from Echinococcus granulosus, a zoonotic intestinal tapeworm of dogs and other carnivores. The application of the recombinant B. subtilis spores led to the colonization of the gut with recombinant B. subtilis but did not cause any adverse effect on the health of the animals. As measured by ELISA and immunoblot, the dogs were able to develop a humoral immune response against mCherry as well as against E. granulosus antigenic peptides. Interestingly, the sera of dogs obtained from immunization with recombinant spores of E. granulosus peptides were able to recognize E. granulosus protoscoleces, which represent the infective form of the head of the tapeworms. These results represent an essential step towards the establishment of B. subtilis as an enteric vaccine agent.

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##### **Description of an outbreak of canine rangelirosis in the northwest littoral of Uruguay (Completo, 2017)**

RIVERO, R., MINOLI, P., PARODI, P., ARMUA-FERNANDEZ, M. T., GIANNEECHINI E., CARVALHO, L., VENZAL, J.M.

Veterinaria (Montevideo), v.: 53 28 208, p.:15 - 22, 2017

Palabras clave: Uruguay rangelirosis canina Rangelia vitalii anemia hemolítica trombocitopenia

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

ISSN: 03764362

DOI: [10.29155/vet.23.208.1](https://doi.org/10.29155/vet.23.208.1)

La rangelirosis canina es una enfermedad causada por el protozoario Rangelia vitalii y transmitida por garrapatas. Afecta caninos domésticos y silvestres, provocando un cuadro de anemia hemolítica

y trombocitopenia. En Uruguay ha sido reportada en los Departamentos de Artigas, Salto y Treinta y Tres. El presente trabajo describe un foco de rangeliosis canina en el litoral oeste del Uruguay, diagnosticado mediante estudios epidemiológicos, clínicos, hematológicos, anatomopatológicos y técnicas moleculares (PCR/secuenciación). El estudio se basó en 9 casos de perros raza Griffon Fauve de Bretagne provenientes de un predio rural próximo a Quebracho, Departamento de Paysandú. De los animales ocho murieron y uno respondió al tratamiento. Los principales signos clínicos fueron apatía, ictericia, fiebre, diarrea con sangre y sangrado por narinas y punta de orejas. Hematológicamente se constató anemia, trombocitopenia y leucocitosis. Los hallazgos macroscópicos se caracterizaron por palidez, ictericia generalizada, esplenomegalia, linfadenomegalia y hepatomegalia. Al examen histopatológico se destacó: nefritis intersticial con degeneración y necrosis tubular, miocarditis, necrosis hepática centrolobulillar. Congestión y edema pulmonar, linfadenitis, y en bazo infiltrado inflamatorio difuso perivascular de tipo mononuclear. En diversos órganos se visualizaron zoítos de *R. vitalii* intracitoplasmáticas en las células endoteliales. En algunos animales así como en los caniles de los perros se constató presencia de *Amblyomma aureolatum*. De dos casos se extrajo ADN de sangre y mediante PCR se amplificó un fragmento del gen 18s ARN ribosomal de Piroplasmas. La secuencia obtenida fue comparada con secuencias registradas en el GenBank utilizando la herramienta BLAST. El resultado reveló una homología entre 99-100% con *R. vitalii*.

[latindex](#)

#### **Latent class models for Echinococcus multilocularis diagnosis in foxes in Switzerland in the absence of a gold standard (Completo, 2017)**

OTERO-ABAD, B., ARMUA-FERNANDEZ, M. T., DEPLAZES, P., TORGERSON, P. R., HARTNACK, S.

Parasites and Vectors, v.: 10 1 612, p.:1 - 14, 2017

Palabras clave: Foxes Echinococcus multilocularis Diagnostic test Diagnostic sensitivity Diagnostic specificity

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias /

Medio de divulgación: Internet

ISSN: 17563305

DOI: [10.1186/s13071-017-2562-1](https://doi.org/10.1186/s13071-017-2562-1)

Background In Europe the principal definitive host for *Echinococcus multilocularis*, causing alveolar echinococcosis in humans, is the red fox (*Vulpes vulpes*). Obtaining reliable estimates of the prevalence of *E. multilocularis* and relevant risk factors for infection in foxes can be difficult if diagnostic tests with unknown test accuracies are used. Latent-class analysis can be used to obtain estimates of diagnostic test sensitivities and specificities in the absence of a perfect gold standard. Samples from 300 foxes in Switzerland were assessed by four different diagnostic tests including necropsy followed by sedimentation and counting technique (SCT), an egg-PCR, a monoclonal and a polyclonal copro-antigen ELISA. Information on sex, age and presence of other cestode species was assessed as potential covariates in the Bayesian latent class models. Different Bayesian latent-class models were run, considering dichotomized test results and, additionally, continuous readings resulting in empirical ROC curves. Results The model without covariates estimated a true parasite prevalence of 59.5% (95% CI: 43.166.4%). SCT, assuming a specificity of 100%, performed best among the four tests with a sensitivity of 88.5% (95% CI: 82.793.4%). The egg-PCR showed a specificity of 93.4% (95% CI: 87.399.1%), although its sensitivity of 54.8% was found moderately low (95% CI: 48.561.0%). Relatively higher sensitivity (63.2%, 95% CI: 55.370.8%) and specificity (70.0%, 95% CI: 60.179.4%) were estimated for the monoclonal ELISA compared to the polyclonal ELISA with a sensitivity and specificity of 56.0% (95% CI: 48.063.9%) and 65.9% (95% CI: 55.875.6%), respectively. In the Bayesian models, adult foxes were found to be less likely infected than juveniles. Foxes with a concomitant cestode infection had double the odds of an *E. multilocularis* infection. ROC curves following a Bayesian approach enabled the empirical determination of the best cut-off point. While varying the cut-offs of both ELISAs, sensitivity and specificity of the egg-PCR and SCT remained constant in the Bayesian latent class models. Conclusions Adoption of a Bayesian latent class approach helps to overcome the absence of a perfectly accurate diagnostic test and gives a more reliable indication of the test performance and the impact of covariates on the prevalence adjusted for diagnostic uncertainty.

