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FRESHWATER CRAYFISH 14 UPDATE

A message to all members of the IAA (and more) - **FC14 is on the road**....running as fast as I can!

I have 15 peer-reviewed, completed manuscripts, but unfortunately, some of the referees take too long to send me their comments and suggestions, so we have to wait a bit more. When I get all the MSs, I'll send some to **David Holdich** for a final revision. Last month I was appointed Chief of the Research and Postgraduate Studies Department of the Faculty of Natural Sciences, so I have more work than I expected—but I also have more chances to get funds to print FC14! I think that we will get a very nice edition. Because the peer review process is not yet finished, we can still accept last minute manuscripts for consideration.

Cheers
Pedro Joaquín Gutiérrez-Yurrita

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Crayfish NEWS

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The official newsletter of the International Association of Astacology

IRISH CRAYNET MEETING

Delegates at the first thematic meeting of CRAYNET

The first thematic meeting of CRAYNET entitled "The endangered native crayfish *Austropotamobius pallipes*" was held in Kilkenny, Ireland from 22-24 June. Organisers were **Julian Reynolds** and Andréanne Demers of the University of Dublin.

The open programme comprised three keynote addresses, two sessions of submitted papers, two poster sessions, four round table discussions and a field trip to crayfish sites. In addition, CRAYNET core members and associates participated in a session to assess progress and direct ideas towards the next thematic meeting, in Halden, Norway, 1-4 September 2003.

The keynote speakers were Paul Harding of the UK Biological Records Centre, **Peter Sibley** of the UK Environment Agency in Nottingham and **Catherine Souty-Grosset** of the Université de Poitiers' research laboratory Génétique et Biologie des Populations de Crustacés.

Paul Harding (UK) gave of his vast experience of data recording, storage and retrieval in the UK and Ireland, using the internet and the UK National Biodiversity Centre's Gateway scheme to provide interactive examples. This was valuable for all those involved in collecting or collating

(Continued on page 3)

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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President's Corner

It is a great pleasure to write to you over the summer as I travel across the United States playing in lakes, creeks and streams with my four kids and indeed finding a few crawfish along the way! I hope you northern hemisphere members are all having a similarly pleasant summer and that our southern hemisphere colleagues are looking forward to their fast approaching summer!

Ours is indeed an impressively global association. I hope you find in the pages of this newsletter all sorts of interesting functions bringing us together to discuss and learn from one another the intricacies of our most beloved organism. The European CRAYNET supported by the European Commission had their first meeting in Ireland this past June 22-24. We have in this issue a report on that most exciting meeting. The CRAYNET has a website for you all to visit at http://labo.univ-poitiers.fr/craynet/, and includes information on upcoming meetings throughout Europe.

I would like to take this opportunity to remind you all of our own upcoming meeting that is not all that far off now - March 29 – April 2, 2004 for IAA 15 in London. A preliminary program and announcement was sent out in our last newsletter. I hope you have now all marked your calendars and are planning to attend our exciting meeting.

Let me also take this opportunity to solicit from our members stories of past events and announcements of upcoming events to be included in this newsletter. These items should be sent electronically to past president **David Holdich** for compilation. He then sends them to immediate past president **Glen Whisson** who compiles the final product of the newsletter. I would like to extend our warm thanks to these two gentlemen for their tireless efforts on behalf of IAA.

Finally, I would like to welcome our new members from Germany who receive this newsletter and membership through their association with the Forum Flusskrebse. I thank you all for your support of our fine organization and hope to see you all in London next spring!

Sincerely

Keith A. Crandall
IAA President

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IAA WELCOMES FORUM FLUSSKREBSE MEMBERS

Over the past year, IAA Officers have liaised with the European crayfish organisation "Forum Flusskrebse" with a view to including members under the IAA umbrella. Thanks largely to the brokering efforts of IAA Honorary member **Max Keller**, we are pleased to announce that an affiliation has been finalised, swelling IAA by over 100 members.

The main elements of the Terms of Agreement are:

1. Affiliate membership fee of $US7.50/year per individual FF member ($US15 per cycle);

2. IAA's newsletter, *Crayfish News*, posted to the secretariat of Forum Flusskrebse in bulk, for forwarding to IAA-FF members.

3. IAA-FF members to enjoy the same benefits as fully-paid IAA members at regional conferences and international symposia.

