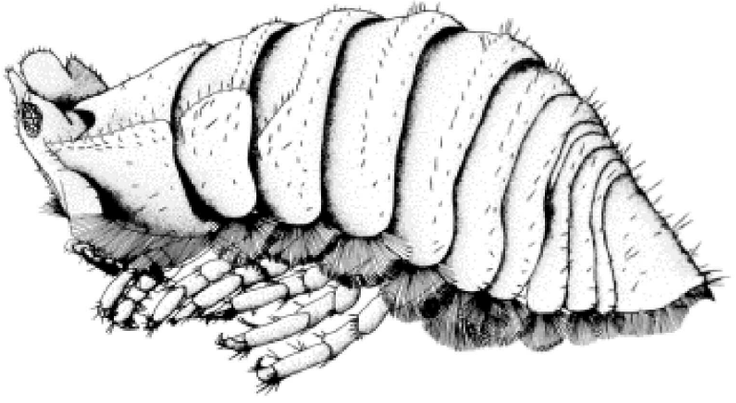
8.Harris RR. Coley S. Collins S. McCabe R. 2001. Ammonia uptake and its effects on ionoregulation in the freshwater crayfish *Pacifastacus leniusculus* (Dana). Journal of Comparative Physiology - B, Biochemical, Systemic, & Environmental Physiology, 171 (8):681-693.
9.Jiravanichpaisal P. Bangyeekhun E. Soderhall K. Soderhall, 2001. I. Experimental infection of white spot syndrome virus in freshwater crayfish *Pacifastacus leniusculus*. Diseases of Aquatic Organisms. 47(2):151-157.
10.Kellie, S., Greer, J. and Cooper, R.L. (2001) Alterations in habituation of the tail flip response in epigean and troglobitic crayfish. Journal of Experimental Zoology 290:163-176.
11.Kawai, T. and Nakata, K. 2001. An overview of ecology of the Japanese crayfish *Cambaroides japonicus* (De Haan, 1941). Journal of Natural History of Aomori, 6:1-8.
12.Kawai, T. and Nakata, K. 2001. On a collection method using miso (soybean paste) and burrow utilisation of the Japanese crayfish *Cambaroides japonicus* (De Haan, 1941). Journal of Natural History of Aomori, 6:49-52.
13.Kawai, T. 2001. Chinese character ideograph and utilization of the Japanese crayfish *Cambaroides japonicus* (De Haan, 1941) during the Meiji era. Journal of Natural History of Aomori, 6:49-52.
14.Kawai, T. and Nakata, K. 2001. Overview of conservation of the Japanese crayfish *Cambaroides japonicus* (De Haan, 1941). Bulletin of Obihiro Centenial Museum, 19:79-88.
15.Nakata, K., Hamano, T., Kawai, T., Hirata, M., The Otofuke River Groundwork Group, Takakura, Y., Kagami, H. and Tsutsumi, K. 2001. Distributions of crayfish in the Tokachi region of Hokkaido, Japan, with notes on temporal changes in density. Bulletin of Obihiro Centenial Museum, 19:67-78.
16.Ko, H.S. and Kawai, T. 2001. Postembryonic development of the Koresn crayfish, *Cambaroides similis* (Decapoda, Cambaridae) reared in the laboratory. Korean J. Syst. Zool. 17(1):35-47.
17.Li, H. and Cooper, R.L. (2001) Spatial familiarity in the blind cave crayfish, *Orconectes australis packardi*. Crustaceana 74: 417-433.
18.Mueller, K.W. (2001). First record of the red swamp crayfish, *Procambarus clarkii* (Girard, 1852) (Decapoda, Cambaridae), from Washington State, U.S.A. Crustaceana, 74(9): 1003-1007.
19.Poulos BT. Pantoja CR. Bradley-Dunlop D. Aguilar J. Lightner DV. 2001. Development and application of monoclonal antibodies for the detection of white spot syndrome virus of penaeid shrimp. Diseases of Aquatic Organisms, 47(1):13-23.
20.Sandeman D. Mellon DF. 2002. Olfactory Centers in the brain of freshwater crayfish. Crustacean Nervous Sytem. PG. 386-404.
21.Schapker, H., Breithaupt, T., Shuranova, Z., Burmistrov, Y. and Cooper, R.L. (2001) Heart rate and ventilatory correlative measures in crayfish during environmental disturbances & social interactions. Comparative Biochemistry and Physiology A 131:397-407.
22.Schulz R. Smietana P. 2001. Occurrence of native and introduced crayfish in northeastern Germany and northwestern Poland.. Bulletin Francais de la Peche et de la Pisciculture (361):629-641.
23.Stucki TP. Romer J. 2001. Will *Astacus leptodactylus* displace *Astacus astacus* and *Austropotamobius torrentium* in Lake Ageri, Switzerland?. Aquatic Sciences. 63(4):477-489.
24.Strawn, J.R., Neckameyer, W.S., and Cooper, R.L. (2000) The effects of 5-HT on sensory neurons, CNS command, and neuromuscular junctions of the crayfish abdominal superficial flexor. Comparative Biochemistry and Physiology B 127:533-550.
25.*The Crustacean Nervous System*. Konrad Wiese (Ed.) Springer-Verlag, Heidelberg
26.Wheatly MG. Hubbard MG. Corbett AM. 2002. Physiological characterization of the $Na+/Ca^{2+}$ exchanger (NCX) in hepatopancreatic and antennal gland basolateral membrane vesicles isolated from the freshwater crayfish *Procambarus clarkii*. Comparative Biochemistry & Physiology. Part A, Molecular & Integrative Physiology, 131(2):343-361.

