SOCIETY NOTES:

IAA-ENGLAND

This account has now been closed and the money transferred to a euro account administered by Catherine Souty-Grosset in Poitiers. This means that British and other non-euro members who normally pay into IAA-England will now have to convert their money to euros rather than pounds.

ERRATA:

70 NOT 7!

In the report on IAA 15 in Crayfish NEWS 26 (2) mention was made of the number of specimens recently moved into the new Darwin Centre at London's Natural History Museum – the figure should have been 70 million not 7 million!

LITERATURE OF INTEREST TO ASTACOLOGISTS

ACQUISTAPACE P., DANIELS W.H. & GHERARDI F., 2004. Behavioral responses to "alarm odors" in potentially invasive and non-invasive crayfish species from aquaculture ponds. *Behaviour* 141: 691-702.

ALCORLO P., GEIGER W. & OTERO M., 2004. Feeding preferences and food selection of the red swamp crayfish, *Procambarus clarkii*, in habitats differing in food item density. *Crustaceana* 77: 435-453.

BARBARESI S., TRICARICO E., SANTINI G. & GHERARDI F., 2004. Ranging behaviour of the invasive crayfish, *Procambarus clarkii*. *Journal of Natural History* 38: 2821-2832.

BARBARESI S., TRICARICO E. & GHERARDI F., 2004. Factors inducing the intense burrowing activity by the red swamp crayfish, *Procambarus clarkii*, an invasive species. *Naturwissenschaften* 91: 342-345.

EL ZEIN G. & HAWI I., 2004. Essais de introduction d'une nouvelle espèce *Astacus astacus* L. écrevisse (crayfish) au Liban, étude de son adaptation et possibilités de son élevage. *L'Astaciculteur de France* 79: 2-9. (In French with brief English summary).

GHERARDI F., ACQUISTAPACE P. & SANTINI G., 2004. Food selection in omnivores: a case study of the crayfish *Austropotamobius pallipes*. *Archiv für Hydrobiologie* 159: 357-376.

KAWAI T., 2004. *Crayfish of the world*. 135 pp. ISBN-89512-519-X. (In Japanese).

KAWAI T., NAKATA K. & KOBAYASHI Y., 2004. Present distribution and taxonomic status of the introduced crayfish from USA, in Honshu, Japan. *Journal of Natural History of Aomori*, 9: 5-10. (In Japanese).

KIRJAVAINEN J. & SIPPONEN M., 2004. Environmental benefit of different crayfish management strategies in Finland. *Fisheries Management and Ecology* 11: 213–218.

LUNDBERG U., 2004. Behavioural elements of the noble crayfish, *Astacus astacus* (Linnaeus, 1758). *Crustaceana*, 77: 137-162.

PAGLIANTI A. & GHERARDI F., 2004. Combined effects of temperature and diet on growth and survival of YOY crayfish: a comparison between indigenous and invasive species. *Journal of Crustacean Biology* 24: 140-148.

RENAI B. & GHERARDI F., 2004. Predatory efficiency of crayfish: comparison between indigenous and non-indigenous species. *Biological Invasions* 6: 89-99.

ANNOUNCEMENT: Louisiana Crawfish Farmers Association, 157 Cherokee Dr., Crowley, LA 70526-3103

The LCFA will be putting on a Crawfish Expo on December 9th in Crowley, LA. The Association would like to invite everyone involved in the crawfish industry to attend. For a schedule of events or available booth space please contact:

Stephen Minvielle at (337) 364-3821 or bayoulandfarms@att.net

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Crayfish NEWS

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The official newsletter of the International Association of Astacology

CRAYNET MEETING IN INNSBRUCK AUSTRIA

European native crayfish in relation to land-use and habitat deterioration with a special focus on *Austropotamobius torrentium*

Delegates watching the Archbach River in search of *Austropotamobius torrentium*.

The third thematic meeting of CRAYNET entitled "European native crayfish in relation to land-use and habitat deterioration with a special focus on *Austropotamobius torrentium*" was held in Innsbruck, Austria from 8-11 September 2004. The organising committee, **Leopold Füreder** (chair) and **Daniela Sint** from the University of Innsbruck with the help of **Ralf Schulz** and **Holger Schulz** from the University of Koblenz-Landau, Germany welcomed 75 participants from 17 countries.

The scientific committee, chaired by **Leopold Füreder** (University of Innsbruck) and consisting of **Ralf Schulz** (University of Koblenz-Landau, Germany), **Catherine**

(Continued on page 4)

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.

Secretariat

The International Association of Astacology has a permanent secretariat managed by Bill Daniels. Address: IAA Secretariat, Room 123, Swingle Hall, Department of Fisheries and Allied Aquacultures, Auburn University, AL 36849-5419, USA.

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Officers:

(This issue edited by James W. Fetzner Jr. and Francesca Gherardi)

President's Corner

Dear IAA members:

This is the first Crayfish News issue published since **Glen Whisson**'s and **David Holdich**'s outstanding contribution over the past several years. Last April I was asked by the Executive Board to provide editorial support to **Liz Watson**, the new Secretary, in producing and editing the newsletter. However, Liz is currently extremely busy with Freshwater Crayfish 15. This is the reason why I looked around for help and I was fortunate to find **Jim Fetzner**, who will be able to take the place of Liz for the next few issues; I hope you all appreciate the result of our collaboration. My heartfelt thanks to Glen, and in particular to David, who keep giving their precious contributions and suggestions.

