



Project no. **044442**

Project acronym: **WOPER**

Project title: **Workshop for the analysis of the impact of Perkinsosis to the European Shellfish Industry**

Instrument: **SPECIFIC SUPPORT ACTION**

Thematic Priority: **SSP/8.1**

Publishable final activity report

Period covered: from 01/01/07 to 31/12/07

Date of preparation: 13/03/08

Start date of project: 01/01/07

Duration: 1 year

Project coordinator name: **Antonio Villalba**

Project coordinator organisation name: **Centro de Investigaciones Mariñas,
Consellería de Pesca e Asuntos Marítimos, Xunta de Galicia**

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1. Project execution

1.1. Subject

This SSA was focused on **Perkinsosis**, a disease that affects molluscs in America, Asia, Europe, Africa and Australasia, resulting in high mortality of some commercial species and huge economic impact. Some species of the genus *Perkinsus* (*P. olseni* and *P. mediterraneus*) are known to affect bivalve molluscs of the European coasts and other species (*P. marinus*, *P. qugwadi*, *P. chesapeaki* and *P. honshuensis*) are exotic to Europe. Two species of the genus are enlisted in the Aquatic Animal Health Code of the World Organisation for Animal Health (OIE). Therefore, perkinsosis has crucial consequences for international trade (introductions and transfer concerns). Research effort has been mostly focused on the disease caused by *Perkinsus marinus*, which affects molluscs in the Atlantic coast of North America, on which considerable amount of information is available. In contrast, information on other *Perkinsus* spp., including those affecting European coasts, is rather scarce and even controversial, particularly in aspects such as epizootiology, accurate estimation of host mortality, pathogenicity, transmission, diagnostic tools, host-parasite interaction, fighting strategies and socio-economic issues

1.2. Main goal

The **major goal** of this SSA was to bring together relevant stakeholders such as industry, public authorities, research community, and regulators in a **3 day workshop to address the threat of perkinsosis to European shellfish industry**. The expected outcomes of the workshop were state of the art knowledge, current and future research priorities and recommendations for industry and for policy makers, all of which would be included in a specific publication to enhance its broad dissemination.

1.3. Participants list

Participant Role	Participant organisation name	Participant org short name	Country
CO	Centro de Investigaciones Marinas	CIMA	Spain
CR	Centro Tecnológico del Mar	CETMAR	Spain
CR	Université de Bretagne Occidentale	UBO	France
CR	Institut Français de Recherche pour l'Exploitation de la Mer	IFREMER	France
CR	University of Algarve	UALG	Portugal
CR	Istituto Zooprofilattico Sperimentale delle Venezie	IZSve	Italy
CR	Consejo Superior de Investigaciones Científicas	CSIC	Spain

CO= Coordinator; CR= Contractor

1.4. Stages, specific objectives and work performed

Three stages with their respective objectives were planned: preparation of the workshop, accomplishment of the workshop, and edition and publication of the Proceedings of the workshop.

1.4.1. Preparation of the workshop (from 01/01/07 to 11/09/07)

Next there is a list of the objectives at this stage:

- To collect, analyse and select the specific contents for each workshop session ensuring high scientific quality, a coherent order, focus on complementary and relevant topics for each session and integration of matters from different approaches (scientific, industrial, administrative, legal...).
- To capture the attention of (at least 50) relevant stakeholders from different geographic areas and different professional fields, with interests in perkinsosis and mollusc production and trade, so that they participate in the Workshop. It is envisaged that some of them will participate as speakers (partners in the proposal and other invited speakers) and others as observers.
- To give a wide dissemination to the announcement of the event, to the planned contents and other important news of the workshop among those who can take decisions and implement measures (scientific community, policymakers and administrations and industry).
- To organise all the material and communication means and other support services in order to ensure a successful development of the event.

Next is a summary of the work performed to achieve the previous objectives. Five thematic areas were considered as the most relevant to be addressed, and each area would correspond to a session of the workshop. Participants were allocated as responsible for each area:

→ **Parasites of the genus *Perkinsus***: Life cycle and transmission ways; host species; taxonomy and phylogeny; physiology/metabolism; diagnostic tools. Responsible participant: IFREMER, UALG

- **Epizootiology:** Geographic range; environmental influence; temporal patterns of disease dynamics; modelling for prediction. Responsible participant: CIMA
- **Host-pathogen interaction:** Host immune reaction; pathogen virulence factors; pathogen mechanisms to elude host response; effects on host physiology. Responsible participant: UBO, UALG
- **Effects on shellfish industry:** Socio-economic aspects of clam industry, with emphasis in Europe; losses due to Perkinsus in Europe and out of Europe; risk of introduction of exotic Perkinsus spp. into Europe through shellfish imports and other ways. Responsible participant: CETMAR
- **Control and fighting strategies:** International rules controlling mollusc traffic; selection programmes for resistance; production of Perkinsus-free seed; therapeutics; culture/fishery management; bed restoration. Responsible participant: CSIC

The responsible participants of each area produced a report gathering the relevant information available on the topics of the thematic area, pointing out knowledge gaps that should be filled and stating all the issues to be addressed in the corresponding session. Each report was the introductory lecture of the respective session of the workshop.

The participants identified and encouraged, through direct contact (e-mail), relevant agents to submit their presentations and to participate actively in the workshop. In addition, the notice of the workshop was disseminated to catch the attention of other potential relevant stakeholders not previously identified by participants. Leaflets announcing the workshop and including a call for contributions were widely distributed through Research Centres, Administration related Services, Internet distribution lists on related subjects, Scientific Societies on related subjects and Shellfish Industry Associations.