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#### **Coenurosis in cattle in Uruguay (Completo, 2017)**

BURONI, F., ARMUA-FERNANDEZ, M. T., NAN, F., MATTO, C., VENZAL, J. M., RIVERO, R. Veterinaria (Montevideo), v.: 54 206, p.:19 - 24, 2017

Palabras clave: Uruguay coenurosis bovina Coenurus cerebralis Bos taurus

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

ISSN: 03764362

Coenurosis is a disease caused by *Coenurus cerebralis*, the larval stage of *Taenia multiceps*. Ruminants, equids, swine and even humans can be affected developing neurological symptoms. This work reports *C. cerebralis* infection diagnosed by macroscopic and histologic lesions and molecular tools (PCR/sequencing) in two heifers in Uruguay. Two 2-3 years old Hereford heifers were necropsied (case A and B). Both animals presented progressive deterioration, ataxia, circling and head deviation. Grossly, in case A, a cystic vesicle protruding from the left hemisphere was observed. The vesicle was broken spontaneously while the encephalon was retrieved from the cranial cavity. On case B, the whole cystic vesicle was retrieved from the right hemisphere. Through the translucent wall's vesicle was possible to visualize whitish scolices attached to the inner layer. Histopathology of the central nervous system revealed an inflammatory reaction on the cyst adjacent tissue, characterized by the presence of macrophages, eosinophils, lymphocytes and giant cells. The vesicle of case B was dissected and a small piece was used for DNA extraction. By PCR, a fragment of *nad1* gene was amplified and sent for direct sequencing. The obtained sequence was compared with the available sequences registered on GenBank using the BLAST tool. The result revealed a 99% homology with sequences registered as *T. multiceps*. Therefore, this work confirmed that bovine coenurosis is present in Uruguay.

[latindex](#)

#### **Detection of *Echinococcus granulosus* and *Echinococcus ortleppi* in Bhutan (Completo, 2017)**

THAPA, N.K., ARMUA-FERNANDEZ, M. T. , KINZANG, D. , GURUNG, R. B. , WANGDI, P. , DEPLAZES, P.

Parasitology International, 2017

Palabras clave: *Echinococcus* spp. *Taenia hydatigena* yaks cattle Bhutan community dogs

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

ISSN: 13835769

In this pilot study, fecal samples were collected from community dogs around slaughterhouses and from the city of Thimphu (n=138) as well as from carnivores in the forest area around a farm in Bhutan (n= 28). Samples were analyzed microscopically for the presence of taeniid eggs by the floatation and sieving method. Further molecular analyses of 20 samples of community dogs positive for taeniid eggs confirmed 10 *Echinococcus granulosus* sensu lato and one *Taenia hydatigena* case. From 14 environmental fecal samples from the forest area positive for taeniid eggs, one contained *E. granulosus* s.l., six *T. hydatigena* and one *Taenia taeniaeformis* DNA. In the remaining samples considered positive for taeniid eggs, no molecular confirmation could be achieved. Additionally, *Echinococcus* cysts were collected from locally slaughtered cattle and imported cattle organs. Seven *Echinococcus* cysts (one fertile) from the local animals and 35 (four fertile) from imported cattle organs were confirmed as *E. granulosus* (G1-3) by PCR/sequencing. One *Echinococcus* cyst each from a local animal and from an imported cattle organ (both fertile) were confirmed to be *Echinococcus ortleppi* (G5). Sterile *Echinococcus* cysts were also collected from local yaks (n=10), and all revealed to be *E. granulosus* (G1-G3). Hospital records of cystic echinococcosis in humans and the presence of *Echinococcus* spp. in dogs and ungulates indicate the existence of local transmission for both *E. ortleppi* and *E. granulosus* in Bhutan.

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#### **The impact of socio-cultural factors on transmission of *Taenia* spp. and *Echinococcus granulosus* in Kosovo (Completo, 2017)**

ALISHANI, M. , SHERIFI, K. , REXHEPI, A. , HAMIDI, A. , ARMUA-FERNANDEZ, M. T. , GRIMM, F. , HEGGLIN, D. , DEPLAZES, P.

Parasitology, v.: 144 p.:1736 - 1742, 2017

Palabras clave: *Echinococcus granulosus* *Echinococcosis* Dogs *Taenia* control

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

ISSN: 00311820

DOI: [10.1017/S0031182017000750](https://doi.org/10.1017/S0031182017000750)

*Echinococcus granulosus* sensu lato (s.l.) and *Taenia hydatigena* are common parasites of ruminant intermediate hosts in the Balkans. Transmission is linked mainly to home slaughtering and the feeding of infected organs to dogs. In Kosovo, many old sheep are slaughtered particularly during Eid al-Adha (Feast of Sacrifice). To determine whether this tradition could affect parasite transmission, we compared the probability of 504 dogs to contract taeniid infections after deworming during one period before Eid al-Adha and a similar period beginning with this event. Initially, taeniid eggs were detected in 6.2% (CI 4.28-6) of the dogs. The prevalence before Eid al-Adha was significantly lower (1.2%, CI 0.42-6) as compared with the prevalence after the event (4.3%, CI 2.66-3). A comparable trend was apparent at species level for *T. hydatigena* and *E. granulosus*. These results indicate that the pronounced increase of taeniid infections, including *E. granulosus* s.l., after Eid al-Adha is linked to traditional home slaughtering that occurs during this celebration. This particular epidemiological situation provides an opportunity for implementing



focussed control activities.

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**Detection of taeniid (*Taenia* spp., *Echinococcus* spp.) eggs contaminating vegetables and fruits sold in European markets and the risk for metacestode infections in captive primates (Completo, 2016)**

FEDERER, K., ARMUA-FERNANDEZ, M. T., GORI, F., HOBY, S., WENKER, C., DEPLAZES, P.  
International Journal for Parasitology, 2016

Palabras clave: alveolar echinococcosis Monkey Primate

Areas de conocimiento:

Ciencias Médicas y de la Salud / Ciencias de la Salud / Parasitología /

Medio de divulgación: Internet

ISSN: 00207519

DOI: [10.1016/j.ijppaw.2016.07.002](https://doi.org/10.1016/j.ijppaw.2016.07.002)

Due to frequent cases of alveolar echinococcosis (AE) in captive primates in Europe, 141 samples of food, which consists mostly of vegetables and fruits, were investigated for contamination with egg-DNA of taeniids. Each sample consisted of at least 40 heads of lettuce as well as various vegetables and fruits. The samples were purchased at different times of the year: either from September to November (autumn), originating from greenhouses or fields in the Basel region in the North of Switzerland, or in April and May (spring) when fruit and vegetables are sourced from throughout Europe from various wholesalers. Each sample was washed, and the washing water sieved through mesh apertures of 50  $\mu\text{m}$  and 21  $\mu\text{m}$ , respectively. The debris, including taeniid eggs, collected on the 21  $\mu\text{m}$  sieve were investigated by a multiplex PCR-analysis followed by direct sequencing. In 17 (18%) of the 95 samples collected in autumn, taeniid-DNA was detected (*Taenia hydatigena* in four, *T. ovis* in three, *T. polyacantha* in two and *Hydatigera (Taenia) taeniaeformis* in five cases). Similarly, in 13 (28%) of the 46 samples collected during spring taeniid-DNA was detected (*Echinococcus granulosus* s.l. in two, *T. crassiceps* in one, *T. hydatigena* in two, *T. multiceps/T. serialis* in two, *T. saginata* in one and *H. taeniaeformis* in five cases). Although DNA of *E. multilocularis* was not found specifically in this study, the detection of other fox taeniids reveals that vegetables and fruit fed to the primates at the Zoo Basel at different times of the year and from different origin are contaminated with carnivore's faeces and therefore act as a potential source of AE infections.