After having contacted most of you, the board decided to publish the newsletter in electronic version only. Once the editing was transferred to Europe, the costs of producing the newsletter, and especially posting hard copy issues, appeared too high: as a result of that, in order to maintain the publication of hard copies we would have had to increase subscription rates. The decision to distribute the newsletter only in an electronic version would allow us to save money that could be used to sponsor regional meetings and to provide scholarships to young scientists and to researchers from less wealthy countries.

I took into consideration the suggestions given by the past president and now propose to expand the Executive Board to new members from different Countries and cultural entities. This action is prescribed by the Article VI of our bylaws and aims at helping the Society to grow. Together with the present officers (**Catherine Souty-Grosset**, **Liz Watson**, and me), the permanent secretary (**Bill Daniels**), and the previous president (**Keith Crandall**), the board will be composed of: (1) **Alexandra Marcal Correia**, Portugal (student matters), (2) **Jim Fetzner**, USA (Crayfish News and IAA web site), (3) **James Furse**, Australia (IAA 16), (4) **Pedro Joaquin Gutiérrez-Yurrita**, Mexico

CRAYNET – FINAL CONFERENCE
European crayfish as heritage species- linking research and management strategies to conservation and socioeconomic development

INTERNATIONAL WORKSHOP – Biological invasions in inland waters

Florence, Italy, May 2-7, 2005

We are pleased to invite you to attend the Final CRAYNET Conference to be held in Florence, Italy. CRAYNET is an EU Thematic network focusing on the European crayfish as keystone species and aims at linking science, management and economics with sustainable environmental quality. The network consists of a consortium from 11 European countries under the co-ordination of Catherine Souty-Grosset (University of Poitiers, France).
The Florence conference will summarize the most relevant themes discussed in the previous CRAYNET conferences, such as the status of European endangered crayfish species, the research activities conducted so far, and the management options adopted by the European countries. It also aims at developing common guidelines for the conservation of indigenous crayfish as heritage species. These purposes will be achieved through an interdisciplinary discussion focusing on general issues related to freshwater biodiversity and its conservation. To this end, the conference will gather European and extra-European crayfish researchers together with ecologists, economists, geneticists, historians of science, managers, and zoologists. A frescoed palace of the Florentine Renaissance will provide the historical atmosphere for this conference. Papers will be published in a special edition of the Bulletin Français de la Pêche et de la Pisciculture.
For more information about the CRAYNET conference, Florence registration form and detailed program, visit the website http://univ-poitiers.fr/craynet. Francesca Gherardi and post-docs, PhD and undergraduate students of the University of Florence (Patrizia Acquistapace, Claudia Angiolini, Laura Aquiloni, Silvia Bertocchi, Sara Brusconi, Andrea Cacchiani, Barbara Renai, Riccardo Russo, and Elena Tricarico) are the local organizers. The scientific committee is composed of: Francesca Gherardi (Italy), Catherine Souty-Grosset (France), David M. Holdich (UK), and Julian Reynolds (Ireland).
A necessary addendum of the CRAYNET conference will be the two-day International Workshop "Biological invasions in inland waters" (InWat), held under the auspices of the University of Florence, IUCN Invasive Species Specialist Group, Unione Zoologica Italiana, and the Italian Ministry of the Environment. The organizer is Francesca Gherardi (University of Florence) and the scientific committee is composed of: Guido Chelazzi and Francesco Dessì-Fulgheri (Florence), Sandro Lovari (Siena), Piero (Papik) Genovesi (Bologna), and David M. Holdich (Nottingham, UK). The venue will be the historical headquarter of the University of Florence, the "Aula Magna" adjacent to the Academia Gallery with Michelangelo's David. Through the analysis of empirical cases from diverse freshwater ecosystems, the Workshop will aim at finding the necessary basis for a quantification of the costs (ecological, economic, and social) of biological invasions and for an improvement of controls of aquatic nuisance species. The exchange among scientists and managers is expected to lead to the proposal of actions to mitigate and/or to halt the invasive processes. Selected papers will be published in Biological Invasions (Kluwer publisher, edited by James Drake).
For those scientists and managers intending to join the InWat group and to present papers and/or posters, please contact the organizer (Francesca Gherardi) via e-mail at the address: gherardi@dbag.unifi.it before the end of this year.

UPCOMING MEETINGS AND CONFRENCES

AQUACULTURE AMERICA 2005

New Orleans (Louisiana) will host the "Aquaculture America 2005" from 17 – 20 January 2005. This is the annual meeting and trade show of the U.S. Aquaculture Association, co-sponsored by the National Aquaculture Association and the U.S. Aquaculture Suppliers Association. The crayfish special session, consisting of 8 invited speakers, is titled "Crawfish Culture in the U.S.A." and will be held from 8:30 am to 12:00 noon on 19 January. This session will be followed during the afternoon by contributed crayfish and freshwater prawn papers. Presentation titles and speakers for the special session are as follows and it is anticipated that the proceedings will be subsequently published in an aquaculture journal.