On behalf of all IAA members, we welcome **President Juergen Petutschnig** and all Forum Flusskrebse members to our wonderful, growing organisation of crayfish enthusiasts, and look forward to extending our welcome at IAA 15 in London next year.

NOTTINGHAM CONFERENCE PUBLISHED

Holdich, D. M. & Sibley, P. J. (eds) (2003). Management & Conservation of Crayfish. Proceedings of a conference held on 7th November, 2002. Environment Agency, Bristol. 217 pp.

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records for the Crayfish Atlas (see below). Peter Sibley (UK), who organised the recent crayfish meeting in Nottingham, described the UK experience in managing indigenous and non-indigenous crayfish species (NICS), which had relevance for most countries where *Austropotamobius pallipes* is in decline. His extrapolations of the rates of decline of indigenous crayfish and expansion of NICS in the UK indicated virtual extinction of the former within 30 years, and a doubling of the number of 10 km squares occupied by NICS within 15 years. He also described the effectiveness of existing European and UK legislation relating to crayfish.

Finally, Catherine Souty-Grosset (France) reviewed the growing importance of genetic studies in understanding relationships among crayfish stocks, and in underpinning protocols for reintroduction and management. This provided a valuable background to a number of the oral and poster contributions.

The first session, on distribution, habitats, bioindicators and water quality, was chaired by **David Holdich** and contained six talks and six posters. Three papers dealt with distribution and environmental quality in Europe, and two in Ireland. Fernando Alonso (Spain) described the crayfish populations in central Spain in terms of changes in distribution and risk factors. Results show no sharp decline in numbers of populations over ten years. Leopold Füreder (Austria) described the situation in South Tyrol (Italy) and the possibility of using indigenous crayfish as surrogate species (indicators, flagship species) for the benefit of freshwater ecosystem quality. Marie Cécile Trouilhé (France) described biotic and abiotic environmental factors and their value in managing brook populations of crayfish.

The Irish contributions were from Roisin Lyons looking at variations in crayfish catches over five years and their possible causes, and Andréanne Demers who showed that crayfish could be found in rivers considered moderately polluted using both the Irish and UK biotic indices.

EDITORIAL

VIRUSES (not the crayfish kind!)

Please update your virus definitions every few days if you send messages from your home computer. BUGBEAR B can be caught via a simple e-mail message rather than an attachment.

PHOTOGRAPHS

If you send photographs to the editors then please make sure they take up as little memory as possible, i.e. less than 100 Kb. Convert your photos to JPEGs before sending them. A higher resolution scan will be requested if needed.

ELECTRONIC VERSIONS OF CRAYFISH NEWS

If you only receive Crayfish NEWS as a hard copy then you will not be able to fully appreciate some of the contributions, e.g. blue crayfish are not very exciting in black and white! The full colour version of the newsletter can only be provided electronically. If you wish to receive the newsletter by this method then please inform Glen Whisson as soon as possible (g.whisson@curtin.edu.au).

This is the last call for anecdotes or photographs from previous IAA meetings. We are now finalising the IAA History Book, ready for printing prior to IAA 15 in London next year.

Glen Whisson
David Holdich

The posters were one from Croatia, three from Italy and one each from France and Ireland. **Ivana Maguire** (Croatia) looked at past and present distribution of Croatian stocks of white-clawed crayfish. Marina Paolucci (Italy) had two posters, on crayfish distribution in southern Italy and on effects of oxidative stress on them. Georgio De Luise (Italy) had a poster on monitoring crayfish populations in northern Italy. **Frédéric Grandjean** (France) described the use of the French macroinvertebrate index (IGBN) to

assess water quality, while Andréanne Demers (Ireland) looked at habitat preferences of juvenile crayfish in two contrasted stream types.

A Round-Table Discussion followed on "Is *A. pallipes* a bioindicator?" chaired by Leopold Füreder (Austria) with Roisin Lyons as rapporteur. The point was made that although white-clawed crayfish occur only in high-quality headwaters in parts of the continent, believed chiefly due to eradication from lower water-courses through disease or environmental change, elsewhere they show fairly broad tolerance to a degree of eutrophication. Crayfish disappear below a Q level of 3 (Ireland) or an ASPT of 4 (UK). The same can be said for salmonids. They are thus not bioindicators of pristine water quality, but rather, 'flagship species' or 'heritage species' indicating a level of water quality which is acceptable for most uses, and which can be improved by management.