A specific web site (<http://www.cetmar.org/woper/>) within CETMAR's website was organised to announce the workshop, and to use it as platform to provide the most relevant information about the event as this information was ready. That website was used for registration of attendants on line and as the way to submit abstracts of contributions.

Deadline for reception of abstracts was 20th May 2007. The abstracts were allocated into the proper thematic area and sent to the respective area responsible participant for evaluation.

Representatives of each participant institution met in Madrid (Spain), on 1st June 2007, to review all the preparatory work; a final decision on abstracts acceptance was taken and a tentative workshop time-schedule for the whole 3 days was established, including the session distribution, oral presentations allocation and poster presentations. Then, authors were informed about acceptance of their contributions.

On June 2007, a press release was distributed including information on the dates, venue, objectives, organisers, supporters and delegates attending the workshop: the information was set in various specialised and general journals.

CETMAR was the entity envisaged to host the Workshop. Thus, they contracted the services needed (English-French-Spanish simultaneous translation; lodging of invited speakers; transport of delegates from hotel to the workshop venue; catering; personal bags...) and prepared the venue infrastructures in order to ensure a successful development of the Workshop.

1.4.2. Accomplishment of the workshop (from 12/09/07 to 14/09/07)

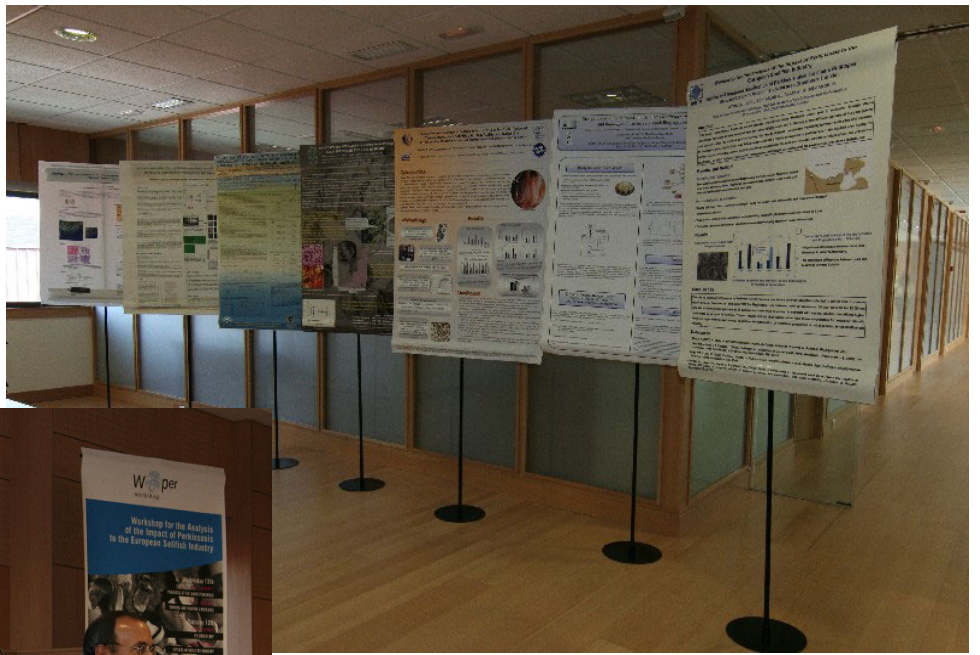
The workshop took place from 12th to 14th September 2007 in the facilities of CETMAR, Vigo (Spain). The workshop was scheduled through five sessions, each starting with an introductory report (30 min.) summarizing the state of the art, followed by oral presentations (20 min.) and ending with a round table for open discussion (60 min.). Thirty oral contributions plus seven posters were presented, most of them providing new, unpublished information and some of them reviewing and updating previous information, corresponding to the following issues in each session:

Parasites of the genus *Perkinsus*: taxonomy and phylogeny, host species, geographic range, life cycle, transmission ways, diagnostic tools. **Epizootiology:** temporal patterns of disease dynamics; influence of environmental conditions, host age and stressing factors, with particular information from different places in France, Italy, Spain, Korea, Tunisia, Mexico and the USA. **Host-pathogen interaction:** Interaction of *Perkinsus* spp. and mollusc defence mechanisms, host genes involved in the immune response, virulence factors of *Perkinsus* spp., impact on host physiology. **Effects on shellfish industry:** review of the production of molluscs in Europe, with emphasis on management and aquaculture of clams in France, Italy and Spain; review of the European regulation on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals. **Control and fighting strategies:** Chemotherapeutants and their effects on *Perkinsus* metabolism, zoosanitary prophylaxis, management and technical strategies, natural selection for resistance, selective

breeding programs for resistance, genes and proteins markers of resistance. **The programme of the workshop is included in the Annex 1.** Each session (including the round table) was chaired by the participants taking charge of the introductory lecture.