1. Status and Considerations for Marketing Crawfish in the USA (Mark Shirley)
2. Crawfish Culture in Forage Based Monocropping Systems (Robert Romaire)
3. Crawfish Culture in Forage Based Rotational Cropping Systems (Ray McClain)
4. Crawfish Culture in Non-Foraged Based Systems (Lou D'Abramo)
5. Crawfish Culture on the Eastern Coast of the USA (Arnie Eversole)
6. Culture of the Australian Species in the USA (David Rouse)
7. Considerations for Culture of Crawfish for the Bait Market (Bill Daniels)
8. Greater Ecological Considerations for Crawfish Aquaculture (Jay Huner)

(Latin American matters), (5) **David Holdich**, UK (editorial consultant), (6) **Jürgen Petutschnig**, Austria (link with the German speaking society *Forum Flusskrebse*), and (7) **Glen Whisson**, Australia (Honorary Members matters).

Next year we will have several events of great interest to astacologists and freshwater biologists. After the successful Craynet Meeting in Innsbruck, I will organize the Craynet Final meeting in Florence (see page 15 in this issue). Immediately after that meeting I will host a two-day International Workshop entitled "Biological invasions in inland waters". I attended last September the International Conference on Aquatic Invasive Species held in Ennis (Ireland) and there I realized that, while there is much comprehensive work on marine invaders, the knowledge of freshwater alien species is scanty and fragmented. We know much about the zebra mussel and coypu, but nobody has ever attempted to develop a comprehensive picture of biological invasions in freshwater systems. The Workshop will be, I hope, the first step towards this direction.

Ray McClain and **Robert Romaire** are organizing a special crayfish session for the Aquaculture America 2005 meeting in New Orleans next January (see the announcement on page 14 of this issue). This session will be entitled "Crawfish Culture in the U.S.A." and will overview industry practices. A special publication is planned in an aquaculture journal.

Finally, there is good news from Pedro. From Cuba, where he is working on a short research assignment, he writes: "*FC 14 is completely done; I am looking for some funds to deliver the book to all the authors. In addition, I have an electronic version of the book in PDF format. When I go back to Quéretaro (in November) I'll send this electronic version via internet. There are 26 peer-reviewed papers, and the book has about 250 pages, 10 pages in full color.*"

Francesca Gherardi
IAA President

IAA WEBSITE HAS A NEW HOME AND UPDATED CONTENT

Dear IAA Members:

Just a short note to let you know some of the exciting things happening with the IAA website, which has now moved to the Carnegie Museum of Natural History in Pittsburgh, PA. The new website address is http://iz.carnegiemnh.org/crayfish/IAA/.

The membership only area of the website is now open and functioning. You should obtain a username an password and then login to the website. For instructions on how to do this, please see this link: http://iz.carnegiemnh.org/crayfish/phpbb2/viewtopic.php?t=13.

Note that the first time you access the members area, you will be prompted to update your contact information so that the Society records are up to date. You can also change your username and password. Afterwards, you can update your information at any time by clicking the "Update Info" link in the Members link box on the left side of the home page, which appears after you login to the site.

You will also notice under Publications, that the link to Crayfish News will allow you to download the latest versions of the newsletter, when they become available. The site will be updated with as many electronic versions of the newsletter as we can get our hands on. If anyone has a complete library of the newsletter (i.e., starting at volume 1) and would be willing to loan it to me for a short period of time so that I can scan them and then post these to the website, you can contact me at FetznerJ@CarnegieMNH.Org. You can also check the website to see which volumes and issues are still needed. I would eventually like to get all volumes and issues up on the website for the membership to access.

Another nice addition to the website is the

(Continued on page 12)

Miklos Puky (Hungary) taking a picture of a handsome *Austropotamobius torrentium* specimen.

Daniela Sint and Leopold Füreder (Austria) trying to catch *Austropotamobius torrentium* in Haldensee.

(Continued from page 1)

Souty-Grosset (University of Poitiers, France), **David Holdich** (University of Nottingham, U.K.), and **Julian Reynolds** (University of Dublin, Ireland), put together an open program with oral and poster presentations and four roundtable discussions which will be featured in the meeting's proceedings (special issue of *Bulletin Français de la Pêche et de la Pisciculture*).

"The effect of land-use and habitat deterioration on autochthonous and alien crayfish in general" was considered a specific topic of particular importance, since the European Water Framework Directive defined guidelines towards unified freshwater assessment methodologies and required member states to commit to the ecological, catchment-orientated management of freshwaters. Therefore, the aim of the Innsbruck meeting was to gather crayfish researchers and managers from the Alpine countries (Austria, Northern Italy, Germany, Switzerland) and to associate partners from circum-Alpine regions (Bosnia-Herzegovina, Croatia, Czech Republic, France, Hungary, Slovenia, Slovakia, Yugoslavia, etc) in order (a) to define the status of crayfish species including *Austropotamobius torrentium* in the individual countries, (b) to share latest results on crayfish research, and (c) to discuss necessary research activities and management strategies for crayfish protection (species conservation programmes). The Innsbruck meeting was actually the first international meeting on the stone crayfish *Austropotamobius torrentium,* one of the three most endangered, and also considered to be the least studied of European crayfish species.

