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Serrano-Pinto, V., Celia Vazquez-Boucard and Humberto Villarreal-Colmenares, 2003. Yolk proteins during ovary and egg development of mature female freshwater crayfish (*Cherax quadricarinatus*), *Comparative Biochemistry and Physiology - Part A: Molecular & Integrative Physiology* 134(1):33-43

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Crayfish NEWS

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December 2002

The official newsletter of the International Association of Astacology

Investigation into crayfish fin blister syndrome in Western Australia

IAA members Tim Storer and Louis Evans send the following update on their project focusing on the marron (*Cherax tenuimanus*) aquaculture industry in Western Australia

A site analysis of selected aquaculture farms in the southwest of Western Australia was conducted to investigate the prevalence, transmission and prevention of the fin blister syndrome in marron, *Cherax tenuimanus*. Data was collected on pond environment variables (water catchment activities, substrate, food chain species, shelter, etc), pond management (pre-

stocking preparation, feeding regimes, water quality management, etc), and on harvesting, handling and transport systems/management.

Fin blisters were identified as a major concern to the marron industry with outbreaks sporadic, but with the capability of affecting large numbers of stock in a short time frame. Affected stock is predominantly unacceptable to market. The syndrome is only apparent in *Cherax* (freshwater crayfish) and in *Homarus*, *Janus* and *Panulirus* (marine lobsters). There are two forms of blisters apparent, the first is a clear fluid filled blister and the second is filled with necrotic and fibrous tissue, not to be confused with tail erosion but possibly leading to this event.

(Continued on page 3)

FRESHWATER CRAYFISH 13 AVAILABLE NOW

The proceedings of IAA's thirteenth symposium held in Perth, August 2000, are now available in CD or book format.

The 627-page volume contains 56 peer-reviewed papers and 44 short communications from 180 authors.

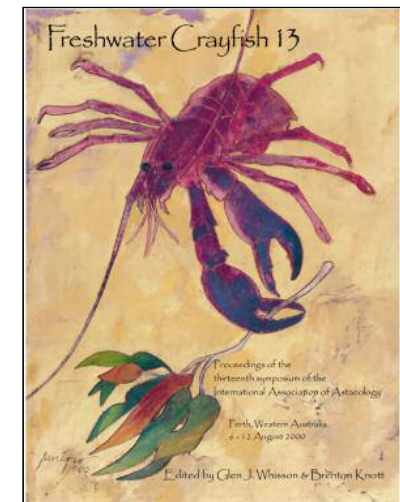
Current IAA members receive a special discount of US\$40 per book (including CD version). Postage extra.

For ordering information contact:

Glen Whisson

Curtin University of Technology

E-mail: g.whisson@curtin.edu.au





The International Association of Astacology (IAA), founded in Hintertal, Austria in 1972, is dedicated to the study, conservation, and wise utilisation of freshwater crayfish. Any individual or firm interested in furthering the study of astacology is eligible for membership. Service to members include a quarterly newsletter, membership directory, bi-annual international symposia and publication of the journal *Freshwater Crayfish*.

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Statements and opinions expressed in *Crayfish News* are not necessarily those of the International Association of Astacology

President's Corner

We are now in that most busy time of year again. Semesters are ending, holidays are beginning, and astacologists are as busy as ever. As we bring an end to 2002 and look forward to 2003, the thought of New Year's resolutions comes to mind. I would like all of you outstanding members of IAA to reach out during the New Year and pass on your newsletter to a colleague, associate, or friend who has an interest in crayfish and invite this person to join us in IAA. Gently explain the benefits of this outstanding association and what you personally have gotten out of your membership. If we all did this with just one person, our ranks would grow and our association would be enriched. So please try and make adding one new member a priority for your New Year.

I understand that we have recently had some difficulties with the "chat room" at the IAA website. I apologize for this and hope to have the situation rectified soon. Indeed, we are working on revamping the entire IAA website. So please be patient and give us a month or two and then look for a new and improved website. In the meantime there is a new list server for freshwater invertebrate taxonomy (see announcement below) that has an active crayfish discussion group.