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**Anaplasma platys in dogs from Uruguay (Completo, 2016)**

CARVALHO, L., ARMUA-FERNANDEZ, M. T., SOSA, N., FÉLIX, M. L., VENZAL, J. M.  
Ticks and Tick-borne Diseases, 2016

Palabras clave: Uruguay Anaplasmataceae Ehrlichia canis Dogs Rhipicephalus sanguineus

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

ISSN: 1877959X

Anaplasmataceae family members include vector-borne bacteria of veterinary importance that may also affect humans. *Ehrlichia canis* and *Anaplasma platys* are the main members of this family detected in dogs worldwide. In Uruguay there are not many published studies on tick-borne pathogens affecting dogs, the only haemoparasite molecularly confirmed in dogs, is the piroplasm *Rangelia vitalii*. The aim of the present work was to detect the presence of *A. platys* and *E. canis* in dogs and dogs-associated ticks of two localities in Northwestern Uruguay. Blood samples from dogs with and without clinical signs associated with vector-borne diseases, and *Rhipicephalus sanguineus* obtained from these dogs were analyzed by PCR for Anaplasmataceae. Positive dogs were further analyzed by PCR for *Ehrlichia* spp. and *A. platys*. All the ticks were found negative. No dog was detected infected with *E. canis*, while eight dogs (4.2%) were found to be infected with *A. platys*. Phylogenetic analysis of groESL operon sequence for *A. platys* revealed no differences with sequences described for *A. platys* in neighbor countries and from other regions of the world. This is the first report of the presence of *A. platys* in Uruguay.

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**First molecular characterization of Galba neotropica in Uruguay (Completo, 2016)**

ARMUA-FERNANDEZ, M. T., CASTRO, O., CORREA, O., CARVALHO, L., MANGOLD, A., SANCHIS, J., VENZAL, J.

FAVE - Sección Ciencias Veterinarias, v.: 15 p.:9 - 13, 2016

Palabras clave: Uruguay Galba neotropica molecular characterization

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

ISSN: 03253112

DOI: [10.14409/favecv.v15i1/2.5978](https://doi.org/10.14409/favecv.v15i1/2.5978)

Until recently, it was believed that only two lymnaeid species (i.e. *Galba viatrix* and *Pseudosuccinea columella*) occurred in Uruguay. However, based on a molecular approach, an additional species *Galba cubensis*, was recently discovered. The aim of this study was to molecularly characterize different lymnaeid populations from the northern region of Uruguay. The lymnaeids collections were carried out in two farms of the departments of Paysandú and Tacuarembó. The collected lymnaeids were divided in two fractions, one fraction was used for conchological analyses and detection of trematode larval stages, while the other fraction was used for molecular studies. Three PCRs targeting the 16S, ITS-2 and COI DNA regions were performed and the amplicons obtained were direct sequenced. The sequences were used for homology search and construction of phylogenetic trees by the maximum-likelihood method. The sequencing results revealed that both isolates corresponded to *Galba neotropica*. The phylogenetic analyses placed our isolates among the *G. neotropica* monophyletic group, closely related to other isolates of this species found in several South American countries. To our knowledge, this is the first record of *G. neotropica* in Uruguay and the confirmation as competent intermediate host of *Fasciola hepatica*. Further studies are needed to define the distribution and the role of each lymnaeid species in the transmission of *F. hepatica* in Uruguay.

**Successful intestinal *Echinococcus multilocularis* oncosphere invasion and establishment in resistant RccHan<sup>TM</sup>:WIST rats after pharmacological immunosuppression (Completo, 2016)**

ARMUA-FERNANDEZ, M. T. , JOEKEL, D. , SCHWEIGER, A. , EICHENBERGER, R.M. , MATSUMOTO, J. , DEPLAZES, P.

Parasitology, v.: 143 10, p.:1252 - 1260, 2016

Palabras clave: *Echinococcus multilocularis* alveolar echinococcosis immunosuppression metacestode rat resistance

Areas de conocimiento:

Ciencias Médicas y de la Salud / Ciencias de la Salud / Parasitología /

Medio de divulgación: Internet

ISSN: 00311820

DOI: [10.1017/S0031182016000809](https://doi.org/10.1017/S0031182016000809)

Susceptibility/resistance to larval *Echinococcus multilocularis* infection varies greatly depending on host species and strains. Whereas several mice strains and non-human primates are highly susceptible to alveolar echinococcosis, rats and most of humans are considered as more resistant. In this study, we aimed to elucidate factors responsible for host resistance in rats (Experiments AD). (A) The parasite establishment was not observed in immunocompetent Wistar rats orally inoculated with sodium hypochlorite resistant eggs with/without pig bile, or activated/non-activated oncospheres (NAO). Peritoneal inoculation with NAO s or metacestode tissue allowed the parasite establishment in rats. (B) T-cell-deficient athymic nude rats showed complete resistance against the metacestode establishment after oral inoculation with parasite eggs. This finding suggests that T-cell-independent parasite clearance occurred in the animals during early phase of the parasite invasion. Finally, Wistar rats that received pharmacological immunosuppression using either dexamethasone (DMS) alone or methotrexate (MTX) i.p. alone or a combination of these compounds were orally inoculated with the parasites eggs. As a result (D), successful establishment of metacestode with protoscoleces was observed in all 3 rats treated with DMS (s.c.) alone or in all 6 rats treated with DMS (s.c.) plus MTX but not in 8 rats with MTX alone, suggesting that factors affected by DMS treatment are responsible to regulate the parasite invasion and establishment.

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**In vivo viability of *Echinococcus multilocularis* eggs in a rodent model after different thermo-treatments. (Completo, 2015)**

FEDERER, K , ARMUA-FERNANDEZ, M. T. , HOBY, S , C. WENKER , DEPLAZES, P.