The organizers emphasized the conference atmosphere by choosing a casual but exquisite hotel (Hotel Grauer Bär) in the centre of Innsbruck and by allocating ample time for discussions and roundtables during the four day meeting. Keynote lectures, several social activities and a field trip on Friday to crayfish sites in Tyrol provided a nice diversion to the exciting program.

The opening, conducted by **Bernd Pelster**, Dean of Biology of the University and **Martin Dolp** Environmental Protection, Tyrolean Government, was followed by two introductory talks on "The EU-Network *CRAYNET*" by **Catherine Souty-Grosset** (France) and "The associaton *Forum Flusskrebse*" by **Jürgen Petutschnig** (Austria).

(Continued on page 6)

RETIREMENT: AN OPEN LETTER BY BRETT EDGERTON

Dear Friends and colleagues:

Apologies for cross-posting. I am writing to inform you that, at the age of 34, I am retiring from the field of aquatic animal health, and from science altogether. From this day I am ceasing all related activities and will be unable to provide related advice and so on. I apologize for any inconvenience that this may cause. I will leave my website on crayfish pathology - www.geocities.com/crayfishdisease - as a resource for colleagues, but will not update or maintain it.

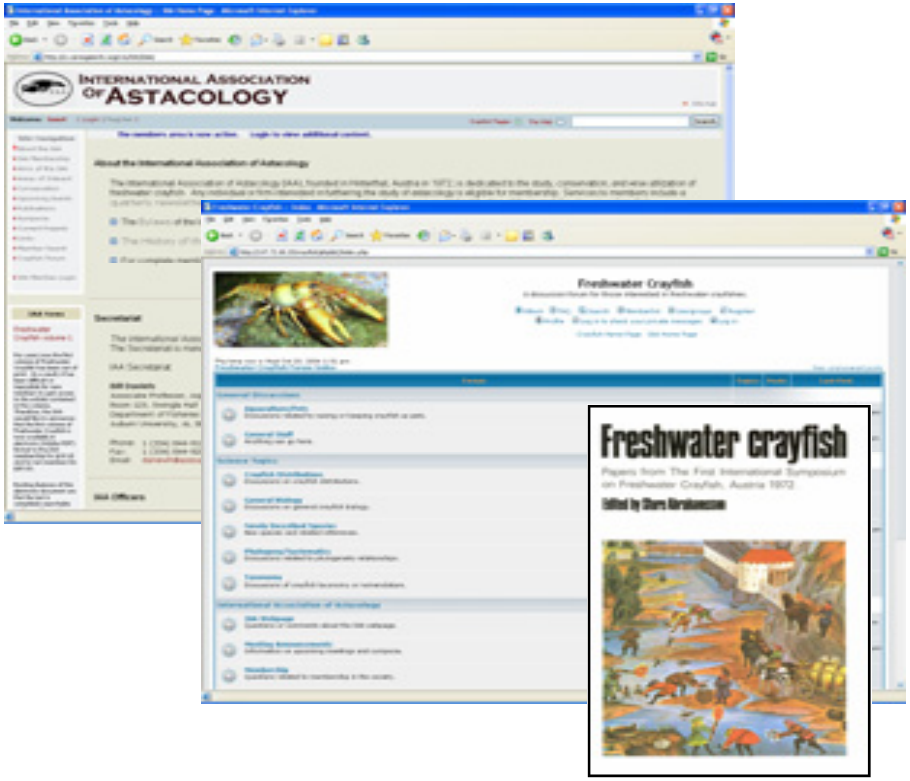
I want to make it clear that this is NOT a decision that I wanted to reach. I have passionately pursued a career in this field for 14 years, and I dreamed of doing this for the rest of my life. However, after returning to Australia 20 months ago from research fellowships in Europe, I have been unable to obtain a salary even though I have continued to work on a full-time basis. (The only exception being a 3 month contract when I was based in Bangkok, away from my wife.) I am certain that I would have been able to continue if I was prepared to shift for jobs - but over the last 6 years my wife and I have lived in 6 cities in 4 countries, and the personal costs have been extreme. We simply could not go through another relocation, not for a while anyway. After delaying starting a family for many years - the right decision after seeing a number of friends have children in countries where they could not communicate with medical staff - we are now planning to start a family. I have exhausted all possibilities of earning a salary from Brisbane. So I need to search for a new occupation which will allow me to contribute to our financial security.

I feel very proud of the contribution that I have made to aquatic animal health - particularly to our understanding of diseases affecting freshwater crayfish. I am bitterly disappointed to be in this position because I feel that my research, knowledge and skills have much to offer my field, my country and my fellow human beings in general. It is especially disappointing because the Australian government and a range of stakeholders have been highlighting the lack of availability of skill in aquatic animal health. The need for a proper understanding of the causes of disease in wild freshwater crustaceans is as great as ever, and I am convinced that freshwater crustacean aquaculture, including crayfish, will be a large global industry in the near future which will demand very significant research attention to disease. I had hoped to convince policy analysts and those in charge of research funding that now is the time to act so that we develop capacity and knowledge in freshwater crustacean pathology - alas I failed, and I expect that research and policy will continue to be reactive rather than proactive - at a cost to the aquaculture industry and the environment.