I hope you were all able to receive and open the last wonderful newsletter filled with colorful photos of our exceptional meeting in Mexico. I encourage you all to think of the newsletter and submit noteworthy crayfish news to **David Holdich** for editing and compilation. Please keep us updated on your recent publications and don't forget the deadline for submission to *Freshwater Crayfish 14* is 31 December 2002! Finally, I encourage you all to purchase a volume and have your libraries purchase a volume of the beautiful *Freshwater Crayfish 13*. Not only is it an exquisite volume, put it is packed with outstanding contributions to our knowledge of our beloved beasts.

Let me close by wishing you all a safe and happy holiday season. Warmest wishes from the snowy mountains of Utah!

Keith A. Crandall
IAA President

UPCOMING CONFERENCES OF INTEREST

IAA member **Kenneth Söderhäll** sends information on two meetings that may be of interest:

1. European Molecular Biology Organization Workshop on

PATTERN RECOGNITION PROTEINS AND RECEPTORS

14-18 May, Trest Castle, Czeck Republic

For more information contact the organiser: [Kenneth Söderhäll@ebc.uu.se](mailto:Kenneth.Söderhäll@ebc.uu.se); or visit the workshop web page: www.jamfys.ebc.uu.se/prp3.html

2. Latsis Symposium 2003

EVOLUTION, IMMUNITY AND INFECTIOUS DISEASE

22-24 May 2003, ETH Zürich, GEP Pavillon

Organisers: *S Bonhoeffer, H Hengartner & P Schmid-Hempel*

Thursday evening, 22 May

Opening public lecture:

Lord May of Oxford PRS, London/Oxford: "Population biology of infection"

Friday, 23 May

SECTION 1 "EVOLUTION AND DIVERSITY OF THE IMMUNE RESPONSE"

1. L. du Pasquier, Basel: "Evolution of vertebrate immune system"
2. K. Söderhäll Uppsala: "Invertebrate immunity"
3. M. Flajnik, U Maryland: "Evolution of adaptive immunity"
4. R. De Boer, Utrecht: "Optimal number of MHC"

SECTION 2 "HOST-PARASITE CO-EVOLUTION"

1. B. Levin, Emory: "The population biology of antibiotic resistance"
2. D. Ebert, Fribourg: "Evolution of virulence"
3. P. Sharp, Nottingham: "Evolution of primate lentiviruses"
4. W Fitch, Irvine: "Predicting influenza epidemics using phylogenetic trees"

Saturday, 23 May

SECTION 3: "POPULATION BIOLOGY OF INFECTIOUS DISEASE AND IMMUNITY"

1. A. Read, Edinburgh: "Evolutionary implications of imperfect vaccines"
2. S. Gupta, Oxford: "Population biology of malaria"
3. S. Frank, Irvine: "Parasite escape from host immunity"
4. A. Perelson, Los Alamos: "Virus dynamics"

SECTION 4: "COSTS AND TRADE-OFFS OF IMMUNITY"

1. M. Kopf, ETH Zürich: "Allergy and immunity"
2. A. Hill, Oxford: "Variability in susceptibility to disease"
3. C. Godfray, Imperial: "Evolutionary cost of the immune system in *Drosophila*"
4. M. Milinski, MPI Plön: "Sexual selection and counting MHCs"
5. R. Zinkernagel, U Zürich: "Function and malfunction of the immune response"



the fluvial crayfishes (Astacidae) as objects of agriculture

6. S.M. Nickitina and A.O. Shirshov Current status of two crayfish populations in the waterbodies of Kaliningrad district

7. V. P. Fedotov. Ecological meaning of native freshwater crayfish and their role in hydrobiocenoses.

Materials were published in Russian:

▶ VI ALL - Russian Conference on Commercial Invertebrates: Theses of Reports/- M: VNIRO Publishing. 2002, 209p.

▶ XVII Work meeting Conservation of the Genetic Resources in Puschino.

▶ Report was made by V.P. Fedotov, S.V.Kholodkevitch, S.V. Sladkova and V.V. Legkov: Crayfish farms as the example of protection and reproducing of the valuable crayfish species.

In October 2002 Yuri Kucherjavyh defended his dissertation "Research of the Electrophysiological characteristics of the freshwater crayfish mechanoreceptor neuron with an influence of the infra-red radiation" at St. Petersburg State University (Department of Biophysics).