Experimental Parasitology (E), 2015

Areas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Biotecnología relacionada con la Salud /

Medio de divulgación: Internet

ISSN: 10902449

*Echinococcus multilocularis* is the causative agent of alveolar echinococcosis, a serious and emerging zoonotic disease in many parts of the northern hemisphere. Humans but also primates and other accidental hosts can acquire the infection by the ingestion of eggs excreted by the carnivore definitive hosts, e.g. after hand contact with egg-contaminated environments or by consumption of contaminated food or beverages. The goal of this study was to develop a sensitive in vivo method to determine the viability of *E. multilocularis* eggs and to establish suitable conditions (optimal temperature, exposure time and humidity) for their (prophylactic) inactivation. The sensitivity of a rodent model was evaluated and, conclusively, C57Bl/6 mice were most susceptible to subcutaneous inoculation of small numbers of sodium hypochlorite-resistant oncospheres, even more than to oral inoculation of mature eggs. In the second part of the study,

various combinations of exposure temperature (between 45 °C and 80 °C), times (between 30 min and 180 min) and relative humidity (70% vs. suspended in water) were tested. After heat treatment in an incubator, the sodium hypochlorite resistance test was used to assess in vitro egg viability at the time of inoculation. Subsequently, the infectivity of the oncospheres was evaluated by subcutaneous inoculation in mice. Eggs exposed to increasing temperatures were more resistant to heat if suspended in water as compared to eggs exposed on a filter paper at 70% relative humidity. As survival of eggs in water droplets on the vegetables cannot be excluded, further experiments were performed with eggs suspended in water only. Eggs were infectious after heat exposure at 65 °C for up to 120 min, however, no echinococcosis developed after treatment of the eggs at 65 °C for 180 min or at 70, 75 and 80 °C for 7.5, 15 or 30 min.

#### **The occurrence of taeniids of wolves in Liguria (northern Italy) (Completo, 2015)**

GORI, F., ARMUA-FERNANDEZ, M. T., MILANESI, P., SERAFINI, M., MAGI, M., DEPLAZES, P., MACCHIONI, F.

International Journal for Parasitology, 2015

Palabras clave: Echinococcus granulosus Liguria-Italy Canis lupus italicus PCR 12S nad1

Areas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

ISSN: 00207519

Canids are definitive hosts of Taenia and Echinococcus species, which infect a variety of mammals as intermediate or accidental hosts including humans. Parasite transmission is based on domestic, semi-domestic and wildlife cycles; however, little is known of the epidemiological significance of wild large definitive hosts such as the wolf. In this study, 179 scats of wolves (*Canis lupus italicus*) collected throughout the Italian region of Liguria were analyzed for the detection of taeniid infection. Taeniid egg isolation was performed using a sieving/flotation technique, and the species level was identified by PCR (gene target: 12S rRNA and nad 1) followed by sequence analyses. Based on sequence homologies of  $\geq 99\%$ , *Taenia hydatigena* was identified in 19.6%, *Taenia krabbei* in 4.5%, *Taenia ovis* in 2.2%, *Taenia crassiceps* in 0.6%, *Hydatigera taeniaeformis* in 0.6% and *Echinococcus granulosus* in 5.6% of the samples. According to these results, *Canis lupus italicus* can be considered as involved in the wild (including cervids and rodents) and semi-domestic cycles (including sheep and goats) of taeniids in this area.

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#### **First case of peritoneal cystic echinococcosis in a domestic cat caused by Echinococcus granulosus sensu stricto (genotype 1) associated to feline immunodeficiency virus infection (Completo, 2014)**

ARMUA-FERNANDEZ, M. T., CASTRO, O.F., CRAMPET, A., BARTZABAL, A., HOFMANN-LEHMANN, R., GRIMM, F., DEPLAZES, P.

Parasitology International, v.: 63 p.:300 - 302, 2014

Palabras clave: Echinococcus granulosus Hydatid cyst Domestic cat Feline immunodeficiency virus

Areas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Otros Tópicos Biológicos /

Medio de divulgación: Internet

ISSN: 1383-5769

DOI: [10.1016/j.parint.2013.11.005](https://doi.org/10.1016/j.parint.2013.11.005)

A new cystic echinococcosis case in a cat in Uruguay is reported herein. The cat was taken to a veterinary clinic in Rocha city, Uruguay, due to dyspnea, constipation and abdominal enlargement. During surgery a large quantity of cysts was retrieved from the abdominal cavity. The cysts were morphologically studied and confirmed as *Echinococcus granulosus sensu stricto* (genotype 1) by molecular tools using cytochrome oxidase subunit 1 and small subunit ribosomal RNA gene as target genes. Moreover, for the first time a coinfection with feline immunodeficiency virus (FIV) was detected. FIV-induced immunosuppression could be a determining factor in the development of cystic echinococcosis in cats.

#### **A semi-automated magnetic capture probe based DNA extraction and real-time PCR method applied in the Swedish surveillance of Echinococcus multilocularis in red fox (Vulpes vulpes) faecal samples. (Completo, 2014)**

M. ISAKSSON, Å. HAGSTRÖM, ARMUA-FERNANDEZ, M. T., H. WAHLSTRÖM, E. OLOF ÅGREN, A. MILLER, A. HOLMBERG, M. LUKACS, A. CASULLI, DEPLAZES, P., M. JUREMALM

Parasites and Vectors, v.: 5 583, 2014

Areas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

Medio de divulgación: Internet

ISSN: 17563305

Background Following the first finding of *Echinococcus multilocularis* in Sweden in 2011, 2985 red foxes (*Vulpes vulpes*) were analysed by the segmental sedimentation and counting technique. This is a labour intensive method and requires handling of the whole carcass of the fox, resulting in a costly analysis. In an effort to reduce the cost of labour and sample handling, an alternative method has been developed. The method is sensitive and partially automated for detection of *E. multilocularis* in faecal samples. The method has been used in the Swedish *E. multilocularis* monitoring program for 2012;2013 on more than 2000 faecal samples. Methods We describe a new semi-automated magnetic capture probe DNA extraction method and real time hydrolysis probe polymerase chain reaction assay (MC-PCR) for the detection of *E. multilocularis* DNA in faecal samples from red fox. The diagnostic sensitivity was determined by validating the new method against the sedimentation and counting technique in fox samples collected in Switzerland where *E. multilocularis* is highly endemic. Results Of 177 foxes analysed by the sedimentation and counting technique, *E. multilocularis* was detected in 93 animals. Eighty-two (88%, 95% C.I. 79.8-93.9) of these were positive in the MC-PCR. In foxes with more than 100 worms, the MC-PCR was positive in 44 out of 46 (95.7%) cases. The two MC-PCR negative samples originated from foxes with only immature *E. multilocularis* worms. In foxes with 100 worms or less, ( $n_i=47$ ), 38 (80.9%) were positive in the MC-PCR. The diagnostic specificity of the MC-PCR was evaluated using fox scats collected within the Swedish screening. Of 2158 samples analysed, two were positive. This implies that the specificity is at least 99.9% (C.I. =99.7 -100). Conclusions The MC-PCR proved to have a high sensitivity and a very high specificity. The test is partially automated but also possible to perform manually if desired. The test is well suited for nationwide *E. multilocularis* surveillance programs where sampling of fox scats is done to reduce the costs for sampling and where a test with a high sensitivity and a very high specificity is needed.