The Field Trip devised by Andréanne Demers visited three sites in County Kilkenny. The first was a third order crayfish limestone stream, the King's River, downstream of Kells village and near a fortified ruined priory. Of eleven August traps set over two nights, three were missing,

Julian Reynolds opens one of the traps, but only one crayfish was found in eight retrieved – many more were found by manual searching under rocks.

and only one crayfish was taken. However, manual stone-turning by **Stephanie Peay** (UK) produced four crayfish from beneath 5 stones, and John Lucey (Ireland) also caught a large male by hand. More, including a female with juveniles, were subsequently caught.

The participants then went on to Jerpoint Abbey, an early Benedictine foundation (1150s) taken over by the Cistercians some 30 years later. It was suggested that these monks may have been the means of introducing crayfish into Ireland. Finally, the tour visited the picturesque village of Inistiogue, where the film "Circle of Friends" was made. Although at

A hand-caught female Austropotamobius pallipes with Stage 1 juveniles.

thought that plague-free populations of *P. leniusculus* could exist, and that the main threat to indigenous crayfish in recent years was from competitive exclusion. There are a number of mixed populations of *P. leniusculus* with other species of crayfish. Some with *Astacus astacus* in Finland have survived for decades, so one wonder what mechanism is operating here if all the *P. leniusculus* carry the plague fungus? It is interesting to speculate on how much stress signal crayfish would have to undergo in the field (rather than the lab.) before plague is expressed? For example, many signal crayfish in a riverine population were killed and the survivors were stressed by a pollution incident in England in 1996, and yet they still live in a mixed population situation with *Austropotamobius pallipes* some 8 years later (S. Peay, pers. comm.).

WHAT CRAYFISH IS THAT?

Following IAA 14 in Queretaro last year, five delegates from Perth, Australia, visited Mexico City and came across a bowlful of tiny cooked crayfish in the central city markets. They were around 50mm long and were sold with a spicy powder and lime juice.

If you recognise the species, or know about the history of the dish, please e-mail Glen Whisson: g.whisson@curtin.edu.au.

(No prizes for guessing who the IAA member is!)

Before they could begin looking for the gland's effects on crayfish behaviour, they had to be certain that the transplanted tissue was functioning. After surgery the team waited a year to be sure that the gland was producing enough male sex hormones to alter the female's physical appearance.

Within 12 months, the implanted females had developed the male's red claw, and their ovaries remained inactive. However, the crayfish were still essentially female, they never developed testes. However Barki was curious to see what would happen when an unaltered and an implanted female came face to face.

Under normal circumstances when crayfish of the same gender come across each other, they begin battling until the vanquished animal backs off. However, some females just wandered around each other and didn't enter into combat; which is just how natural males and females respond when attracted to each other, but several pairs of female crayfish began attempting to copulate! Apparently, it's hard enough to get normal crayfish couples to mate in experimental situations, so this wasn't a subtle behavioural alteration; this was a completely unprecedented role reversal! The altered female behaved just like a *bona fide* male, rolling its tail under its body ready for the real female to roll it onto its back for intercourse. This act requires a high degree of cooperation from the female, she must pick up all the right signals before she is convinced that the creature before her is a male.

Somehow, the altered females were sending out the right messages, as if they were fully 'male' crayfish. Barki knows what was inserted into the females, and the effect that it had on the crayfish's physiology and behaviour, but he doesn't have a clue what hormones the androgenic gland produces, or what the mechanism is behind the behavioural change. Having found that the androgenic gland has the power to divert these crustaceans aggressive behaviour to more sexy ends, Barki and his colleagues are keen to identify the hormones and neuroendocrine mechanisms behind this powerful effect.