For further information email **Dr Fedotov** on: Fedotov@VF4493.spb.edu

PAPERS OF INTEREST TO ASTACOLOGISTS

Abdu, U., Davis, C., Khalaila, I., and Sagi, A., 2002. The vitellogenin cDNA of *Cherax quadricarinatus* encodes a lipoprotein with calcium binding ability, and its expression is induced following the removal of the androgenic gland in a sexually plastic system. Gen Comp. Endocrinol. 127:263-272.

Fernandes Denise; Potrykus Joanna; Morsiani Cinzia; Raldua Demetrio; Lavado Ramon; Porte Cinta, 2002. The combined use of chemical and biochemical markers to assess water quality in two low-stream rivers (NE Spain). Environmental Research. 90:169-178.

Fidalgo Silvana G; Longbottom Chelsea J; Riley Thomas V., 2002. Susceptibility of *Erysipelothrix rhusiopathiae* to antimicrobial agents and home disinfectants. Pathology 34:462-465.

Garduno Julieta; Elenes Sergio; Cebada Jorge; Becerra Elizabeth; Garcia Ubaldo, 2002. Expression and functional characterization of GABA transporters in crayfish neurosecretory cells. Journal of Neuroscience 22:9176-9184.

Grasso, F.W. and Jennifer A. Basil, 2003. How lobsters, crayfishes, and crabs locate sources of odor: current perspectives and future directions, Current Opinion in Neurobiology 12(6): 721-727

Harris-Warrick, R.M. 2003. Voltage-sensitive ion channels in rhythmic motor systems, Current Opinion in Neurobiology 12 (6):646-651

Herberholz Jens; Antonsen Brian L; Edwards Donald H, 2002. A lateral excitatory network in the escape circuit of crayfish. Journal of Neuroscience 22:9078-9085.

Kawai, T. & Scholtz, G. 2000. Behaviour of juveniles of the Japanese endemic species *Cambaroides japonicus* (Decapoda: Astacidae:Cambaridae) with observations on the spermatophore attachment on adult females. Journal of Crustacean Biology 22(3): 532-537.

Kirschner, L.B. 2003. Sodium-proton exchange in crayfish, Biochimica et Biophysica Acta (BBA) - Biomembranes 1566 (1-2):67-71

Khalaila, I., Manor, R., Weil, S., Granot, Y., Keller, R., and Sagi, A., 2002. The eyestalk-androgenic gland-testis endocrine axis in the crayfish *Cherax quadricarinatus*. Gen Comp. Endocrinol. 127(2):147-156

(Continued from page 1)

Many apparent causes were identified for the condition and further study is proposed. Based on the present observations further investigations will test the hypothesis that adverse rearing conditions (e.g. poor nutrition, exposure to anoxic sediments, exposure to environmental toxins, poor water quality, etc) predispose marion to developing fin blisters when they are subsequently exposed to environmental stressors, in particular exposure to high levels of sediment during harvest, physical handling during harvest, poor water quality during purging or a sudden drop in oxygen levels in purging tanks.

Blisters and/or eroded lesion formation is exacerbated by mechanical damage to the underside of the tail fan. Eroded tail lesions develop from the initial sterile fluid filled blisters when tissue is damaged and invaded by a suite of opportunistic bacteria.

An extended analysis of the fin blister syndrome, and future results, will be reported in a future issue of *Crayfish News*.

NEW LIST SERVER FOR FRESHWATER INVERTEBRATE TAXONOMY

To send a message to all list members, simply address it to:

FIT-LISTSERV@ECOANALYSTS.COM

To remove yourself from the list, send a message to the above address with „unsubscribe%0 in the subject line. You may rejoin the list by sending a message with „subscribe%0 in the subject line.

If you have any questions, or suggestions as to how this service could be improved, please send a message to the moderator at: mwalters@ecoanalysts.com.

EDITORIAL

At IAA 14 in Mexico the IAA Board decided to extend membership to the newly-founded European association "Forum Flusskrebse".

This has been welcomed as a positive step for IAA—raising membership by about 100; and more importantly, spreading the “crayfish word” further into non-English speaking regions.

Please send your newsletter contributions to **David Holdich** at: david.holdich@ntlworld.com

A reminder that we have decided to extend the IAA History book to include the first 30 years of our Association. So if you have anecdotes or photographs from IAA 12, 13 or 14, please send them to David Holdich or myself.