ISSN 1023-8174

Crayfish NEWS

Vol.24 No.1 December 2001

The official newsletter of the International Association of Astacology



Side view of a male *Paravireia holdichi* Source: Brökeland *et al.* 2001

There is more to life than crayfish!

Ex-IAA President **David Holdich** has had a second new crustacean species named after him. Prior to developing a fascination with crayfish he worked on marine Isopoda and Tanaidacea, being involved in the description of some 18 new genera and 75 new species!

Since taking early retirement he has moved his collections to his wife's garage, although she can still get her car in - just! Now that the new crayfish book is finished he intends to start working on isopods again as he reckons he has at least another 20 new species from various parts of the world.

Zeuxo holdichi Bamber 1990 (Crustacea, Tanaidacea, Tanaidae) was named after David for a species found by Roger Bamber in the intertidal on the Atlantic coasts of France. *Paravireia holdichi* Brökeland, Wägele & Bruce 2001 (Crustacea, Isopoda, *incertae sedis*) was actually found by David in the upper intertidal zone of Canary Island coasts but, as you can't name a species after yourself, he gave it to others to do so!

P. holdichi is an enigmatic isopod that lacks uropods. The two other species belonging to the genus occur in New Zealand, so its distribution is very strange. At present the genus is *incertae sedis* as it does not fit clearly into any known isopod family. Illustrated above is a male (3.4 mm in length) *P. holdichi* in side view (from Brökeland *et al.* 2001).

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 Jay Huner. The address is: IAA Secretariat, PO Box 44650, University of Southwestern Louisiana, Lafayette, Louisiana 70504, USA.

Tel: (+1 318) 4825239
Fax: (+1 318) 4825395
E-mail: jhuner@usl.edu

Web page:

http://www.uku.fi/english/organizations/IAA/

Officers:

President's Corner

I was overwhelmed with positive feedback about the last newsletter going 'online'. Obviously members consider that this is an important development for IAA. From the production side, an online newsletter saves a lot of time—Tania and I spend many, many hours inserting newsletters into envelopes, printing labels, sticking stamps, etc. And that's all after the newsletter has been produced.

The next logical step is to allow members to choose whether they receive their newsletter **only** electronically. Initial feedback suggests that many members would be supportive of this **if** the online version could be printed easily and effectively. As a result I have used another format for this issue. The idea is that it can be printed double-sided (I suggest printing single-sided first, then photocopying on "1➔2 side" mode), then folded to present like the standard hard copy edition. Please give me more feedback—I'll get there eventually!

Some members have suggested posting the newsletter on the IAA web site. I would only support this if we had 'member only' access. I will ask **Ari Mannonen** about the feasibility.

After last year's unforseen setbacks we appear to be back on track to have *Freshwater Crayfish 13* published before IAA 14. My plan is also have it in CD-ROM format.

Pedro Joaquin Gutierrez Yurrita has sent the preliminary programme for IAA 14 (Page 8-9). Pedro informs me that the response to date has been very encouraging.