Although there have been many tough times, I have enjoyed the last 14 years working in the field. I would like to make special mention of colleagues at Biosecurity Australia and NACA as particularly good work mates, and that very much included the managers. Lastly I want to make very special mention of the incredible camaraderie of the astacology (crayfish) community – without doubt, meetings of the International Association of Astacology were the highlights of my time spent as a scientist and I shall never forget them or the people. (Keep an eye out in the December edition of "Conservation Biology" for a paper by myself and a number of prominent Astacologists - ironic that my most important paper was my last!)

Many of you I will miss a great deal. Take care and best of luck for the future.

Best regards,
Brett Edgerton



(Continued from page 3)

Freshwater Crayfish Forum. This forum is useful for the discussion of ideas and issues related to crayfishes and I would encourage all members to take advantage of this tool. The forum also contains discussion groups for issues related to the society. The forum can be found at http://iz.carnegiemnh.org/crayfish/phpbb2/index.php.

In addition, I would like to request that members send content for inclusion on the website. This content can be in the form of meeting announcements, photos, reference lists or publications (PDFs), and even promotional fliers related to crayfishes. Basically, any information that may be useful to the membership (or to site visitors interested in crayfish) would be welcomed. Content can be sent directly to me at the e-mail address above. Suggestions on improving or adding to the website are also welcomed.

Last but not least, the IAA would like to announce the availability of Freshwater Crayfish volume 1 in electronic (PDF) format. This volume has been out of print for some time, and it has not been easy for members to gain access to this compilation of important papers. The text of the electronic version is completely searchable and now also contains a subject index. This volume is available to the membership for $10 US plus S&H and to non-members for $15 US plus S&H. Orders can be placed with the Secretariat and will be shipped from Pittsburgh. Over the next few months and years, other volumes of Freshwater Crayfish will also be converted to electronic format and distributed to the membership. At some point, papers contained in these volumes may also be downloadable from the IAA website.

James W. Fetzner Jr.
IAA Webmaster

Julian Reynolds and David & Kay Holdich enjoying a culinary break.

Delegates from Pavia (Italy) smiling at the photographer with Yoichi Machino.

Nordic delegates at the reception in the "Landhaus" of Innsbruck.

German (Max and Burgl Keller), French (Catherine Souty-Grosset), Irish (Julian Reynolds), and English (Kay Holdich) delegates taking a rest under the sun.

Yoichi diving for crayfish in the Archbach River.

Yoichi's catch of the day.

The youngest delegate from France.

(Continued from page 4)

After a coffee break, which was held amidst the poster exhibition in the winter garden of the hotel, **Steven Weiss** from the University of Graz, Austria, in his keynote lecture gave a overview of "Conservation genetics on freshwater organisms". In a skilful manner he presented the broad array of theoretical and practical perspectives, including various disciplines like population genetics, phylogenetics, and phylogeography, and critically proposed guidelines for incorporating genetic perspectives into conservation programs.

The first session was chaired by **Catherine Souty-Grosset** (France) and included four speakers: Two presented recent investigations on the white-clawed crayfish, i.e. **Pietro Angelo Nardi** (Italy) with "Status of the *Austropotamobius pallipes* complex in the water courses of the Alessandria province (N-W Italy)" and **Julian Reynolds** (Ireland) with "Comparison of stream and lake feeding patterns in *Austropotamobius pallipes*" The other two presentations were on the stone crayfish with **Manfred Pöckl** (Austria) who assessed this species' role as an indicator for habitat quality in running waters and **Andreja Lucic** (Croatia) who reported on seasonal changes of the condition indices and haemocyte counts in *A. torrentium* in a Croatian stream.
In the evening, all participants and guests gathered at a mixer in the hotel's winter garden, with Prosecco and biscuits, before all moved on to one of the meeting's culinary highlights: **Max** and **Burgl Keller**, experienced hosts from the IAA 12th Symposium in Augsburg, Germany, started the dinner buffet with a surprise. Those who have had a chance to taste the famous "Crayfish Soup à la Keller" know what it tastes like. Besides having two beautiful cups of soup, I had the chance to pick up only some of the ingredients: crayfish tails, dill tips, cognac, sour cream (the rest is only known to the Kellers). This starter produced a luscious smile on almost every face that evening. Even the newspaper wrote "Species protection with a taste!"

The first session on day 2 was chaired by **Francesca Gherardi** (Italy) and dealt with the contrary situation of native crayfish species in Europe. **Lennart Edsman** (Sweden) and **Trond Taugbol** (Norway) introduced the historical and present relevance of crayfish in Scandinavia. Contrary to this socioeconomic significance, native crayfish species in our latitudes are mostly known as threatened species. While e.g., Sweden produces 230 tons of noble crayfish per year, in Tyrol we only have about 40 noble crayfish sites. Distribution, recent status, and trends, as well as conservation issues, were described from Hungary by **Miklos Puky** and from Slovakia by **Monika Harváneková**.