**Glen Whisson
David Holdich**

MEMORIES OF JOE FITZPATRICK

IAA member **Aloyzas Burba** sends the following recollections about the late Joe Fitzpatrick.

I am very proud to see myself in the *Crayfish News* cover picture (Vol. 24:3) together with the famous astacologist J.F. Fitzpatrick. I would like to pass on some facts about this astacologist's activities, which may be not well known to other IAA members.

At the end of 1987 I received a letter from J.F. Fitzpatrick, dated 18 November 1987, and was in Russian (not good Russian). At this time Lithuania was part of the Soviet Union and the official scientific language was Russian – almost all our publications and doctoral theses



were in Russian. In this letter J.F. Fitzpatrick wrote that he and Dr. H. Hobbs, Jr. had started an unofficial project detailing similarities of famous astacologists. Dr. Hobbs had a good collection of North American astacologists and J. F. Fitzpatrick agreed to collect materials about astacologists from overseas' countries. These materials would be deposited in the archives of, maybe the Smithsonian Institute, and everybody could access them. J.F. Fitzpatrick asked for a photo to go with information about Lithuanian astacologists he received from Kosakowski (Poland).

In this letter J.F. Fitzpatrick apologized that he was not able to write in Lithuanian and hoped I understood his "bad Russian". I sent my photo and information about my activities and received J.F. Fitzpatrick's letter dated 29 February 1988. In this letter J.F. Fitzpatrick did thank me for the information and wrote (of course in Russian by hand like the first letter) that he was very interested in information from the Soviet Union and apologized that the West knows little about Eastern European scientists.

It was my first direct contact with an astacologist from the West. We had information about IAA and Prof. Kosakowski (from Poland) was sending for us copies of IAA newsletters but this first direct contact was very significant for me. J. F. Fitzpatrick's idea to collect materials about eastern astacologists was very significant and prophetic.

In 1992 I attended my first IAA symposium in Reading, England. My first question at the reception desk was "did J. F. Fitzpatrick arrive and how to find him?" He was one person from IAA who knows Russian and I hoped to find help, because it was my first trip abroad. During this symposium I became a member of IAA

and established contacts with many astacologists from all world.

Later I asked J.F. Fitzpatrick for a copy of one of his articles and – received very big and heavy parcel – copies of all his articles and poster abstracts.

J.F. Fitzpatrick was a very rounded and interesting scientist and memories about this astacologist I will keep forever.

CRAYFISH BOOK PUBLISHED

Professor Semen Brodsky informs the IAA that he has 300 copies of the English translation of his Ukrainian crayfish book. We will inform members of ordering information as soon as it comes to hand.

UPDATED CLASSIFICATION OF RECENT CRUSTACEA

Available for Free Download or \$20 Hard Copy

Martin, J. W., and G. E. Davis. 2001. An Updated Classification of the Recent Crustacea. Natural History Museum of Los Angeles County, Science Series No. 39: 1-124.

This was formerly available only in hard copy from the Natural History Museum of Los Angeles County, and is now available in its entirety and at no cost as a pdf file from the home page of The Crustacean Society.

The volume can be accessed via the TCS website, <http://www.vims.edu/tcs/> under the downloads link, or directly at http://www.vims.edu/tcs/crustacean_downloads.htm.

► **Dr Mohamed Benabid** (Marrakech-Morocco) has defended his thesis on the propagation of *Astacus astacus* in the high watershed of Atlas mountains. It is on the way to being published.

► I am preparing to publish my book "L'Ecrevisse et son élevage" (expected by next April, by Lavoisier edit.). "Aquaculture from A to Z" (Arrignon, Billard, Breton, Michel) was published in June 2002 (by Lavoisier edit.)

NEWS FROM RUSSIA

IAA member **Valery Fedotov** sends the following crayfish update from Russia.

In Russia, at the Saint-Petersburg Scientific Research Center for Ecological Safety, Russian Academy of Sciences we started to carry out a project concerning the use of the crayfish *Procambarus clarkii* as an bioindicator of the purified water quality after the additional purifying by the "Vodokanal". We work with the crayfish populations bred in laboratory conditions.