Glen Whisson
IAA President

Biology of Freshwater Crayfish

David M. Holdich (Editor)
Blackwell Science Ltd 2002

Holdich has compiled another 'must have' reference for anyone interested in freshwater crayfish. *Biology of Freshwater Crayfish* is a follow up volume to the highly sought after *Freshwater Crayfish: Biology, Management and Exploitation* published in 1988 (Eds Holdich and Lowery). Part one of the book has seen the addition of three new chapters: taxonomy and conservation of native crayfish species, genetic variation, and physiological adaptation to environment. Part two deals with crayfish of commercial importance with chapters on *Astacus*, *Pacifastacus*, *Procambarus*, *Orconectes*, *Cambarus and Cherax*. Featuring 22 experts from around the world, the book covers most aspects of the biology of crayfish, providing an up-to-date grounding in morphology, evolution and phylogenetics, anatomy, reproductive and life-history biology, ecology, conservation, behaviour, genetics, physiology, diseases and immunology. It is an impressive and invaluable contribution to a field receiving ever-increasing interest from anatomists, physiologists, biologists and conservationists. Put one on your shelf.

Glen Whisson
President
International Association of Astacology
22 February 2002

Papers of interest to astacologists

1.Angeler DG. Sanchez-Carrillo S. Garcia G. Alvarez-Cobelas M. 2001. The influence of *Procambarus clarkii* (Cambaridae, Decapoda) on water quality and sediment characteristics in a Spanish floodplain wetland. Hydrobiologia, 464(1-3):89-98.

2.Celada JD. Carral JM. Saez-Royuela M. Munoz C. Perez JR. 2001. Effects of different thermal treatments on the maternal incubation efficiency of the astacid crayfish *Austropotamobius pallipes* (Lereboullet, 1858) under controlled conditions. Crustaceana. 74(Part 9):801-808.

3.Cooper, R.L., Southard, R.C., He, P., and Whiteheart, S.W. (2002) Influence of neuromodulators and vesicle docking related proteins on quantal release. In, A*The Crustacean Nervous System*@. Konrad Wiese (Ed.) Springer-Verlag, Heidelberg, Germany. Pp. 63-82.

4.Cooper, R.L., Li, H., Long, L.Y., Cole, J., and Hopper, H.L. (2001) Anatomical comparisons of neural systems in sighted epigean & troglobitic crayfish species Journal of Crustacean Biology 21:360-374.

5.Djokaj, S., Cooper, R.L. and Rathmayer, W. (2001) Effects of octopamine, serotonin, and cocktails of the two modulators on synaptic transmission at crustacean neuromuscular junctions. Journal of Comparative Physiology A 187 (2):145-154.

6.Feuerverger, A., Menzinger, M., Atwood, H.L., and Cooper, R.L. (2000). Assessing the dimensions of synaptic vesicles in nerve terminals of crayfish. Journal of Neuroscience Methods 103:181-190.

7.Griffis, B., Moffett, S. and Cooper, R.L. (2001) Muscle phenotype remains unaltered after limb autotomy and unloading. Journal of Experimental Zoology 289:10-22.

International congress for Norway
IAA member **Kenneth Söderhäll** is organising two symposia for the 7th International Union of Biochemistry and Molecular Biology (IUBMB) Conference:

RECEPTOR-LIGAND INTERACTIONS -
Molecular, Physiological and Pharmacological Aspects
Grieghallen, Bergen, Norway, 4-8 May 2002

Please note that there are many more symposia in this International Congress and people can visit the following website to see the complete program: http://www.iubmb.unibe.ch/

Program:
Saturday 4th May
17:00 Opening
17:15 Plenary lecture: Tom Blundell, Cambridge, England: "The structural biology and bioinformatics of receptor ligand interactions"
18:00 Plenary lecture: Linda B Buck, Boston, USA: Deconstructing smell and taste
18:45 Get-together

Sunday 5th May
9:00 Plenary lecture: Tony Pawson, Toronto, Canada: Modular protein-protein interactions in signal transduction.