After a delicious break with coffee and posters, **Yoichi Machino** from Japan (the furthermost travelled participant) gave details on the biogeographic range of *A. torrentium* in Europe. Further explanations of species distribution by involving genetic analysis, were provided by **Sanja Baric** (Italy) for *A. pallipes* and by **Martin Huber** (Germany) for *A. torrentium*.

After lunch, the session was chaired by **Julian Reynolds** (Ireland). Several talks concentrated on habitat conditions, like the development of a habitat suitability index for the noble crayfish by **Steffen Zuther** (Germany) and extreme habitat conditions for a dense population of stone crayfish by **Reinhard Pekny** (Austria). The distribution of *A. torrentium* in Salzburg

(Continued on page 7)

THE SUSTAINABILITY OF CRAYFISH HARVESTING IN RANOMAFANA NATIONAL PARK, MADAGASCAR

Madagascar's freshwater crayfish, belonging to the endemic genus *Astacoides*, are harvested throughout their range in the eastern highlands of the country. They provide an important source of protein and revenue to local communities but there is concern that the harvest may be unsustainable. In this thesis I assess the sustainability of crayfish harvesting in and around Ranomafana National Park, an area well known for its reliance on crayfish harvesting.

Six taxa (belonging to four described species) are found in the Ranomafana area. Most families in villages with access to forest carry out some harvesting for subsistence use. Due to variation in local taboos (*fady*) and in access to forest, commercial crayfish harvesting is very important in only three of the 27 villages I visited. However, in these villages crayfish revenue is very important, particularly to poorer households. One species, *Astacoides granulimanus*, dominates the harvest: more than 95% of crayfish caught in the harvesting village of Vohiparara are of this species.

I used a mark-and-recapture study involving more than 26,000 *A. granulimanus* across 79 sites under a range of harvesting intensities to estimate demographic parameters (growth, fecundity and survival) and investigate density-dependent control of growth and fecundity. No evidence for density-dependent control of growth was found, but the density of large crayfish negatively influenced the proportion of females of a given size which reproduced.

I investigated the sustainability of the harvest of *A .granulimanus* using two approaches: I) comparing population structure and density under varying harvesting intensity and II) using population models to investigate the forest area necessary to provide the observed annual harvest from one harvesting village and comparing that with the area available. The conclusions are encouraging as they suggest that the *A. granulimanus* harvest in the Ranomafana area may be sustainable under current conditions. Preliminary work suggests habitat loss may be a more immediate threat, so scarce conservation resources should perhaps be concentrated on reducing habitat loss rather than enforcing a ban on harvesting.

Julia Patricia Gordon Jones
Synopsis of PhD Dissertation, University of Cambridge, St John's College (July 2004)

'WIDE AWAKE' FOR THE ALIEN CHALLENGE!

Ecologist Julie Bywater was helping none other than keen TV conservationist Michaela Strachan last month with her challenge to find some alien species. To the dismay of her male colleagues in Conservation & Ecology, Julie was the one who got to meet Michaela and star in her TV show Michaela's Wildlife Challenge.

Julie said: *"Michaela's challenge was to find alien species, so I showed her some non-native signal crayfish and explained the threats that they cause to our native species."* She added: *"I had requests from the guys back in the office to get autographs for them, but I couldn't really ask Michaela for that many!"*

The episode is to be broadcast on Channel 5 in the autumn.

Julie Bywater and Michaela Strachan show off their alien species!

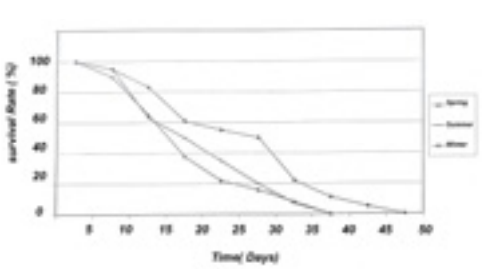


Fig 1 : The Survival Rate of Caspian Sea Crayfish (*Astacus leptodactylus*) in Freshwater

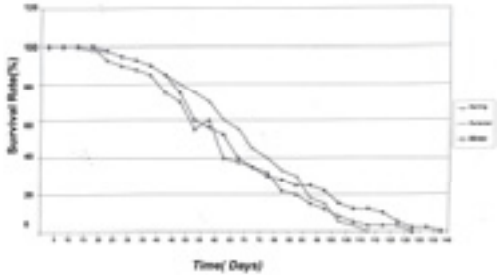


Fig 2 : The Survival Rate of Caspian Sea Crayfish (*Astacus leptodactylus*) in 6 PPT Salinity

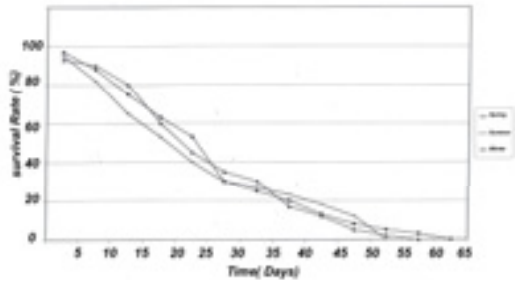


Fig 3 : The Survival Rate of Caspian Sea Crayfish (*Astacus leptodactylus*) in 3 PPT Salinity

SHORT ARTICLES:

CRAYFISH KILL IN CUMBRIA, ENGLAND

Environment Agency officers are investigating a major pollution incident, which has killed thousands of native crayfish in a popular South Cumbrian beauty spot. An alert was raised on Sunday evening (6 June 2004) when Agency officials were contacted by a member of the public regarding a number of dead crayfish seen in the River Mint at Patton Bridge, north east of Kendal.