At the water purifying station (North aeration station) a module with aquariums with purified water is located. Water contains active sludge—food for crayfish. There is one aquarium with the crayfish family. We work with the 4-th crayfish generation. The functional state of animals is assessed, based on the cardiogrammes, processed by the variation pulsometry method. Data analysis allows the determination of stress levels and the normal state of animals in the experiment. This is a type bioindication which helps to detect water quality changes in the stages-very important for biota in the Gulf of Finland.

P. clarkii is well adapted to the aquarium conditions and can live at the temperature range of 13 and 28C. This is the first case of using *P. clarkii*

in Russia. These crayfish can live at the low temperatures of North-West Russia. Small crayfish were born when the temperature was 16C. The progeny grows normally. Daria Safronova (5th year student of the Saint-Petersburg State University) works with morphometric data of the progeny in the tested water.

This species adapts to the bad water quality better than the native crayfish species (*Astacus astacus* and *Pontastacus leptodactylus*). It is known that the progeny is more sensitive to pollution than the adults, so we hope that the young crayfish will give information about changes in water at the lower sensitiveness level. Also we plan to control the water quality by instrumental methods.

The sixth Russian conference on commercial invertebrates was held in Russia (Kaliningrad) on 3-5 September 2002. There were some reports concerning crayfish:

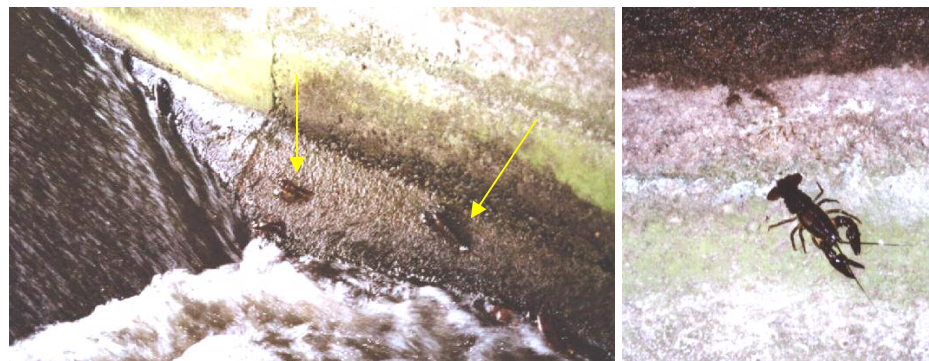
1. E.N. Alexandrova. Freshwater crayfish (Gen. *Pontastacus* Bott) from the Msta river Basin within the limits of the landscape province Byelorussian-Valdai lake system: ecology and analysis of the morphometric variation
2. R.R. Borisov. Setae and Function of the mouthparts of the crayfish (*Pontastacus leptodactylus*)
3. O.I. Mickevitch. Estimation of the present status of crayfish stocks in European Russian waterbodies
4. V.N. Nefedov and G.N. Nefedov. The results of works on cultivation of the long-fingered crayfish (*Astacus leptodactylus*) in the lower Volga region
5. G.N. Nefedov, K.A. Truveller and V.N. Nefedov. Biochemical polymorphism of proteins in



STOP ME IF YOU CAN!

Signal crayfish, *Pacifastacus leniusculus*, make their way round a weir by climbing out of water! Signal crayfish continue to invade new waterbodies in the UK and are proving almost impossible to control.

Photos by Phil Smith, Environment Agency.



(Continued from page 7)

seamless use of burrowing crayfish video clips. Damian Bubb of the University of Durham maintained the high standard of session four with the final presentation of the day. This imparted much useful knowledge regarding the spatial behaviour of signal crayfish in upland rivers and data relating to the stimuli for movement and dispersal.

Pete Sibley rounded off a busy day with thanks to the organising committee, sponsors and delegates for their contributions, not forgetting his Mum, for her excellent painting that adorned the conference literature and the children of Flintham Primary School for their 'Gallery of crayfish' in the delegate handout.

The Environment Agency intends to publish the conference proceedings for 'Management

and Conservation of Crayfish' in hard copy (and possibly on the internet) in 2003 with David Holdich as Chief Editor.

UPDATE FROM FRANCE AND SURROUNDS

IAA member **Jacques Arrignon** sends the following information.

► The annual production of crayfish (*Cherax quadricarinatus*) in New Caledonia is 6 tons (6 hectares and 18 farmers).