NO SUCH THING AS PLAGUE-FREE SIGNAL CRAYFISH!
(Editors' abstract from Cerenius *et al*. 2003)

Lage Cerenius and **Kenneth Söderhäll** and their co-workers at the University of Uppsala (Sweden) have made *Aphanomyces astaci* and crayfish one of the most thoroughly studied invertebrate-parasite pairs. In resistant species such as the signal crayfish, *Pacifastacus leniusculus*, the parasite becomes encapsulated by a sheath of melanin as a result of phenoloxidase activity of the host that prevents outgrowth of the pathogen. The parasite remains viable within this sheath and can resume growth when the animal is subjected to a variety of different immunosuppressive conditions (e.g. moulting and environmental stress) and other types of parasite. **Cerenius *et al*. provide evidence to show that this crayfish species is a permanent carrier of the parasite and that there are no *A. astaci*-free *P. leniusculus*.**

In crayfish species susceptible to the effects of *A. astaci* the parasite is rarely seen melanised. In resistant crayfish the defence machinery is always on alert but cannot produce enough toxic substance to kill the parasite, whilst the parasite in turn is unable to overtake the host and produce an extensive mycelium. In susceptible species the balance between host defence and parasite attack is never established and the hyphae of the parasite are only partially melanised. As a result the parasite becomes well established in a few days.

Editors' note – these findings are extremely important. In Britain, at least, it had been

the tidal limits of the River Nore, the water was fresh, and although crayfish have not been recorded, they could occur there. However, an otter spraint discovered on a riverbank walk appeared to contain only fish bones (probably eel). The day ended with the Conference dinner in the Springhill Court Hotel, and traditional music afterwards in the Paddock Bar.

The second session, "Population genetics and stock management", was chaired by Catherine Souty-Grosset and contained, apart from the two keynote addresses described above, two submitted papers and seven posters. In her keynote address, Catherine Souty-Grosset (France) summarised the central importance of genetics in defining taxa and stocks and in interpreting the historical phylogeography of the species since the last glaciation, including in her talk aspects of work on mitochondrial DNA phylogeography of *Austropotamobius* in Italy. This was to have been presented by **Sylvia Barbaresi** (Italy), who for family reasons could not attend.

The first contributed paper was by Marcello Iaconelli (Italy), on the distribution and systematics of all three *Austropotamobius* in Italy He recommended the inclusion of *A. italicus* as a distinct species in the invertebrate red data book. It was followed by a discussion by **José Carral** (Spain) about the present status of artificial incubation and storage of crayfish eggs as a management tool.

Posters covered a variety of topics. Barbara Renai (Italy) presented data on sexual selection and mating in *A. italicus*, with relevance for management restocking, while **Edo D'Agaro** (Italy) demonstrated that haemolymph vitellogenin levels could be used to indicate ovarian maturation in both wild and confined stocks. The other posters were on genetics and stock management. **Przemyslaw Smietana** (Poland) discussed the taxon *Austropotamobius*, Frédéric Grandjean (France) looked at the founder effect within Spanish crayfish stocks as a result of translocations, and in another poster at the evolution of

Stephanie Peay (right) and Andréanne Demers (centre) discuss sampling techniques with delegates by the King's River.

Photo opportunity for an Irish crayfish!

distribution in native and exotic crayfish in Poitou-Charentes. Serena Zaccara (Italy) applied mitochondrial DNA variability to repopulation studies in Northern Italy. Stephanie Peay (UK) discussed stock management, and the importance of minimising crayfish and habitat loss during engineering works on waterways.

Three round table discussions followed. The first, "What do we mean by *A. pallipes*?" was convened by Catherine Souty-Grosset (France) with José Carral (Spain) as rapporteur. It took as its starting point the *A. pallipes* complex as evidenced by work presented in these meetings, and discussed the difficulties in finding

(Continued on page 6)

MOULES WITH EVERYTHING!
During a recent trip to the South of France, co-editor **David Holdich** experienced a gastronomic delight – a large bowl of steaming mussels (moules) in the bottom of which were three large narrow-clawed crayfish (*Astacus leptodactylus*). With a side order of fries this went down very well after a hard day's sunbathing!

morphological evidence of species and subspecies. It also dwelt on the statutory problem of recognising as new taxa populations formerly included in *A. pallipes* under European legislation. Pierre Nöel (France) proposed *A. pallipes* as a new supra-species.

The second, on "Species mapping and data gathering", was convened by Pierre Nöel (France) with Andréanne Demers (Ireland) as rapporteur. This took cognisance of the extensive material presented by Paul Harding (UK) in the first session on the value of the internet for storing and exchanging information. With the assistance of Patrick Haffner and Horace Dacosta (National Museum, Paris), plans are being developed to incorporate data into European-scale maps of each species, probably at 50 km square scale and using the UTM grid. The need for further country recorders was emphasised, and a detailed protocol will be issued within a month.