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#### **Red foxes (*Vulpes vulpes*) and wild dogs (dingoes (*Canis lupus dingo*) and dingo/domestic dog hybrids), as sylvatic hosts for Australian *Taenia hydatigena* and *T. ovis* (Completo, 2014)**

JENKINS, D , URWIN, N , WILLIAMS, T , MITCHELL, K , LIEVAART, J , ARMUA-FERNANDEZ, M. T. International Journal for Parasitology, v.: 30 3 2, p.:75 - 80, 2014

Palabras clave: *Taenia ovis* *T. hydatigena* Foxes Dingoes Australia

Areas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

Medio de divulgación: Internet

Lugar de publicación: Australia

ISSN: 00207519

DOI: [10.1016/j.ijppaw.2014.03.001](https://doi.org/10.1016/j.ijppaw.2014.03.001)

<http://www.sciencedirect.com/science/article/pii/S2213224414000066>

Foxes ( $n = 499$ ), shot during vertebrate pest control programs, were collected in various sites in the Australian Capital Territory (ACT), New South Wales (NSW) and Western Australia (WA). Wild dogs (dingoes (*Canis lupus dingo*) and their hybrids with domestic dogs) ( $n = 52$ ) captured also as part of vertebrate pest control programs were collected from several sites in the ACT and NSW. The intestine from each fox and wild dog was collected, and all *Taenia* tapeworms identified morphologically were collected and identified to species based on the DNA sequence of the small subunit of the mitochondrial ribosomal RNA (rrnS) gene. *Taenia* species were recovered from 6.0% of the ACT/NSW foxes, 5.1% of WA foxes and 46.1% of ACT/NSW wild dogs. *Taenia ovis* was recovered from two foxes, 1/80 from Jugiong, NSW and 1/102 from Katanning, WA. We confirm from rrnS sequences the presence of *T. ovis* in cysts from hearts and diaphragms and *Taenia hydatigena* in cysts from livers of sheep in Australia. *T. ovis* was not recovered from any of the wild dogs examined but *T. hydatigena* were recovered from 4(8.3%) wild dogs and a single fox. With foxes identified as a definitive host for *T. ovis* in Australia, new control strategies to stop transmission of *T. ovis* to sheep need to be adopted.

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#### ***Echinococcus granulosus* and other intestinal helminths: current status of prevalence and management in rural dogs of eastern Australia (Completo, 2014)**

JENKINS, D , LIEVAART, J , BOUFANA, B , LETT, W , BRADSHAW, H , ARMUA-FERNANDEZ, M. T. Australian Veterinary Journal, v.: 92 8 , p.:292 - 298, 2014

Palabras clave: *Echinococcus granulosus* Australia Rural dogs Intestinal helminths Parasitology Coproantigen

Areas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

Medio de divulgación: Papel

Lugar de publicación: Australia

ISSN: 00050423

DOI: [10.1111/avj.12218](https://doi.org/10.1111/avj.12218)

<http://onlinelibrary.wiley.com/doi/10.1111/avj.12218/abstract>

Ascertain the prevalence of intestinal helminths in rural dogs from eastern Australia and Tasmania. Identify farm management practices contributing to the perpetuation and transmission of *Echinococcus granulosus*. Helminth infection in dogs was determined microscopically through faecal flotation. Infection with *E. granulosus* was determined via faecal antigen-capture ELISA and coproPCR. Taeniid eggs were identified using molecular methods. Data on dog management and owner understanding of hydatid disease were collected via questionnaire. Faeces were collected from 1425 Australian rural dogs (1119 mainland; 306 Tasmania). Eggs of hookworms were most prevalent, up to 40.2%, followed by whipworms (*Trichuris vulpis*), up to 21.2%. Roundworms (*Toxocara canis* and *Toxascaris leonine*) were least common, up to 6.1%. Taeniid eggs were found in 11 dogs (5 *Taenia pisiformis*; 2 *T. serialis*; 4 *T. hydatigena*); 2 of the *T. hydatigena*-infected dogs were also *E. granulosus* coproantigen-positive. Of the 45 dogs found to be *E. granulosus* coproantigen-positive, 24 were in Tasmania, 16 in NSW, 3 in Victoria and 2 in Queensland. Three Tasmanian coproantigen ELISA-positive dogs were also coproPCR-positive. The most common dog ration was commercial dry food, but half the owners fed raw meat to their dogs and some fed offal of lambs (8.9%) or mutton (7.8%). More than half (69%) of owners weighed their dogs before deworming. Few dewormed their dogs often enough to ensure they remained cestode-free and owners hunting wildlife usually left carcasses where they were shot. *E. granulosus* is still present in Australian rural dogs, including Tasmania, but at low levels. Owner behaviour perpetuates transmission of cestodes.

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**Taeniid species of the Iberian wolf (*Canis lupus signatus*) in Portugal with special focus on *Echinococcus* spp. (Completo, 2013)**

GUERRA, D., ARMUA-FERNANDEZ, M. T., SILVA, M., BRAVO, I., SANTOS, N., DEPLAZES, P., MADEIRA DE CARVALHO, L.M.

International Journal for Parasitology, v.: 2 p.:50 - 53, 2013

Palabras clave: *Echinococcus intermedius* *Taenia* spp Iberian wolf Portugal

Areas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Otros Tópicos Biológicos /

Medio de divulgación: Internet

ISSN: 00207519

Taeniid species represent relevant pathogens in human and animals, circulating between carnivorous definitive hosts and a variety of mammalian intermediate hosts. In Portugal, however, little is known about their occurrence and life cycles, especially in wild hosts. An epidemiological survey was conducted to clarify the role of the Iberian wolf as a definitive host for taeniid species, including *Echinococcus* spp. Wolf fecal samples (n = 68) were collected from two regions in Northern Portugal. Taeniid eggs were isolated through a sieving-flotation technique, and species identification was performed using multiplex-PCR followed by sequencing of the amplicons. *Taenia hydatigena* (in 11.8% of the samples), *Taenia serialis* (5.9%), *Taenia pisiformis* (2.9%), *Taenia polyacantha* (1.5%) and *Echinococcus intermedius* (*Echinococcus granulosus* pig strain, G7) (1.5%) were detected. This is the first study to characterize the taeniid species infecting the Portuguese Iberian wolf, with the first records of *T. polyacantha* and *E. intermedius* in this species in the Iberian Peninsula. Iberian wolves can be regarded as relevant hosts for the maintenance of the wild and synanthropic cycles of taeniids in Portugal.