Seventy eight delegates attended the workshop from the following countries: Australia (1 delegate), Canada (1), France (15), Italy (5), Korea (3), Maroc (1), Mexico (1), Norway (1), Poland (1), Portugal (3), Spain (35), Tunisia (1), United Kingdom (1), and USA (9). Sixty three delegates belonged to the research community, 9 to the Shellfish Industry, 4 to the Administration and 2 to the EC (SANCO and Research Directorate-General, respectively). Remarkably, 2 researchers of the OIE reference laboratory for Perkinsosis were speakers as well as other researchers who have developed leading research on this disease in the USA, Australia, Asia and Europe. **The list of attendants is included in Annex 2.**

The attendants did not have to pay any registration fee. The organisation provided free catering services for 5 coffee breaks and 3 lunches for all the attendants. The organisation took charge of the costs of accommodation in Hotel Pazo Los Escudos (Vigo) of every speaker and poster responsible author who asked for it. Transportation by bus from the Hotel to the workshop venue was also covered. English-French-Spanish simultaneous translation was available throughout the workshop. In addition, a dinner banquet and a guided excursion by boat through the Ría de Vigo was supported with funds from the City Council of Vigo.



1.4.3. Edition and publication of the Proceedings of the workshop (from 15/09/07 to 31/12/07)

Publication of relevant issues and conclusions of the workshop and dissemination of such publication among relevant administrations, research community and industry representative bodies was an objective of this SSA. Thus, a book including the whole introductory reports, the abstract of all the presentations, a summary of the discussion within the round table of each session, and the conclusions of the workshop, has been edited and published. The coordinator of the SSA took charge of the edition and CIMA and CETMAR were responsible for its publication. The participants chairing sessions provided the summary of each round table. All the SSA participants agreed the conclusions of the workshop. A CDrom has been produced including the Power Point files supporting the presentations of those speakers who agreed its free distribution. The CD will be distributed with the book.

Five hundred copies of the book have been produced. A copy of the book will be sent to each workshop attendant. To assure a wide distribution, the book has been and will be announced at relevant international meetings related to shellfish production and shellfish diseases, such as International Conference of the European association of Fish Pathologists (EAFP) (September 2007), Annual Meeting of the National Shellfisheries Association (NSA) of USA (April 2008), European Aquaculture Society Conference (EAS) (Aquaculture Europe 2008), Annual Meeting of the ICES Working Group on Pathologies and Diseases of Marine Organisms (2008). An electronic file with the book will be provided to FAO, OIE, ICES, EAFP, EAS and NSA, asking them for showing it in their web sites, with the possibility of down loading. These Institutions and Associations will be asked for helping to distribute the book and disseminate its contents. In addition, the electronic file will be available to download from the workshop website (<http://www.cetmar.org/woper/>).

1.5. Overall coordination

From the very beginning of the SSA throughout all the year period, contact among all participants through electronic mail was very frequent. A video conference meeting took place in 02/02/07 to coordinate all the efforts. The participants met in Madrid on 01/06/07 to review all the preparation labour, to establish a list of the accepted presentations and to establish the agenda of the workshop. Indeed, close contact among participants was possible during the workshop in Vigo.

1.6. Conclusions of the workshop

The information available on perkinsosis was reviewed, the lack of knowledge to address this disease in Europe was highlighted and research priorities for the immediate future were stated. The conclusions of the workshop are enumerated next:

1. Information available on perkinsosis has been summarised and reviewed. There is much information on the disease caused by *Perkinsus marinus*, which still causes important losses to oyster industry in the Atlantic and Gulf coasts of the USA. However information on the other *Perkinsus* spp. is much less abundant.

2. Geographic range of perkinsosis has been updated, including those European areas where the disease has been detected as well as the susceptible mollusc species. Two species of the genus *Perkinsus*, *P. olseni* and *P. mediterraneus*, have been detected in European waters thus far. However, there are still places where specific identification has not been accomplished. Proper identification of *Perkinsus* spp. is important because there could be differences in pathogenicity between species.

3. Various venerid clam species are included in the list of the perkinsosis susceptible species with high commercial interest in Europe. No abnormal mortality has been claimed by shellfishermen or shellfish farmers in some European areas affected by perkinsosis whereas high clam mortality has been recorded in other European affected areas. Information on mortality rates in exploited clam beds (either natural or cultured) from most European coasts is scarce or non-existent. Factors controlling the impact of perkinsosis in clams are very poorly understood. Nevertheless, it is well-known that high values of both water temperature and salinity enhance the proliferation of *P. olseni* (the only known *Perkinsus* sp. affecting European clams thus far), whereas low values inhibit or avoid it.

4. Clams are an important resource for the European shellfish industry and there are reasonable expectations for production increase, especially through aquaculture. Warmer waters and longer drought periods, as a consequence of global climate change, would increase the pressure of perkinsosis on clam populations.

5. Models predicting the dynamics of perkinsosis, improvement of zootechnical procedures based on information about the disease dynamics, selective breeding programmes to produce *Perkinsus*-tolerant oyster strains, and search for chemotherapeutants are fighting strategies developed in the USA. The scarcity of knowledge on perkinsosis in Europe prevents from advising properly the European shellfish industry with regard to this disease. Common sense advises to be cautious and to avoid perkinsosis spreading. Perkinsosis has been detected in

many non-European countries that could be a source of clams for the European shellfish industry.