The third round-table discussion, on "What is meant by Biodiversity" in the particular context of freshwater crayfish, was co-convened by **Francesca Gherardi** and Catherine Souty-Grosset, with Julian Reynolds as rapporteur. The many meanings of biodiversity were presented, from genes and individuals to population levels. The loss or diminution of crayfish populations through disease or environmental damage would reduce the biodiversity at a species level. With the inclusion of an environmental or community dimension, crayfish whether indigenous or non-indigenous, would, as keystone species, be expected to suppress the dominant invertebrates in their food-web, reducing competition and so enhance community diversity. In the Irish and Spanish contexts at least, *A. pallipes* might be considered as a long-established NICS with a community-enhancing role.

The meeting closed with a summary of the different paper and poster sessions and the round table discussions by chairpersons. It was agreed that *A. pallipes* was an important heritage or flagship species in the freshwater community, and that the discoveries of its genetic complexity in different parts of its range made conservation of this species less straightforward than previously thought, but equally pressing, especially in relation to European legislation. The prize for the best oral presentation went to Fernando Alonso and for the best poster to Ivana Maguire.

Following departure of the non-core delegates, the core and associate delegates held a final meeting to examine its continuing responsibilities within CRAYNET, and to decide on the way forward to the Halden meeting, with its emphasis on socio-economic aspects of crayfish exploitation and conservation.

by **Julian Reynolds**
Trinity College
Dublin, Ireland

(Continued from page 7)
Accounts differ about how the crawfish spread. Maybe the local entrepreneur abandoned his crawfish farm, which had been limited to a small area. Maybe flooding lifted the crawfish over their confines. Maybe the crawfish staged a jailbreak. In any case, certain types of fish and frogs in the lake suddenly became scarce - or worse. "We put the puzzle together," said Mr. Paglialunga, who went on to cite a clue that no detective could miss. "Fishermen found fish half-eaten in the net, with crawfish hanging onto them."

The Louisiana crawfish were not only more gluttonous and brutish than their delicate European cousins. They also had an expansionist streak. Biologists and park managers said the Louisiana crawfish would walk from one source of water to another, colonizing areas far beyond Massaciuccoli. "Now you find them in all of Tuscany," Mr. Paglialunga said.

He said he could not be sure they had managed that feat entirely on their own spindly legs. "There are some legends of how they spread so quickly to other parts, like someone near Florence bought them for dinner, didn't like the taste and tossed the rest in the river," he said.

The crawfish inspired academic papers. They got a reputation. "Their march, strangely a forward march, is determined and relentless, like advancing marines," reads an article, titled "Killer Crawfish," on one of several Italian Web sites with musings about the strange invaders. "You find them everywhere," the article says. "In the middle of the street, in the city, on the house's doorstep. "They can also be found in the nets of Lake Massaciuccoli fishermen, who now catch them deliberately because there is still a market for them and no longer enough indigenous crawfish to sell. As several fishermen hauled in about 100 Louisiana crawfish early this evening and Mr. Ercolini and **Francesca Gherardi**, another biologist, watched, the group's chatter was not entirely anti-American. It betrayed a grudging respect.

"They are beautiful animals," Ms. Gherardi said as she carefully held a crimson specimen aloft. It thrashed its tail furiously. "They are competitors," Mr. Ercolini said, noting that the pike had their work cut out for them. "It will be a battle." "They are tyrannical," said Francesco Gilarducci, a fisherman, but he quickly added that they were also tasty. At a recent party, he said, he and several friends "ate tons of them." "They are exquisite with spaghetti," he said.

ANDROGENIC GLAND IMPLANTS ALTER BEHAVIOUR
(Editors' abstract from Barki *et al*. 2003)

When crayfish are trapped in close proximity to an aggressive individual they really suffer. This is why **Assaf Barki** and **Ilan Karplus** are keen to understand what drives aggression in cultivated crustaceans. So when crayfish (*Cherax quadricarinatus* - redclaw) were introduced to the Israeli aquaculture industry, Barki started to study them. Barki's colleague, **Amir Sagi** already knew that the male's androgenic gland, is responsible for controlling the development of some male physical characteristics, but could the gland affect male behaviour too?