Environment Agency Officers immediately attended the scene and discovered that large numbers of native 'white-clawed' crayfish had been killed or were in distress. Although exact figures are yet to be confirmed, officers initially estimate that the number of crayfish killed is likely to be 'thousands'. Initial investigations have confirmed that the crayfish have been killed by a pollutant entering the water, although its exact nature is still unclear.

A 10 kilometre stretch of the River Mint is believed to have been affected by the incident, and Agency officers are still checking as to whether the pollutant has affected the neighbouring River Kent. They are also trying to establish whether any other fish species have been affected.

Environment Agency Officer, Simon Taylor, comments: "At present it is still unclear whether the pollutant has dispersed or how far it has travelled, although our own investigations today should establish this." Environment Agency Officers are currently working hard to identify a possible source for the pollutant. Graeme McKee, the Environment Agency's Fisheries Technical Officer for Cumbria, says the incident will have a substantial environmental impact on species in the river.

He comments "White-clawed crayfish are the only native crayfish species and we expect this loss to have a significant impact on other creatures locally such as otters, which rely on crayfish as a key food source." He added: "The pollution has affected the entire river and clearly our key concern at this stage is to minimise any further impact, particularly into the nearby River Kent."

was presented by Stephan Langmaier (Austria), while Elena Tricarico (Italy) clearly explained the dominance relationships and status recognition in *A. italicus*. The session was completed by **Leopold Füreder** (Austria) by giving an overview of species protection programs on autochthonous crayfish in Tyrol.

For the rest of the Thursday afternoon and Saturday morning, four roundtables were conducted, each involving all the participants and therefore getting a picture from many European regions. The intention of Roundtable I "*Species protection programs*", organised by **Catherine Souty-Grosset** (France) and **Ralf Schulz** (Germany), was to identify and evaluate projects that aim directly at crayfish conservation or at habitat improvement in order to protect crayfish environments. Different approaches and recent new skills were discussed in order to gain knowledge of advances and positive results for the management of native species.

Manfred Pöckl (Austria) and **David Holdich** (Great Britain) asked the question in Roundtable II: "*Does legislation work in protecting vulnerable species*?" While most countries in Europe have legislation that is aimed at trying to protect their indigenous crayfish species from overexploitation, habitat modification, pollution, and the spread of non-indigenous crayfish species and crayfish plague, the organisers discussed if there was any evidence that such protection measures actually work in the long-term.

Already some results presented during the meeting indicated that effective long-term conservation planning must incorporate genetic factors. In Roundtable III "*Conservation genetics"* **Frederic Grandjean** (France) and **Holger Schulz** (Germany) highlighted general aspects of conservation genetics and opened the discussion about the application of genetic analysis in European crayfish. Discussed aspects were the search for evolutionary significant units (ESU), conservation units of European crayfish, necessary improvements and perspectives, an overview of current activities and working groups on genetics and the potential of adaptive traits linking genetics to habitat, like phenotype, ecology, and behaviour.

From many discussions it was evident that involvement with the general public was an important tool in species or habitat conservation. In Roundtable IV "*Education of the public*" **Julian Reynolds** (Ireland) and **Miklos Puky** (Hungary) analysed the earlier distributed questionnaire (28 answers representing 17 countries were given back to the organisers). Scandinavian countries were ahead of other nations when knowledge about crayfish is considered, mainly due to the wide-scale exploitation of crayfish. The threatened

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Delegates listening to presentations in the Conference Hall in the Hotel Grauer Bär.

Delegates from Firenze, Italy (Francesca Gherardi, smiling after a beer during the reception in the "Landhaus" of Innsbruck).

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status of native crayfish species is well-known in Japan, also in Sweden, Norway, the Czech Republic, and the UK. Information on crayfish was considered to be the most available in Finland, Austria, and Sweden according to the conference participants.

On Thursday evening, the Governor of Tyrol and the Major of Innsbruck invited all the participants to a reception in the historic festival room of the "Landhaus" (government building). A typical Tyrolean supper with wine, beer, and non-alcoholic beverages, was offered, and provided the essential nutrients for the next day's trip to the crayfish sites.

Early Friday morning – one participant even asked "do they serve breakfast that early" – two buses left for the trip. The weather was excellent (like on all the other days), so was the spirit within the group. After a comfortable bus ride through picturesque Tyrol, the group full of beans got off at the first *A. torrentium* site: Haldensee. Soon, **Daniela Sint**, **Yoichi Machino,** and **Leopold Füreder** caught the first individuals, which turned out to be the most photographed crayfish in Tyrol. After a pleasant break the now even happier group moved to the Life Centre in Weissenbach, where **Christine Strub** and **Christian Moritz** (coordinator of the project) introduced the Life Project on the River Lech, which is one the biggest Life projects on freshwaters.