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**Development of PCR/Dot blot assay for specific detection and differentiation of taeniid cestode eggs in canids. (Completo, 2011)**

ARMUA-FERNANDEZ, M. T., Nariaki Nonaka, Tatsuya Sakurai, Seita Nakamura, GOTTSTEIN, B., DEPLAZES, P., PHIRI, I.G.K., KATAKURA, K., OKU, Y.

Parasitology International, v.: 60 1, p.:84 - 89, 2011

Palabras clave: Taeniid cestode eggs Species-specific oligonucleotide probes PCR/dot blot assay

Areas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Otros Tópicos Biológicos /

Medio de divulgación: Internet

ISSN: 13835769

We report the development of a colourimetric PCR/dot blot assay targeting the mitochondrial gene NADH dehydrogenase subunit 1 (*nad1*) for differential diagnosis of taeniid eggs. Partial sequences of the cestode *nad1* gene were aligned and new primers were designed based on conserved regions. Species-specific oligonucleotide probes (S-SONP) for canine taeniid cestodes were then designed manually based on the variable region between the conserved primers. Specifically, S-SONP were designed for the *Taenia crassiceps*, *T. hydatigena*, *T. multiceps*, *T. ovis*, *T. taeniaeformis*, *Echinococcus granulosus* (genotype 1), *E. multilocularis* and *E. vogeli*. Each probe showed high specificity as no cross-hybridisation with any amplified *nad1* fragment was observed. We evaluated the assay using 49 taeniid egg-positive samples collected from dogs in Zambia. DNA from 5 to 10 eggs was extracted in each sample. Using the PCR/dot blot assay, the probes successfully detected

PCR products from *T. hydatigena* in 42 samples, *T. multiceps* in 3 samples, and both species (mixed infection) in the remaining 4 samples. The results indicate that the PCR/dot blot assay is a reliable alternative for differential diagnosis of taeniid eggs in faecal samples.

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#### **Multiplex PCR system for identifying the carnivore origins of faeces for an epidemiological study on *Echinococcus multilocularis* in Hokkaido, Japan (Completo, 2009)**

Nariaki Nonaka, SANO, T., INOUE, T., ARMUA-FERNANDEZ, M. T., FUKUI, D., KATAKURA, K., OKU, Y.

Parasitology Research, v.: 106 1, p.:75 - 83, 2009

Palabras clave: *Echinococcus multilocularis* eggs carnivore faeces Multiplex PCR

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

ISSN: 09320113

A multiplex PCR system was developed to identify the carnivore origins of faeces collected in Hokkaido, Japan, for epidemiological studies on *Echinococcus multilocularis*. Primers were designed against the D-loop region of mitochondrial DNA. Two separate primer mixtures (mix 1, specific forward primers to fox, raccoon dog and dog, and a universal reverse primer [prH]; and mix 2, specific forward primers to cat, raccoon and weasels and prH) were used so that the PCR products (160 bp, fox and cat; 240 bp, raccoon dog and raccoon; and 330 bp, dog and weasel) were distinguished by size. The multiplex PCR exhibited no cross-reactivity between carnivore species and did not amplify DNA from rodent prey. When 270 field-collected faeces were examined, 250 showed single PCR products belonging to specific target sizes, suggesting successful carnivore identification for 92.6% of samples. Taeniid eggs were detected in 11.1% of samples and coproantigen in 30.4%; whereas the prevalences of taeniid eggs and coproantigen were 12.9% and 34.0% in fox faeces, and 0% and 26.3% in cat faeces, respectively. These results suggest that the prevalence in different target animals can be evaluated individually and precisely using multiplex PCR system.

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#### **PUBLICACIÓN DE TRABAJOS PRESENTADOS EN EVENTOS**

##### **Avances en el estudio de poblaciones de *Galba* spp. (Gastropoda: Lymnaeidae) en establecimientos con antecedentes de fasciolosis en el litoral norte de Uruguay (2017)**

Resumen

ARMUA-FERNANDEZ, M. T., CASTRO, O., CORREA, O., FÉLIX, M. L., SANCHIS, J., MANGOLD, A., VENZAL, J. M.

Evento: Regional

Descripción: X Congreso Latinoamericano de Malacología

Ciudad: Piriápolis

Año del evento: 2017

Anales/Proceedings: Libro de Resúmenes

Publicación arbitrada

Palabras clave: Uruguay *Galba neotropica*

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

##### **New reports of *Rickettsia* spp infecting ticks in Uruguay (2017)**

Resumen

ARMUA-FERNANDEZ, M. T., FÉLIX, M. L., SOSA, N., QUEIROLO, D., CARVALHO, L., VENZAL, J. M.

Evento: Regional

Descripción: VI Congreso Latinoamericano de Enfermedades Rickettsiales & I Encuentro de Ecología y Control de Ectoparásitos

Ciudad: Medellín

Año del evento: 2017

Publicación arbitrada

Palabras clave: distribution range humans *Rickettsia parkeri* rickettsiosis

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Internet

**Estudio de poblaciones de Galba spp. (Gastropoda: Lymnaeidae) en establecimientos con antecedentes de fasciolosis en el litoral norte de Uruguay (2017)**

Resumen

ARMUA-FERNANDEZ, M. T. , CASTRO, O. , CORREA, O. , FÉLIX, M. L. , SANCHIS, J. , MANGOLD, A. , VENZAL, J. M.

Evento: Nacional

Descripción: Jornadas Técnicas Veterinarias

Ciudad: Montevideo

Año del evento: 2017

Publicación arbitrada

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Otros

**Diagnóstico molecular de Hepatozoon spp. (Apicomplexa: Hepatozoidae) en carnívoros domésticos y silvestres de Uruguay (2015)**

Resumen expandido

CARVALHO, L. , SOSA, N. , MENONI, A. , ARMUA-FERNANDEZ, M. T. , FÉLIX, M. L. , VENZAL, J. M.

Evento: Nacional

Descripción: Jornadas Técnicas Veterinarias

Ciudad: Montevideo

Año del evento: 2015

Palabras clave: Hepatozoon spp. carnívoros salvajes carnívoros domésticos diagnóstico molecular

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Otros

**Identificación molecular de una población de Lymnaea neotropica actuando como hospedador intermediario de Fasciola hepatica en un establecimiento de Tacuarembó, Uruguay (2015)**

Resumen expandido

ARMUA-FERNANDEZ, M. T. , CASTRO, O. , CORREA, O. , ALFONSO, G. , VELÁZQUEZ, D. , MANGOLD, A. , CARVALHO, L. , VENZAL, J. M.