Scientists at the Sagi Laboratory transplanted the male's gland into juvenile females and watched the youngster's physical development. Over a year the implanted females developed external male features, but the gland did not transform the females into fully functional males. However, when Barki examined their behaviour, he found that the implanted females' behaviour was so convincing that they completely fooled the normal females into believing that they were sexually mature males, to the extent that they even began mating! But

Agenzia Adnkronos
www.adnkronos.com/IGNDispacci/20030519/ADN20030519/131053.htm

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www.raiclicktv.it/raiclick/pc/website/0,4388,4-13-83-CTY15-CID12109-0-0-0---1-4-ABB0,00.HTML

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www.corriere.it/Primo_Piano/Cronache/2003/05_Maggio/20/gamberi.shtml

KILLER FROM LOUISIANA ON THE LOOSE IN ITALY

At first the Americans were welcome. They were admired. Robust and energetic, they looked like partners in a better, richer future. But they did not know their place. They did not respect limits. Conquest by conquest, they revealed themselves as too ambitious, too domineering, imposing their will on less truculent populations.

Now many Italians in this northern Tuscan town have had enough. They would like to say "arrivederci" to the big, red, rapacious Louisiana crawfish. Lake Massaciuccoli can be seen as the murky, reedy theatre for a clash of zoological cultures: the brawny Americans versus the aggrieved Europeans. The drama is an example of nature out of whack that also plays, at least loosely, like an allegory of recent world events. Italian biologists and wildlife experts say that Louisiana crawfish, brought here more than a decade ago as a culinary experiment, multiplied like mad, ascended the food chain, altered the ecosystem and devoured indigenous flora and fauna, including their European-crawfish cousins.

"I've never seen anything like it," said Sergio Paglialunga, the director of Massaciuccoli Park, which encompasses the lake in which the Louisiana crawfish established its beachhead. "They eat the vegetation," Mr. Paglialunga said as he rode today in a motorboat that plied the lake's dark, cloudy surface, an opaque cover for the danger that lay beneath. "They eat everything." Marcello Carrara, a park guard who steered the boat, chimed in, "They even eat the weakest among them." "They are very aggressive," he added. "It's proof that they aren't from around here."

So park managers and regional biologists are redoubling their efforts to get rid of them.

They said that one of the few species of lake fish that could turn the clawed predators into crawling prey was the pike, armies of which are being deployed to the field - or, rather, pool - of battle. The first troops arrived four years ago, and the reinforcements are still coming. While biologists pressed about 6,000 pike into service from 1999 to the end of 2002, they said they would dump 10,000 to 15,000 pike into the lake this year. "We have changed the rules," said Paolo Ercolini, a biologist who is closely monitoring the situation. Somebody else changed the rules in the first place, and that was the problem. Mr. Ercolini and others familiar with the history say it happened around 1990, when a local entrepreneur decided to farm Louisiana crawfish in this broad, marshy lake, once one of Puccini's favourite haunts.

(A lakefront cafe here is named Butterfly, after one of his best-loved operas, "Madame Butterfly," another tale of an American whose foreign trip takes a fatal toll.)

Similar experiments with Louisiana crawfish had been conducted in Spain and other European countries, which were drawn to the species because it was hardier and meatier than its Continental counterparts. There was commercial promise in the enterprise, and no one around Lake Massaciuccoli raised much of a warning or fuss. Sure enough, a modest market for the crawfish developed. But as the years went by, there were unintended effects.

WHITE-CLAWS AND 4X4S

A recent report in the Environment Agency magazine 'Environment Action' issue 38 (2003) suggests that recreational off-road drivers of 4x4s are causing serious damage to wildlife and important historical sites in Britain. They are also having an impact on some white-clawed crayfish (a protected species) populations. By driving across river beds they are destroying banks where the crayfish burrow and also crushing them under stones.

THE FRENCH CONNECTION

(Editors' abstract from Gouin *et al*., 2003)

Nobody is quite sure how the white-clawed crayfish got to Great Britain. It may have been naturally after the last ice-age or the result of human translocations. Their presence in Ireland was previously thought to have been the result of translocations from Great Britain. New evidence, however, has shown that the true origin of Irish crayfish may well be western France. **Nicolas Gouin** and colleagues applied molecular genetic techniques to nine populations along a south-north cline (Gouin *et al*., 2003 - see Literature of Interest to Astacologists). An absence of polymorphism was found within the Irish populations. The RFLP haplotype found in them was only recorded in western French populations and was different from those found in English populations. RAPD analysis suggested a stepwise model of translocation from south to north after the introduction of the white-clawed crayfish to Ireland. How long the white-clawed crayfish has been in Ireland and who introduced it is not known. As Ireland was entirely covered by ice at one time no freshwater organisms could have survived. No records of crayfish appear in Irish literature until the 17th C, but it is possible that they were introduced from France by monastic orders as early as the 12th C.