6. To remedy the scarcity of knowledge on perkinsosis in Europe is urgent. Identified research priorities are:

- Evaluation of the impact (namely mortality) caused by perkinsosis in different shellfish growing areas.
- Specific identification of *Perkinsus* parasites occurring in different shellfish growing areas.
- Validation of diagnostic techniques
- Characterisation of the modulation of the disease dynamics (proliferation of parasite free living stages and *Perkinsus* - host interaction) by environmental factors (including pollution).
- Immunological, physiological and molecular characterisation of *Perkinsus* - host interaction. Identification of host genes/proteins linked to higher disease tolerance or resistance.
- Identification and characterisation of *Perkinsus* virulence factors (proteins, genes, other factors).
- Characterisation of *Perkinsus* metabolic routes as target for chemotherapeutants

2. Dissemination of knowledge

Each partner has carried out dissemination activities within their territorial and activity scope, in order to encourage the attendance and participation of relevant stakeholders in the workshop. The overwhelming response achieved proves the effectiveness of the strategy undertaken as well as the great interest and need in Europe of tackling this problem. Besides, an especially stronger dissemination campaign was developed in Spain, as the host country of the workshop.

Overview table

Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
<i>Jan 2007-July 2008</i>	<i>Project web-site</i>	<i>Whole sector: industry, research, administration</i>	Wide world	<i>Massive</i>	<i>CETMARs</i>
<i>Jan-Sept 2008</i>	<i>Direct dissemination in conferences, meetings and other relevant forums</i>	<i>Involved in R+D projects and scientific meetings</i>	15-20	<i>Undetermined</i>	<i>All partners</i>
<i>March 2007; Sept 2007</i>	<i>Flyers</i>	<i>Whole sector: industry, research, administration</i>	15-20	<i>1.000 (aprox.)</i>	<i>All partners</i>
<i>May 2007</i>	<i>Direct e-mailing</i>	<i>Whole sector: industry, research, administration</i>	15-20	<i>Undetermined</i>	<i>All partners</i>
<i>June 2007; Sept 2007</i>	<i>Press release (press/radio/TV)</i>	<i>General public</i>	Spain	<i>Massive</i>	<i>CETMAR</i>

Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
<i>Sept 2007</i>	<i>Posters</i>	<i>Workshop attendants</i>	Spain	<i>90</i>	<i>CETMAR</i>
<i>Sept 2007</i>	<i>Media briefing</i>	<i>General/ Specialised media</i>	Spain		<i>CETMAR/ CIMA</i>
<i>Dec 2007</i>	<i>Publication of the Workshop Proceedings</i>	<i>Workshop attendants; Any interested public</i>	Wide world	<i>500</i>	<i>All partners</i>

At the very beginning of the project, a website was launched for providing general public and potential participants with details about the workshop organisation and development, such as participation guidelines, venue and related facilities, agenda of the event, etc. Moreover, the registration process was administered by means of this website, where also, later on, the photographs of the workshop were made available, as well as the proceedings book in pdf format, for downloading.

Statistics on the visits received can be found in the Annex 3. The website will be operative until July 2008, and then the relevant documents will be kept available in each partner's website.

During the whole preparation period, both direct e-mailing and direct dissemination within different meetings were carried out by all partners, in order to foster the participation of world class experts in the workshop.

Some press releases were launched in Spain, aimed to getting media attention to the event. The distribution list included general newspapers (6), journals (5) radio (9), television (6) and news agencies (3), both local and national scope, as well as some thematic websites such as www.oesa.org (Spanish observatory of aquaculture), www.mispecies.com, www.mundopesca.org (sectorial daily newsletter distributed to about 650 recipients).

The information was also distributed from Press Office of the Regional Ministry of Fisheries and Maritime Affairs. The first one was issued in June, for awareness of all potential participants. During the workshop development, daily press releases were distributed and the second workshop day, they were called for a media briefing in CETMAR.

Flyers were designed and a total of around 1.000 copies printed in English and in all partners' languages (Spanish, Italian, Portuguese and French), for being distributed about March. They were also provided to all attendants, together with the workshop documentation.

Furthermore, two posters were located in the workshop venue.

As foreseen in the work plan, a book containing all the introductory lectures of each session, as well as summaries of most of the presentations, has been published for giving the widest diffusion to the workshop conclusions. Five hundred copies have been printed and its distribution will be reinforced by making the contents available in pdf format for downloading in the workshop and partners' websites. This availability is being duly communicated to all potential interested stakeholders. An electronic file with the book will be provided to FAO, OIE, ICES, EAFP, EAS and NSA, asking them for showing it in their web sites, with the possibility of downloading. These Institutions and Associations will be asked for helping to distribute the book and disseminate its contents.

Annex 1. Workshop Programme



Wednesday September 12

- 8.15 Registration/hanging of posters
- 8.45 Welcome and Workshop opening

9.10 SESSION: PARASITES OF THE GENUS *PERKINSUS* Introductory lecture (I Arzul et al.)

- 9.40 Taxonomy of *Perkinsus* species based on molecular genetic data: identification of species, and host and geographic ranges.
KS Reece, JA. Moss, C Audemard, CF. Dungan, E M Burreson.
- 10.00 *Perkinsus qugwadi* the enigmatic pathogen of Japanese scallops, *Mizuhopecten yessoensis*, cultured in British Columbia, Canada
Gary R. Meyer and Susan M. Bower.
- 10.20 Some considerations on the use of RFTM, PCR and other assays in monitoring and research of perkinsosis
D Bushek, S Ford.
- 10.40 Epidemiological evidence contradicts experimental results, and indicates consistent partitioning of hosts by two *Perkinsus* spp. that are co-endemic among sympatric Chesapeake Bay bivalve molluscs
CF Dungan, KS Reece, JA Moss, NA Stokes, KL Hudson, RM Hamilton, EM Burreson.
- 11.00 Coffee Break
- 11.20 Transmission of *Perkinsus olseni*
RJG Lester, CJ Hayward.
- 11.40 Infectious dose and transmission by cohabitation of *Perkinsus olseni* in *Ruditapes decussatus*
JJ Navas, MC Quintero, IM García-Pardo, JC Manzano.