► A new crayfish farm in the eastern part of France has been breeding *Astacus astacus* for two years with good results. Three independent hatcheries have been established and commercial production in ponds is expected by autumn 2004. The farm is supported by EU with a scientific assistance.

Hard (printed) copies are still available through the Museum Publications Office for \$20 USD plus shipping and handling, by contacting:

Victoria Brown, Publications Office, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California USA 90007, E-mail: vbrown@nhm.org

SNIPPETS FROM EUROPE

David Holdich sends the following interesting news items concerning crayfish in Europe.

► Once bitten, twice shy!

It has been reported in a doctoral thesis that a French fisherman was bitten by a *Procambarus clarkii* taken from the Garonne estuary, and ended up in hospital with a severe fever, swollen arm and large injuries to his finger! Bacteriological investigations revealed the presence of *Vibrio vulnificus*, a bacterium related to that responsible for causing cholera! Apparently *V. vulnificus* needs brackish water and summer temperatures to develop in nature. If not treated with appropriate antibiotics *V. vulnificus* can lead to septicaemia and death. Adapted from a report in *L'Astaciculteur de France*, 73: 10-11. (2002).

► Fake date for 'alien' crayfish

Crayfish alien to British waters are being lured into traps using sex chemicals. Underwater baskets have been laced with natural pheromones produced by the creatures to attract a mate.

UK scientists are using the bait in a conservation exercise to catch North American signal crayfish. The larger, more aggressive species is regarded as a threat to the native British crayfish. It is under threat from pollution, habitat loss and competition from its trans-Atlantic cousin.

► Novel approach

Researchers are discussing the first results of the scheme at an international conference in Nottingham. "Although pheromones have been used in pest management for a number of years on land, this is one of the first attempts to use them to improve trapping success in the water," said the Environment Agency's Peter Sibley.

Work began in March last year when a Newcastle University scientist started collecting pheromones from female crayfish in the laboratory. Tests have since been carried out in rivers and ponds. "Results so far suggest that using pheromones with established trapping methods could be a viable option for controlling this species," said Paul Stebbing. "Female crayfish pheromones only attract the males so we are now working with male pheromones in an attempt to capture the females as well."

► Fungal disease

American crayfish have been thriving in British waters for many years. They were introduced into the UK for restaurant food in the 1970s and some later escaped. Signal crayfish often walk overland in their search for a home and are known to colonise freshwaters, killing or displacing native crayfish. They are also blamed for damaging river banks. The introduced crayfish carry a fungal disease, known as crayfish plague, which can spread rapidly among the more vulnerable native species.

Source: <http://news.bbc.co.uk/1/hi/sci/tech/2414881.stm>

NEW CRAYFISH BOOK IN JAPANESE

IAA member **Tadashi Kawai** sends news of this recent release.

"Crayfish of the World" by M. Sunagawa and S. Nishimura are in paperback form with color photographs on 72 of the 119 pages. The book



costs approximately \$US18 (ISBN4-89512-519-X C0045) and is published by Marine Planning Company, Tokyo. Mrs. M. Sunagawa and S. Nishimura, Japan Crayfish Club, edited this book for their aquarist and astacologist members.

IAA members, **Drs S. Parkyn**, and **T. Kawai**, **Mr. Y. Ogawa**, contributed many of the sections and photographs used in the book. Although this book was written in Japanese, it contains high quality color photographs of 25 species of crayfishes from Europe, North and Central America, Eastern Asia, Papua, New Guinea, Indonesia, Australia, New Zealand, and Madagascar. In addition, the color photographs show many color variations in the red swamp crayfish, and crayfishes in their natural and aquarium habitats.

I believe that IAA members worldwide will be fascinated and enlightened by the information in the beautiful photographs. If you are interest in this book, further information can be obtained from these home pages, <http://www.mpj-aqualife.co.jp>; e-mail, book@bk.ij4u.or.jp.

MANAGEMENT AND CONSERVATION OF CRAYFISH

Organising Committee:

Peter Sibley—Environment Agency
Jonathan Brickland—British Waterways
David Holdich—IAA
Richard Jennings—Environment Agency
Julie Bywater—Environment Agency
David Fraser—English Nature

Sponsored by: Environment Agency, British Waterways, English Nature, Institute of Fisheries Management, and International Association of Astacology.