After having satisfied their thirst for knowledge, people experienced their still empty stomachs. **Wolfgang Klien,** from the river engineering authorities Reutte, invited the participants to "Wiener Schnitzel", "Tagliatelle with Mushrooms" or "Green Salad with Chicken Stripes" in a nice local inn. Since drinks and coffee were also included, the group was prepared to visit another *A. torrentium* site: the Archbach, a heavily impacted river. While **Yoichi Machino** was putting on a swim suit, mask, and snorkel (the hero of the day!) to dive for stone crayfish, **Leopold Füreder** explained completed and planned restoration measures within the species protection program which he is carrying out in this river.

Afternoon coffee and Eispalatschinken (omelette with ice-cream) was served at Plansee, a lake where the non-indigenous *A. pallipes* was introduced one hundred years ago from Italy. During the meal, the participants were shown both *A. torrentium* and *A. pallipes* and could compare their morphology.

On the way back to Innsbruck another highlight was an historic crayfish site, the Krebsbach, being the outlet of the Freundsheimer Weiher, already mentioned in the "Hunting and Fishing Book" of Emperor Maximilian I in 1504 as having a good population of crayfish. And it was the THIRD crayfish species of the day: *Astacus astacus*. Now, nobody was able to abstain from poaching. Even strict lab-biologists were observed "taking the sample".

Nevertheless, as the day was long, in people's faces one could read another recreational break was highly needed. Fortunately, the Major of Mieming, the commune where the Krebsbach is located, was impressed by the interest of the international group in this small stream and its crayfish. For a good finale, according to a Tyrolean tradition he invited everybody to a "Glas Bier" or "Gläschen Wein". Drinks were served and people had Tyrolean food with them.

Indeed, the overall intention to bringing together crayfish researchers and managers for discussing general aspects of crayfish ecology and conservation activities was more than fulfilled: A living network from science at the international scale to individual nations, regions and even communities.

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RESEARCH ARTICLE:

THE EFFECT OF DIFFERENT SALINITIES AND FRESHWATER ON THE SURVIVAL RATE OF THE CASPIAN SEA CRAYFISH *ASTACUS LEPTODACTYLUS EICHWALDI*

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Introduction

Crayfish are known to be able to tolerate a wide range of salinities for a short time (Holdich *et al*., 1997). Whilst most crayfish species normally occupy freshwater habitats, those in the Caspian Sea sometimes live at low salinities permanently. The following experiments were carried out to test the tolerance of Caspian Sea crayfish to freshwater and a range of low salinities with a view to finding the best medium to keep them in prior to export.

Materials and Methods

The experiments were carried out in spring, summer and winter. Freshwater and 3, 6 and 9 ppt salinity were used. Each experiment was replicated three times. The control test was crayfish kept in Caspian Sea seawater. We used aquaria with 40 l capacity and each aquarium was filled with 20 l of water. The dissolved oxygen was fixed at 6-7 mg/l and water temperature was kept in the range 16-17^{o}C. The density of crayfish in the aquaria was 2 crayfish per litre. PVC pipes were used as shelters. Fresh kilka, (*Clupeonela engrauliformis*), which is similar to anchovy, was used for crayfish diet. The diet rate was 1% of body weight (Moshiri & Goldman, 1969; Avault & Huner, 1985). The kilka that were not eaten by crayfish and dead crayfish were taken out from the aquaria. Each two days the water of the aquaria was changed. We used the average of three replicates of each treatment for the results and figures.

Results and Discussion

In the northern Caspian Sea the highest concentration of crayfish is found at 5-8 ppt salinity, with an increase in salinity the concentration of crayfish decreases, i.e. at 12 ppt salinity

The concentration of Caspian Sea crayfish is very low (Ivanov & Sokolsky, 2000). This organism lives at 13 ppt salinity in the southern Caspian Sea and 0 ppt (freshwater) in the northern Caspian Sea in the delta of the Volga River (Kolmykov, 2002). The salinity of the Caspian Sea in the Bandar Anzali region (the main habitat of Caspian Sea crayfish along the Iranian shore) is 12.41-12.79 ppt (Karimpour *et al*., 2004).

The results show that there was no mortality amongst Caspian Sea crayfish kept in freshwater for 5 days, but after this time the mortality increased, with 50% of crayfish dying after 25 days. All the crayfish caught in winter died after 45 days, but those caught in summer and spring died after 40 days (Fig. 1). In the water with 9 ppt salinity the mortality rate was 7.5 % after 4 months. In 6 ppt salinity there were no mortalities for first 20 days. In this salinity all of the crayfish were dead after 135, 120 and 110 days in winter, spring and summer respectively (Fig. 2). In 3 ppt salinity the survival rate in the first 5 days was 95 % and in first 10 days changed from 82 % in summer to 90 % in winter. The all Caspian Sea crayfish kept in this salinity were dead after 60, 55 and 50 days in winter, spring and summer respectively (Fig. 3). In all treatments no mortalities occurred in the control experiment.

The results show that the Caspian Sea crayfish can be kept in 6 ppt salinity for a long time for live export to European countries, but their ability in freshwater is very low and because of this we can keep the Caspian Sea crayfish in freshwater for a maximum of 5 days and then they must be cooked and exported.

(*See Next Page For Figures*).