APPEARANCE OF *ORCONECTES LIMOSUS* IN CROATIA

Croatia was, until recently, one of the rare European countries where the presence of alien crayfish species had not been detected. The presence of *Austropotamobius torrentium*, *Austropotamobius pallipes*, *Astacus astacus* and *Astacus leptodactylus* have been recorded (Maguire, 2002). *A. torrentium*, *A. pallipes* and *A. astacus* are all treated as endangered and are protected by Croatian Law – Law of Nature Conservation (Narodne novine, 30/94) and Rule Book on Protection of Crayfish (Crustacea, Astacidae) (Narodine novine, 76/98).

Orconectes limosus, a species native to North America, occurs in many European countries, including countries bordering Croatia such as Hungary and Austria (Holdich, 2002). As this species is fast-growing and very fertile, it spreads rapidly, therefore its appearance in Croatian waters was inevitable. Tibor Mikuska, a research assistant in the Nature Park Kopački rit, collected the specimens of *O. limosus* from two localities within the Nature Park. Kopački rit is one of the largest natural marshlands in Europe and is situated in the north-east of Croatia in the corner made by the mouths of the Drava River into the Danube River. Once established, *O. limosus* will probably spread through the Drava River and Sava River to the west of Croatia, displacing native species.

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CRAYFISH AS THE BY-CATCH OF GILL-NETS IN THE CASPIAN SEA

The Iranian Fisheries Company has banned the gill-net usage operation in the Iranian coastal water of the Caspian Sea. The reason behind the decision was based on the observation of a multitude of young Sturgeon fish incidentally trapped and killed by this type of fishing gear.

Several irresponsible and opportunist fishermen use illegal ways to go fishing and set their gill-nets at a depth of 30-80 m on the bottom for catching the valuable commercial bony fishes that spend their wintering period in the deep waters. The mesh size of these gill nets is 2, 3, 5 and 7 cm (knot to knot).

Setting gill-nets on the bottom of the sea also catches the Caspian Sea crayfish (*Astacus leptoductylus*) as the main by-catch especially in the Anzali region. When the sea is stormy the power of water currents and waves take the gill-nets off and they move on the bottom with the sea current. In this position a large number of crayfish become trapped.

I have found this kind of gill-net in the sea with 40 m length, which trapped 252 crayfish (see photos), 45.24% were alive and the others were dead. The resources protection guards are trying to stop this kind of fishery on the Iranian coast of the Caspian Sea. Please note that the monitoring program in the Arass water reservoir started in 2003, not 1993 as mentioned in issue 25(2), and continues until the end of 2003.