Over 120 delegates from more than 50 organisations attended a one day conference at Nottingham Forest Football Club on 7 November 2002. Workers from across the British Isles and as far a field as Croatia and the Czech Republic met to discuss recent developments in the fields of native crayfish conservation and the management of alien crayfish species. The pulling power of the event exceeded expectations and the organisers received applications to attend from more than 180 people prompting the creation of a long waiting list.

An informal get-together and meal at The Lobster Pot restaurant in Nottingham preceded the event, with shellfish (including crayfish) firmly on the menu for more than 30 delegates. The evening concluded with the presentation of a singing crayfish (well, lobster) to co-organiser and birthday boy **Jonathan Brickland**.

On the morning of the 7th **Pete Sibley** started the day by welcoming delegates on behalf of the organisers and thanking the sponsors, named above, for their generous contributions. Given the surroundings Pete was pleased to work some tenuous football links into his remarks, although his comparison between Nottingham Forest F.C. and the native crayfish – both formerly unchallenged but now facing hard times – may not have been well received by the hosts. The opening remarks concluded with a statement of the tens rule of Williamson and Fitter, namely that 10% of imported species generally become introduced, of these, 10% become established and of these, 10% become pests. Introduced crayfish have clearly not read the rule book!

The conference programme was divided into four sessions concerned with monitoring and records, conservation of native crayfish, practical management and research.

The first presentation by **Julian Reynolds** of Trinity College, Dublin, summarised CRAYNET, an impressive proposal concerned with the use of crayfish as biomonitors of environmental health. Important outcomes will include an electronic database and distribution atlas, providing difficulties concerned with EU funding can be overcome. Next up, **David Holdich** of the IAA gave an overview of crayfish distribution in Europe, emphasising the importance of accurate mapping and local recording with reference to indigenous and non-indigenous crayfish species (ICS and NICS). The concluding message from Paul Harding of the Biological Records Centre was “look at the website!” with reference to the National Biodiversity Network (www.searchnbn.net). Finally in session one Stephanie Peay imparted a wealth of useful information in her description of a monitoring protocol for native crayfish.

Erica Kemp of Scott Wilson Resource Consultants (SWRC) began session two by describing a native crayfish re-introduction protocol, produced as part of the ‘Life in UK Rivers Project’ and potentially of great value. This was followed by the Environment Agency’s Anne Lewis with an overview of the Wansbeck project, a partnership scheme aiming to protect native crayfish in habitat associated with farmland. Session two concluded with a presentation by the Agency’s Steve Chambers who is leading a proposal to introduce a new national by-law concerned with the use of crayfish traps or fixed engines. Steve imparted the news that crayfish are in fact classified as fish under English law and advertised the consultation process that is now taking place in connection with the proposed bylaw.

Following a hearty buffet and another opportunity to view more than 20 excellent posters

brought by delegates, session three began with a case study presented by **Pavel Kozak** of the University of South Bohemia. Pavel discussed the trials and tribulations encountered during his attempts to eliminate signal crayfish from a pond in the Czech Republic, sharing experiences familiar to many of those present in the audience. Next to speak was Pete Hiley (SWRC) who left the delegates in no doubt regarding his thoughts on the bleak long-term survival chances for all but a handful of native British crayfish. Potential (and radical) methods for environmental manipulation to prevent the spread of alien crayfish were discussed but the final recommendation supported the creation and protection of native crayfish habitats. **David Rogers** concluded session three with a very useful summary of recent advances in the field of crayfish diseases, work undertaken jointly by David Rogers Associates and the University of Munich. The importance of this area of work was emphasised by the lively discussion, which followed David’s presentation.

The final session of the day began with a presentation by **Paul Stebbing**, who is working on a joint venture by the Universities of Portsmouth and Newcastle. Paul discussed elements of his work, which is investigating the potential use of crayfish pheromones to improve trapping success. He showed no adverse effects from the early start required for a live interview concerning his work on BBC national radio and from the countless media enquiries that followed during the day. The penultimate presentation was delivered with a flourish by Jeama Stanton of the University of Leicester. Jeama described burrowing behaviour and movements of signal crayfish in the English Midlands and set a new standard for Powerpoint presentations with her

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