Evento: Nacional

Descripción: Jornadas Técnicas Veterinarias

Año del evento: 2015

Palabras clave: Lymnaea neotropica Identificación molecular Uruguay

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

Medio de divulgación: Otros

**Estacionalidad de Ixodes auritulus y su infección con Borrelia burgdorferi sensu lato en las sierras del este de Uruguay (2015)**

Resumen expandido

FÉLIX, M. L. , CARVALHO, L. , MAYA, L. , ARMUA-FERNANDEZ, M. T. , DE SOUZA, C. G. , GONZÁLEZ, E.M. , COLINA, R. , VENZAL, J. M.

Evento: Nacional

Descripción: Jornadas Técnicas Veterinarias

Ciudad: Montevideo

Año del evento: 2015

Palabras clave: Ixodes auritulus Borrelia burgdorferi sensu lato

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias /

Medio de divulgación: Otros

**In vivo viability testing of Echinococcus multilocularis eggs in a rodent model after different thermo treatments [poster] (2014)**

Resumen

ARMUA-FERNANDEZ, M. T. , FEDERER, K. , WENKER, C. , HOBY, S. , DEPLAZES, P.

Evento: Regional

Descripción: Innovation for the Management of Echinococcosis

Ciudad: Besançon, Francia  
Año del evento: 2014  
Palabras clave: Echinococcus multilocularis eggs In vivo viability thermo treatment  
Áreas de conocimiento:  
Ciencias Médicas y de la Salud / Otras Ciencias Médicas / Otras Ciencias Médicas /  
Medio de divulgación: Papel

**Study of resistance of Echinococcus multilocularis oncosphere invasion in a rat model [poster] (2014)**

Resumen  
ARMUA-FERNANDEZ, M. T. , SCHWEIGER, A , EICHENBERGER, R , DEPLAZES, P.

Evento: Regional  
Descripción: Innovation for the Management of Echinococcosis.  
Ciudad: Besançon, Francia  
Año del evento: 2014  
Palabras clave: rat model Echinococcus multilocularis  
Áreas de conocimiento:  
Ciencias Médicas y de la Salud / Otras Ciencias Médicas / Otras Ciencias Médicas /  
Medio de divulgación: Papel

**Viability testing of Echinococcus multilocularis eggs in an in vivo mouse model after different thermo-treatments [poster] (2014)**

Resumen  
FEDERER, K , ARMUA-FERNANDEZ, M. T. , WENKER, C , HOBY, S , DEPLAZES, P.

Evento: Regional  
Descripción: Paratrop 2014  
Ciudad: Zurich  
Año del evento: 2014  
Palabras clave: in vivo viability test Echinococcus multilocularis eggs thermo-treatment  
Áreas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Biotecnología relacionada con la Salud /  
Medio de divulgación: Otros

**Study of factors influencing the resistance to Echinococcus multilocularis oncosphere invasion in a rat model [presentación oral] (2014)**

Resumen  
ARMUA-FERNANDEZ, M. T. , SCHWEIGER, A , EICHENBERGER, R , DEPLAZES, P.

Evento: Regional  
Descripción: Paratrop 2014  
Ciudad: Zurich2014  
Año del evento: 2014  
Palabras clave: rat model Echinococcus multilocularis oncosphere invasion  
Áreas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Biotecnología relacionada con la Salud /  
Medio de divulgación: Otros

**Echinococcus granulosus in eastern Australia, current role of domestic dogs and wildlife: Implications for control [presentación oral] (2013)**

Resumen  
JENKINS, D , LIEVAART, J , BOUFANA, B , LETT, W , BRADSHAW, H , ARMUA-FERNANDEZ, M. T.

Evento: Internacional  
Descripción: The 25th World Congress of Echinococcosis  
Ciudad: Khartoum, Sudan  
Año del evento: 2013  
Áreas de conocimiento:  
Ciencias Naturales y Exactas / Otras Ciencias Naturales / Otras Ciencias Naturales /  
Medio de divulgación: Papel

**Development of a rat model for the study of oncosphere invasion [presentación oral] (2013)**

Resumen  
ARMUA-FERNANDEZ, M. T. , SCHWEIGER, A , EICHENBERGER, R , DEPLAZES, P.



Evento: Internacional  
Descripción: The 25th World Congress of Echinococcosis  
Ciudad: Khartoum, Sudan  
Año del evento: 2013  
Áreas de conocimiento:  
Ciencias Naturales y Exactas / Otras Ciencias Naturales / Otras Ciencias Naturales /

**Development of a rat model for the study of alveolar echinococcosis and the different factors that influence the success of the infection [presentación oral] (2013)**

Resumen  
ARMUA-FERNANDEZ, M. T. , SCHWEIGER, A , EICHENBERGER, R , DEPLAZES, P.

Evento: Internacional  
Descripción: 24th International Conference of the World Association for the Advancement of Veterinary Parasitology  
Ciudad: Perth, Western Australia  
Año del evento: 2013  
Áreas de conocimiento:  
Ciencias Naturales y Exactas / Otras Ciencias Naturales / Otras Ciencias Naturales /

**Cystic echinococcosis in an Uruguayan domestic cat caused by Echinococcus granulosus sensu stricto (genotype 1) [poster] (2013)**

Resumen  
ARMUA-FERNANDEZ, M. T. , CASTRO, O.F. , CRAMPET, A. , BARTZABAL, A. , HOFMANN-LEHMANN, R. , GRIMM, F. , DEPLAZES, P.

Evento: Internacional  
Descripción: 24th International Conference of the World Association for the Advancement of Veterinary Parasitology  
Ciudad: Perth, Western Australia  
Año del evento: 2013  
Áreas de conocimiento:  
Ciencias Naturales y Exactas / Otras Ciencias Naturales / Otras Ciencias Naturales /

**Use of recombinant Bacillus subtilis spores as a safe carrier for enteric immunization against Echinococcus granulosus in a mice mode [poster] (2013)**

Resumen  
VOGT, C , ARMUA-FERNANDEZ, M. T. , DEPLAZES, P. , AGUILAR, C , ACKERMANN , M , EICHWALD, C

Evento: Local  
Descripción: Swiss society of microbiology, 71st annual congress  
Ciudad: Interlaken, Switzerland  
Año del evento: 2013  
Áreas de conocimiento:  
Ciencias Naturales y Exactas / Otras Ciencias Naturales / Otras Ciencias Naturales /

**PCR/dot blot for specific detection and differentiation of taeniid cestode eggs in canids [presentación oral] (2010)**

Resumen  
ARMUA-FERNANDEZ, M. T. , Nariaki Nonaka , Tatsuya Sakurai , GOTTSTEIN, B. , DEPLAZES, P. , KATAKURA, K. , OKU, Y.