12.00 Round Table

13.00 Lunch

14.30 SESSION CONTROL AND FIGHTING STRATEGIES Introductory lecture (A Figueras et al.)

- 15.00 Mitigating the perkinsosis impact on *Crassostrea virginica* populations and industries in Chesapeake Bay, USA
RB Carnegie, EM Burreson.
- 15.20 The Moroccan plan of zoo sanitary surveillance of shellfish
O Belhsen, S Kodad, E Talbaoui, A Orbi.
- 15.40 The unique fatty acid synthetic capability of the oyster protozoan parasite, *Perkinsus marinus*: a target for chemotherapeutic treatment?
FLE Chu, ED Lund, P Soudant.
- 16.00 Coffee Break
- 16.20 Folate pathway in *Perkinsus* sp.: Candidate for therapeutic target?
RB Leite, R Afonso, ML Cancela.
- 16.50 *In vitro* and *in vivo* evaluation of quinine as a potential anti-protozoal for the eastern oyster parasite *Perkinsus marinus*
AK. Volety, C Panko, V Encomio, J Barreto.

17.10 Round Table (1 hour)

Thursday September 13



8.50 SESSION EPIZOOTIOLOGY

Introductory lecture (A Villalba et al.)

- 9.20 The role of endemic Perkinsosis, in the mortality of aquaculture cultivated carpet shell clam (*Ruditapes decussatus*) in Portugal
F Ruano.
- 9.40 Temporal distribution of *Perkinsus olseni* in two important production areas of *Ruditapes decussatus* in Galicia (NW Spain)
R Aranguren, C Gestal, J Gómez León, A Figueras.
- 10.00 Epizootiological study of the Perkinsosis in Manila clam (*Ruditapes philippinarum*) farmed in the Marano lagoon (North Adriatic Sea)
G Ceschia, L. Sgro, R Ramirez-Tafur, M Sello, **G Arcangelli,** K. Capello, A. Zentilin.
- 10.20 *Perkinsus* sp. infection in edible bivalves from St. Gilla and Marceddi lagoons (Sardinia, SW Mediterranean)
J Culurgioni, V D'Amico, R De Murtas, G Canestri-Trotti, **V Figus.**
- 10.40 Results of the Perkinsosis survey in France (2004 – 2005)
L Miossec, C Garcia, I Arzul, C François, JP Joly, B Chollet, S Robert, M Ferrand, I de Blas.
- 11.00 Spatio-temporal variation of *Perkinsus olseni* infection on clams *Ruditapes* spp. in Arcachon Bay (SW France) and Mundaka estuary (NW Spain)
C. Dang, F Huchin, X de Montaudouin, N Caill-Milly.
- 11.30 Coffee Break
- 11.50 *Perkinsus olseni* infection among *Ruditapes philippinarum* populations in major clam culture grounds along the West Coast of Korea
KS Choi, HS Yang, BK Kim, JM Uddin, Y Limpanont, KJ Park, YJ Park, KI Park
- 12.10 Prevalence of *Perkinsus marinus* of the eastern oyster *Crassostrea virginica*, SW Gulf of Mexico: environmental, physiological and immunological factors associated
M Gullian-Klanian, L Aguirre-Macedo, R Rodriguez-Canul.

12.30 Round table

13.30 Lunch

15.00 SESSION Effects on shellfish industry

Introductory lecture (R Fernández et al.)

- 15.30 C D'Hardivillé, I Peronnet, **L Miossec,** **G Hussenot,** A Le Mena'ch: Production management of clams in Brittany
- 15.50 Culture of *Ruditapes philippinarum* in the Northern Adriatic (Italy): productions and perspectives
A Zentilin
- 16.10 Legislative aspects in prevention and control of mollusc diseases
P Rosado
- 16.30 Coffee break

16.50 Round table (1 hour)

Friday September 14

8.30 SESSION: Host-pathogen interaction Introductory lecture (P Soudant et al.)

- 9.00 Molecular responses of American oysters to infection with the protozoan parasite *Perkinsus marinus*: Lessons from the functional genomics and candidate gene approaches
M Gomez-Chiari.
- 9.20 Differentially expressed immune genes in response to *Perkinsus olseni* infection in clam *Ruditapes decussates*
M Prado, C Gestal, B Novoa, A Figueras.
- 9.40 Does *Perkinsus olseni* parasite respond differently to diverse bivalves challenge?
RMT Ascenso, RB Leite, R Afonso, ML Cancela.
- 10.00 Identification of eastern oyster host defenses against *Perkinsus marinus*
J La Peyre, QG Xue, J Supan.
- 10.20 Immune reaction of venerid clams *Tapes philippinarum* and *T. decussatus* against *Perkinsus olseni* infection
JF Montes, M Durfort, J García-Valero.
- 10.40 Effects of harmful algae *Karenia selliformis* on *Perkinsus olseni* burden and immunological responses of the Manila clam *Ruditapes philippinarum*
PM da Silva, H Hégaret, C Lambert, G Wikfors, T De Bettignies, N Le Goïc, S Shumway, P Soudant.
- 11.00 Coffee Break
- 11.30 Impact of *Perkinsus olseni* infection on hemocyte and physiological parameters of Manila clam *Ruditapes philippinarum*
J Flye-Sainte-Marie, P Soudant, C Lambert, P M da Silva, C Paillard, F Jean.
- 11.50 Experimental infection with *Perkinsus olseni* in *Ruditapes decussatus*: disease progression and effects on physiological process in the carpet shell clam
JJ Navas, R de la Herrán, I López-Flores, IM García-Pardo, AS Naranjo, M Ruiz-Rejón, JC Manzano.