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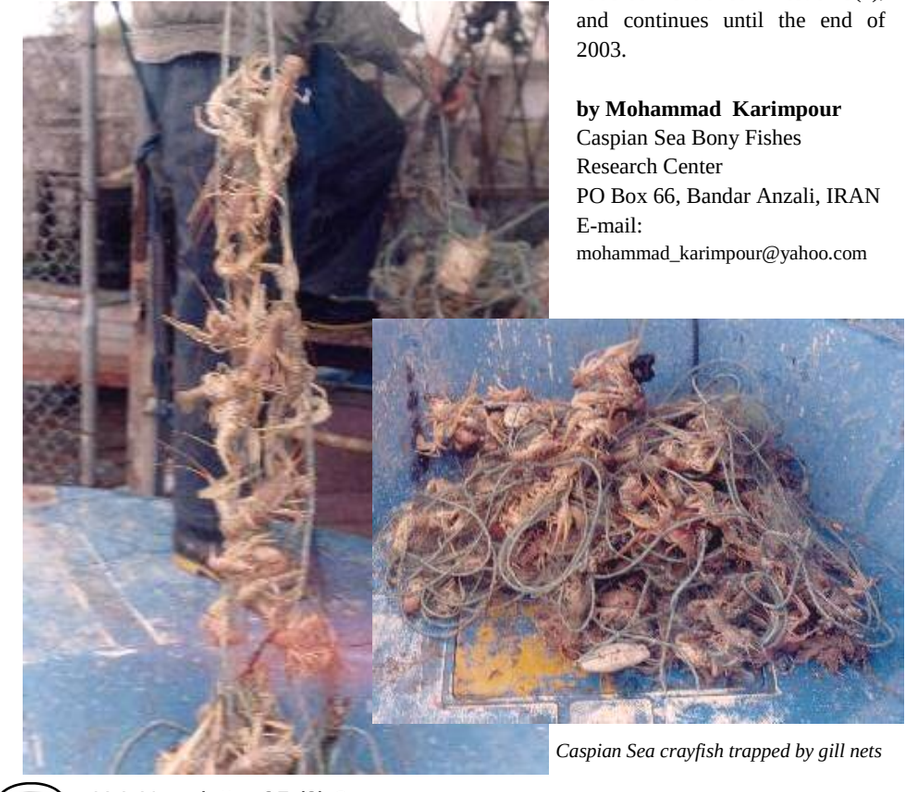

Caspian Sea crayfish trapped by gill nets

NORWEGIAN CRAYNET MEETING

The second CRAYNET meeting entitled "Socioeconomic and cultural aspects in European native crayfish with a special focus on *Astacus astacus*: links between conservation and use" will be held in Halden, Norway from 1-4 September, 2003. **Trond Taugbøl** of the Norwegian Institute of Nature Research (trond.taugbol@nina.no) is the chief organiser. For further details see the CRAYNET website: http://labo.univ-poitiers.fr/craynet

AUSTRIAN CRAYNET MEETING

The third CRAYNET meeting entitled "European native crayfish in relation to landuse and habitat deterioration – a special focus on *Austropotamobius torrentium*" will be held in Innsbruck, Austria. The chief organizer will be Leopold Füreder of the University of Innsbruck. For further details see the CRAYNET website:
http://labo.univ-poitiers.fr/craynet

CRAWFISH NEWSLETTERS FROM LOUISIANA

Mark Shirley of the Aquaculture and Coastal Resources, SW Region, LSU Ag. Center, has developed a new website for those interested in crayfish. His last seven newsletters can be found on:
http://www.lsuagcenter.com/parish/vermilion/CrawfishLetters/CrawfishHomePage.htm

OZARK STREAM CRAYFISH

(Abstract from DiStefano *et al*. (2003))

This paper is one of several products (past and future) resulting from the federally-funded, long-term Crayfish Management Project that was initiated to document Ozark stream crayfish basic biology/life history, population dynamics, habitat use, and trophic importance to and interactions with the popular sport fishes, smallmouth bass and rock bass. The paper describes macrohabitat (eg. riffles, pools, etc.) use by three sympatric crayfish species (and two age classes within each species), and documents differential patterns of use among those species and age classes across two seasons and over several years. Essentially, we showed that while these species and age classes are occupying the same stretches of Ozark streams (Jacks Fork and Big Piney rivers), they are partitioning the available habitats and using them differentially.

We documented that our Missouri Ozark streams harbour among the highest crayfish densities reported in the world. Finally, we discussed the conservation/ management implications of our data that indicate that the greatest crayfish densities consistently occurred in shallow, stream-margin habitats (i.e. water willow patches and backwaters) that are vulnerable to several common anthropogenic activities (e.g. gravel mining, instream cattle watering, etc.).

ASTACOPSIS WEBSITE

Todd Walsh has set up an *Astacopsis gouldi* ecotourism website (www.lobsters.tascom.net) in order to give this species of giant Tasmanian crayfish more worldwide recognition.

RED SWAMP CRAYFISH IN ITALY

Various articles have appeared in the press and on websites recently regarding the spread of the red swamp crayfish in Italy. **Francesca Gherardi** has supplied the website addresses below and the article following is by Frank Bruni (Assaciuccoli, Italy, May 16, 2003) from the *Massaciuccoli Journal*.

Times Picayune
www.nola.com/news/t-p/frontpage/index.ssf?/base/news-0/1050299864130900.xml

New York Times
www.nytimes.com/2003/05/19/international/europe/19TUSC.html