Evento: Internacional  
Descripción: 4th Wildlife Society of Zoo and Wildlife Medicine International Meeting.  
Ciudad: Kuala Lumpur, Malasia  
Año del evento: 2010  
Áreas de conocimiento:  
Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

**Reverse line blot for detection of canine cestodiosis (2010)**

Resumen  
ARMUA-FERNANDEZ, M. T.

Evento: Regional

Descripción: The 56th Joint Annual Meeting of Japanese Society of Parasitology and Northern Branch of Japanese Society of Animal Health

Ciudad: Sapporo

Año del evento: 2010

Áreas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Otros Tópicos Biológicos /

Medio de divulgación: Papel

**Simultaneous detection and discrimination of taeniid cestodes in canids by Reverse line blotting [poster]. (2010)**

Resumen

ARMUA-FERNANDEZ, M. T.

Evento: Internacional

Descripción: The 2nd International Young Researcher Seminar in Zoonosis Control.

Ciudad: Sapporo

Año del evento: 2010

Áreas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Otros Tópicos Biológicos /

Medio de divulgación: Papel

**Simultaneous detection and discrimination of taeniid cestodes in canids by reverse line blotting (2010)**

Resumen

ARMUA-FERNANDEZ, M. T.

Evento: Internacional

Descripción: ICOPA XII

Ciudad: Melbourne, Australia

Año del evento: 2010

Áreas de conocimiento:

Ciencias Naturales y Exactas / Ciencias Biológicas / Otros Tópicos Biológicos /

Medio de divulgación: CD-Rom

**DNA dot blot assay for the differentiation of taeniid cestodes in canids [poster] (2009)**

Resumen

ARMUA-FERNANDEZ, M. T. , Nariaki Nonaka , Tatsuya Sakurai , GOTTSTEIN, B. , DEPLAZES, P. , KATAKURA, K. , OKU, Y.

Evento: Internacional

Descripción: XXII International Congress of Hydatidology

Ciudad: Colonia, Uruguay

Año del evento: 2009

Áreas de conocimiento:

Ciencias Médicas y de la Salud / Biotecnología de la Salud / Tecnologías que involucran la identificación de ADN, proteínas y enzimas /

## Evaluaciones

### EVALUACIÓN DE PROYECTOS

#### EVALUACIÓN INDEPENDIENTE DE PROYECTOS

##### Programa de Vinculación Universidad Sociedad y Producción ( 2017 )

Uruguay

Comisión Sectorial de Investigación Científica (CSIC) de la Universidad de la República.

Cantidad: Menos de 5

### EVALUACIÓN DE PUBLICACIONES

#### REVISIONES

##### Ciência Rural ( 2017 / 2018 )

Tipo de publicación: Revista

Cantidad: De 5 a 20

## Revista Brasileira de Parasitologia Veterinária ( 2017 / 2018 )

Tipo de publicación: Revista

Cantidad: Menos de 5

## JURADO DE TESIS

### Doctor en Ciencias Veterinarias ( 2016 / 2018 )

Jurado de mesa de evaluación de tesis

Sector Educación Superior/Público / Universidad de la República / Facultad de Veterinaria - UDeLaR, Uruguay

## Formación de RRHH

### TUTORÍAS CONCLUIDAS

#### OTRAS

#### Comparación molecular de estadios adultos y larvales de *Spirometra* sp. (Cestoda: Diphyllbothriidae) en hospedadores definitivos e intermediarios de muestras de Uruguay (2018)

Otras tutorías/orientaciones

Sector Educación Superior/Público / Universidad de la República / Centro Universitario Regional Litoral Norte / Salto, Uruguay

Tipo de orientación: Tutor único o principal

Nombre del orientado: Mauricio Burutarán Panissa

Medio de divulgación: Otros

País/Idioma: Uruguay, Español

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

#### Epidemiologie der alveolären Echinococcose in Schweizer Zoos (Epidemiología de la echinococcosis alveolar en Zoológicos suizos) (2013)

Otras tutorías/orientaciones

Sector Extranjero/Internacional/Otros / University of Zurich, Suiza

Tipo de orientación: Asesor/Orientador

Nombre del orientado: Karin Federer

Medio de divulgación: Papel

País/Idioma: Suiza, Alemán

Palabras Clave: Echinococcosis alveolar zoológicos suizos primates

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

#### The sylvatic and synanthropic cycles of *Echinococcus* spp., *Taenia* spp. and *Toxocara* spp. in Portugal: coprologic and molecular diagnosis in Canids (2012)

Otras tutorías/orientaciones

Sector Extranjero/Internacional/Otros / University of Zurich, Suiza

Tipo de orientación: Asesor/Orientador

Nombre del orientado: Diogo Ribeiro Almeida Guerra

Medio de divulgación: Papel

País/Idioma: Suiza, Inglés

Palabras Clave: Portugal carnivore faeces *Taenia* spp. *Echinococcus* spp.

Areas de conocimiento:

Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

### TUTORÍAS EN MARCHA

#### POSGRADO

#### Detección molecular de *Ehrlichia* y *Anaplasma* en garrapatas de interés sanitario para humanos en Uruguay (2015)

Tesis de maestría

Sector Educación Superior/Público / Universidad de la República / Facultad de Veterinaria - UDeLaR, Uruguay

Programa: Maestría en Salud Animal

Tipo de orientación: Cotutor en pie de igualdad  
Nombre del orientado: María Laura Felix Rivero  
País/Idioma: Uruguay, Español  
Palabras Clave: Ehrlichia spp. Anaplasma spp Ixódidos  
Áreas de conocimiento:  
Ciencias Agrícolas / Ciencias Veterinarias / Ciencias Veterinarias / Parasitología

## Indicadores de producción

<b>PRODUCCIÓN BIBLIOGRÁFICA</b>	<b>40</b>
<b>Artículos publicados en revistas científicas</b>	20
Completo	20
<b>Trabajos en eventos</b>	20
<b>EVALUACIONES</b>	<b>4</b>
<b>Evaluación de proyectos</b>	1
<b>Evaluación de publicaciones</b>	2
<b>Jurado de tesis</b>	1
<b>FORMACIÓN RRHH</b>	<b>4</b>
<b>Tutorías/Orientaciones/Supervisiones concluidas</b>	3
Otras tutorías/orientaciones	3
<b>Tutorías/Orientaciones/Supervisiones en marcha</b>	1
Tesis de maestría	1