12.10 Round table

13.10 Lunch

14.40 CONCLUSION SESSION

Poster presentations:

Spatial and temporal distribution of *Perkinsus olseni* in clams *Ruditapes decussatus* from Medenine coastal area (Southern Tunisia)

H Attia El Hili, C Ben Salah, W Ayari, N Ben Amor

Lectins (MCLs) from the Manila clam *Ruditapes philippinarum* are induced upon infection with bacterial and protozoan

M Cho, KI Park, KS Choi

New data on perkinsosis affecting three clam species cultured in the Vigo estuary

C Crespo, H Rodríguez, M Soto, R Iglesias, JM García-Estévez.

Energetic cost of perkinsosis in the clams *Ruditapes philippinarum* and *Ruditapes decussatus*, a modelling approach?

J Flye-Sainte-Marie, F Jean.

Evaluation of *Perkinsus* infection levels within a Variable Range of Temperatures and Salinities in Clam *Ruditapes decussatus*. Effect on Clam Oxidative Stress and Expression of Antioxidant-related genes

RB Leite, R Afonso, M Simão, S Joaquim, D Matias, ML Cancela.

Evaluation of the sensitivity and specificity by latent class analysis of Ray's method, histological assay, and PCR diagnosis of *Perkinsus olseni* in *Ruditapes decussatus*

Jl Navas, R de la Herrán, I López-Flores, MC Quintero, IM García-Pardo, M Ruiz-Rejón, JC Manzano.

Occurrence of *Perkinsus olseni* in the Venus clam *Protothaca jedoensis* in Korean waters

KI Park, KS Choi.

Annex 2. List of attendants

First / Middle name	Family name	Affiliation	Country	P	Sector
Emílio	Abella Rey	Confraría de Pescadores "A Pastoriza"	Spain	Att	Ind
Elvira	Abollo	Centro de Investigacións Mariñas	Spain	Att	Res
Ricardo	Afonso	Universidade do Algarve	Portugal	Spk	Res
Standish K	Allen Jr	Virginia Institute of Marine Science	USA	Att	Res
María José	Alonso juste	Consellería de Pesca e Asuntos Marítimos - Xunta de Galicia	Spain	Att	Adm
Raquel	Aranguren	Instituto de Investigaciones Marinas - CSIC	Spain	Spk	Res
Giuseppe	Arcangeli	Istituto Zooprofilattico Sperimentale delle Venezie	Italy	Spk	Res
Isabelle	Arzul	IFREMER	France	Spk	Res
Rita	Ascenso	Universidade do Algarve	Portugal	Spk	Res
Hedia	Attia El Hili	Institut National des Sciences et Technologies de la mer	Tunisia	Post	Res
Oum Keltoum	Belhsen	Institut National de Recherche Halieutique	Maroc	Spk	Res
María José	Blanco Domínguez	Instituto Español de Oceanografía	Spain	Att	Res
David	Bushek	Rutgers University	USA	Spk	Res
María Asunción	Cao Hermida	Centro de Investigacións Mariñas	Spain	Att	Res
María Jesús	Carballal	Centro de Investigacións Mariñas	Spain	Att	Res
Ryan B.	Carnegie	Virginia Institute of Marine Science	USA	Spk	Res
Giuseppe	Ceschia	Istituto Zooprofilattico Sperimentale delle Venezie	Italy	Att	Res
Moonjae	Cho	Cheju National University	Republic of Korea	Post	Res
Kwang-Sik Albert	Choi	Cheju National University	Republic of Korea	Spk	Res
Fu-Lin E.	Chu	Virginia Institute of Marine Science	USA	Spk	Res
Jacopo	Culurgioni	Università di Cagliari	Italy	Att	Res
Patricia Mirella	da Silva	Université de Bretagne Occidentale	France	Spk	Res
Cecile	Dang	Station Marine Arcachon - Université Bordeaux	France	Spk	Res
Roberto	de la Herrán	Universidad de Granada	Spain	Att	Res
Xavier	de Montaudouin	University Bordeaux	France	Att	Res
Seila	Díaz	Centro de Investigacións Mariñas	Spain	Att	Res
Sonia	Dios	Instituto de Investigaciones Marinas - CSIC	Spain	Att	Res
Christopher	Dungan	Maryland Department of Natural resources	USA	Spk	Res
Fernando	Febrero	Consellería de Pesca e Asuntos Marítimos - Xunta de Galicia	Spain	Att	Adm
Rosa	Fernández Otero	CETMAR	Spain	Spk	Ind
Antonio	Figueras	Instituto de Investigaciones Marinas - CSIC	Spain	Spk	Res
Vincenza	Figus	Università di Cagliari	Italy	Spk	Res
Jonathan	Flye Sainte-Marie	Université de Bretagne Occidentale	France	Spk	Res
Belén	Gómez Pardo	Universidade de Santiago de Compostela	Spain	Att	Res
Celine	Garcia	IFREMER	France	Spk	Res

José Manuel	García Estévez	Universidade de Vigo	Spain	Post	Res
Camino	Gestal	Instituto de Investigaciones Marinas - CSIC	Spain	Att	Res
Marta	Gomez-Chiarri	University of Rhode Island	USA	Spk	Res
Mariel	Gullian Klanian	CINVESTAV	Mexico	Spk	Res
Hallgeir	Herikstad	European Commission	Norway	Att	EC
Gérald	Hussenot	Comité Régional des Pêches de Bretagne	France	Spk	Ind
David	Iglesias Estepa	INTECMAR	Spain	Att	Res
Paula	Iglesias González	Instituto Español de Oceanografía	Spain	Att	Res
Mónica	Incera	Centro Tecnológico del Mar-Fundación CETMAR	Spain	Att	Ind
Marcel	Koken	Université de Bretagne Occidentale	France	Att	Res
Christophe	Lambert	Université de Bretagne Occidentale	France	Att	Res
Jerome	La Peyre	Louisiana State University Agricultural Center	USA	Spk	Res
Nelly	Le Goic	Université de Bretagne Occidentale	France	Att	Res
Fabienne	Le Grand	Université de Bretagne Occidentale	France	Att	Res
Adrien	Le Mena'ch	Comité Régional des Pêches de Bretagne	France	Att	Ind
Ricardo	Leite	Universidade do Algarve	Portugal	Spk	Res
Robert J.G.	Lester	University of Queensland	Australia	Spk	Res
Carmen	López Gómez	Centro de Investigacións Mariñas	Spain	Att	Res
Gary	Meyer	Fisheries and Oceans Canada	Canada	Spk	Res
Laurence	Miossec	IFREMER	France	Spk	Res
José	Molares	Centro de Investigacións Mariñas	Spain	Att	Res
Juan Francisco	Montes Castillo	Universitat de Barcelona	Spain	Spk	Res
Antonio	Muñoz	Xunta de Galicia	Spain	Att	Adm
José Ignacio	Navas	IFAPA, Junta de Andalucía	Spain	Spk	Res
Beatriz	Novoa	Instituto de Investigaciones Marinas - CSIC	Spain	Att	Res
José Manuel	Parada Encisa	Centro de Investigacións Mariñas	Spain	Att	Res
Kyung-Il	Park	Korea Polar Research Institute	Republic of Korea	Att	Res
Agnieszka	Pekala	National Veterinary Research Institute	Poland	Att	Res
Luis Antonio	Pérez Carrasco	Acuinuga-División Acuicultura	Spain	Att	Ind
María	Pérez Rodríguez	CETMAR	Spain	Att	Ind
Rita	Pesqueira Portas	Arola Consultora S.C.	Spain	Att	Ind
Maria	Prado	Instituto de Investigaciones Marinas - CSIC	Spain	Spk	Res
Kimberly S.	Reece	Virginia Institute of Marine Science	USA	Spk	Res
Tristan	Renault	IFREMER	France	Att	Res
Juan José	Rodríguez Quiroga	Universidade de Vigo	Spain	Att	Res
Carmen	Rodríguez Rodríguez	Consejería Medio Rural y Pesca - Principado de Asturias	Spain	Att	Adm
Pedro	Rosado	European Commission	Spain	Spk	EC
Hamish	Small	Centre for Environment, Fisheries & Aquaculture Science (CEFAS)	UK	Att	Res
Philippe	Soudant	Université de Bretagne Occidentale	France	Spk	Res

Román	Vilas	Universidade de Santiago	Spain	Att	Res
Antonio	Villalba	Centro de Investigacións Mariñas	Spain	Spk	Res
Aswani	Volety	Florida Gulf Coast University	USA	Spk	Res
Aurelio	Zentilin	Ditta ALMAR	Italy	Spk	Ind

Att: Attendant

Post: Poster

Spk: Speaker

Adm: Administration

EC: European Commission

Ind: Industry

Res: Research

Annex 3. Traffic statistics of the workshop website.

JANUARY

1.	/woper/index.html	78	27,96%	
2.	/woper/objetivos.html	44	15,77%	
3.	/woper/inscripcion.html	30	10,75%	
4.	/woper/es/inscripcion.html	29	10,39%	
5.	/woper/agenda.html	29	10,39%	
6.	/woper/INFORMATION.html	26	9,32%	
7.	/woper/CONTACTO.html	26	9,32%	
8.	/woper/es/inscripcion.asp	8	2,87%	
9.	/woper/en/inscripcion.asp	4	1,43%	

FEBRUARY

1.	/woper/index.html	130	32,75%	
2.	/woper/objetivos.html	76	19,14%	
3.	/woper/inscripcion.html	59	14,86%	
4.	/woper/INFORMATION.html	37	9,32%	
5.	/woper/agenda.html	35	8,82%	
6.	/woper/CONTACTO.html	31	7,81%	
7.	/woper/CONTRIBUTIONS.html	28	7,05%	

MARCH

1.	/woper/index.html	196	30,82%	
2.	/woper/objetivos.html	84	13,21%	
3.	/woper/inscripcion.html	83	13,05%	
4.	/woper/agenda.html	75	11,79%	
5.	/woper/CONTRIBUTIONS.html	67	10,53%	
6.	/woper/INFORMATION.html	64	10,06%	
7.	/woper/CONTACTO.html	54	8,49%	
8.	/woper/inscripcion.asp	11	1,73%	

APRIL

1.	/woper/index.html	136	30,84%	
2.	/woper/inscripcion.html	47	10,66%	
3.	/woper/objetivos.html	45	10,20%	
4.	/woper/INFORMATION.html	36	8,16%	
5.	/woper/agenda.html	36	8,16%	
6.	/woper/inscripcion.asp	25	5,67%	

7.	/woper/CONTACTO.html	25	5,67%	
8.	/woper/folleto/es.pdf	23	5,22%	
9.	/woper/CONTRIBUTIONS.html	22	4,99%	
10.	/woper/folleto/en.pdf	17	3,85%	

MAY












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5.	/woper/inscripcion.html	161	7,27%	
6.	/woper/agenda.html	158	7,14%	
7.	/woper/INFORMATION.html	116	5,24%	
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9.	/woper/Leaflets.html	112	5,06%	
10.	/woper/CONTACTO.html	112	5,06%	
11.	/woper/folleto/en.pdf	101	4,56%	
12.	/woper/inscripcion.asp	39	1,76%	
13.	/woper/folleto/it.pdf	35	1,58%	
14.	/woper/folleto/pt.pdf	24	1,08%	
15.	/woper/folleto/fr.pdf	17	0,77%	

JUNE

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4.	/woper/objetivos.html	89	6,44%	
5.	/woper/inscripcion.html	88	6,37%	
6.	/woper/preinscripcion.html	80	5,79%	
7.	/woper/INFORMATION.html	71	5,14%	
8.	/woper/contributions.html	69	4,99%	
9.	/woper/inscripcion.asp	59	4,27%	
10.	/woper/Leaflets.html	44	3,18%	
11.	/woper/CONTACTO.html	36	2,60%	
12.	/woper/folleto/es.pdf	32	2,32%	
13.	/woper/folleto/it.pdf	13	0,94%	
14.	/woper/folleto/en.pdf	13	0,94%	

JULY

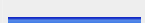










1.	/woper/index.html	409	32,56%	
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3.	/woper/agenda.html	126	10,03%	

4.	/woper/INFORMATION.html	91	7,25%	
5.	/woper/objetivos.html	77	6,13%	
6.	/woper/preinscripcion.html	48	3,82%	
7.	/woper/CONTACTO.html	45	3,58%	
8.	/woper/Leaflets.html	43	3,42%	
9.	/woper/contributions.html	41	3,26%	
10.	/woper/docs/Time+schedule-prov-jul.pdf	35	2,79%	
11.	/woper/inscripcion.html	33	2,63%	
12.	/woper/folleto/es.pdf	28	2,23%	
13.	/woper/folleto/en.pdf	19	1,51%	
14.	/woper/folleto/fr.pdf	10	0,80%	

AUGUST

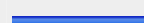

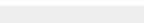
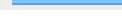






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4.	/woper/INFORMATION.html	64	6,50%	
5.	/woper/objetivos.html	48	4,88%	
6.	/woper/docs/Time+schedule-prov-jul.pdf	36	3,66%	
7.	/woper/Leaflets.html	35	3,56%	
8.	/woper/preinscripcion.html	34	3,46%	
9.	/woper/CONTACTO.html	29	2,95%	
10.	/woper/contributions.html	27	2,74%	
11.	/woper/folleto/es.pdf	24	2,44%	
12.	/woper/inscripcion.html	22	2,24%	
13.	/woper/folleto/fr.pdf	13	1,32%	
14.	/woper/folleto/en.pdf	10	1,02%	
15.	/woper/folleto/pt.pdf	3	0,30%	
16.	/woper/folleto/it.pdf	3	0,30%	
17.	/WOPER/objetivos.html	2	0,20%	

SEPTEMBER

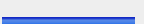
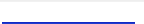





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5.	/woper/objetivos.html	126	6,86%	
6.	/woper/Leaflets.html	87	4,74%	
7.	/woper/docs/Agenda.pdf	84	4,57%	
8.	/woper/CONTACTO.html	71	3,86%	
9.	/woper/contributions.html	67	3,65%	
10.	/woper/preinscripcion.html	64	3,48%	
11.	/woper/folleto/es.pdf	41	2,23%	

12.	/woper/folleto/en.pdf	34	1,85%	
13.	/woper/folleto/fr.pdf	16	0,87%	
14.	/woper/docs/Time+schedule-prov-jul.pdf	12	0,65%	

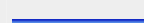








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4.	/woper/index.html	80	14,34%	
5.	/woper/agenda.html	27	4,84%	
6.	/woper/objetivos.html	21	3,76%	
7.	/woper/Leaflets.html	15	2,69%	
8.	/woper/CONTACTO.html	13	2,33%	
9.	/woper/INFORMATION.html	11	1,97%	
10.	/woper/contributions.html	10	1,79%	

NOVEMBER

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5.	/woper/agenda.html	15	4,19%	
6.	/woper/index.html	14	3,91%	
7.	/woper/INFORMATION.html	9	2,51%	
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9.	/woper/CONTACTO.html	6	1,68%	

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7.	/woper/agenda.html	4	1,57%	
8.	/woper/INFORMATION.html	3	1,18%	
9.	/woper/Leaflets.html	3	1,18%	
10.	/woper/contributions.html	3	1,18%	