Tuesday 7th May
Marine models of signal transduction I
Chair: Kenneth Söderhäll, Uppsala, Sweden.
Co-chair: Jan Olafsen, Tromsø, Norway
10:00 Daniel Chourrot, Bergen: "Molecular evolution at the invertebrate/vertebrate transition"
10:30 Kenneth Söderhäll, Uppsala, Sweden: "The proPO and clotting systems in crustaceans"
11:00 Short talk to be advised
11:15 Coffee break
11:45 Sadaaki Iwanaga, Kyushu, Japan: "The innate immunity of horseshoe crab"
12:15 Jürgen Soll, Kiel, Germany: "From cyanobacteria to chloroplasts: Evolution of signal transduction and transport systems.
12:45 Short talk to be advised
13:00 Lunch
14:30-17:30 Minisymposia: Caveolae in receptor signalling and trafficking. Structural aspects of the interactions of receptors with their ligands. Marine models of immunity.
Chair: Kenneth Söderhäll, Uppsala, Sweden.
Co-chair: Jan Olafsen, Tromsø, Norway
14:30 Teizo Fujita, Fukushima, Japan: "Lectin pathway of complement activation"
15:00 Bruno Lemaitre, Gif-sur-Yvette, France: "Signal cascades in the immune system"
15:30 Short talk to be selected from abstracts
15:45 Coffee break
16:15 Kurt Drickamer, Oxford, England: "Immunoglycobiology"
16:45 Short talk to be selected from abstracts
17:00-19:00 Poster presentations

IAA Elections
It is election time again! We are particularly seeking the services of a Secretary/Treasurer capable of producing the IAA Newsletter—both 'on line' and in 'printed' format. Contact **Glen Whisson** if you require any more information on this aspect of the position.

Please send nominations to any IAA officer before 1 April 2002

Proposals for IAA 15
IAA President-elect **Keith Crandall**, has invited pre-proposals for hosting IAA 15 on the European continent. Pre-proposals should include an identified host location, associated individuals, and statement of reasoning behind the venue. From these pre-proposals, the Time and Place Committee will make a recommendation to the IAA Board and then, after a presentation from the proposer, to the General Assembly at IAA 14.

IAA has a policy of rotating the meetings and IAA 15 is scheduled for Europe. We therefore invite pre-proposals from our members in Europe. Please send these proposals to Keith Crandall (keith_crandall@byu.edu) by 1 May 2002. Thank you for your membership and consideration of hosting our exciting meetings.

News from Sweden
IAA member **Tommy Odelstrom** reports little crayfish activity in Sweden at this time of the year. A good winter with about 5 dm of snow has resulted in all small lakes and slow-flowing streams being covered with ice! So, we have to wait for another good crayfish season next August-September.

New crayfish listserv
This message is to announce the establishment of a new listserv dedicated to freshwater crayfishes and titled "crayfish-l". The e-mail address is <crayfish-l@ilstu.edu>. Commands and instructions for subscribing are available from any of the authors.

The listserv was the idea of Dr. Karen Wilson (University of Wisconsin) and **Dr. Bill Perry** (Illinois State University), and Bill has been kind enough to set it up and will manage it through his university.

The listserv is not intended to compete with any other existing listservs like the IAA's chat room or the well established crustacean listserv, but to supplement them.

We envision this listserv as a forum for inquiries, discussion and announcements concerning anything related to crayfish, including biology, ecology, conservation, taxonomy, systematics, management, culture, policy, etc. We hope it will be used by experts and novices alike as a mode of communication, to facilitate new ideas, and as a general means of networking.

Thanks in advance for your cooperation. Enjoy!

Karen Wilson
University of Wisconsin
kawilson@students.wisc.edu

Bill Perry
Illinois State University
wlperry@ilstu.edu

Bob DiStefano
Missouri Department of Conservation
dister@mail.conservation.state.mo.us

Self mutilation in crayfish, *Procambarus clarkii*

IAA member **Robin Cooper** sends the following fascinating article.

Mutilation of one's self is well recognized to occur in primates, rodents and birds. We are not aware of any literature documenting such behavior in crayfish. Possibly the conditions we maintain our stock of crayfish cause this behavior to be manifested. However, we have maintained, in identical conditions, hundreds of juveniles (5 cm) and adults (12 cm) and even raised eggs to adulthood over the last 6 years and have noted this occurrence 2 times, both of which occurred in juvenile crayfish.

Since our research is concerned with actions of neuromodulators (i.e. serotonin, octopamine) on the neuromuscular junction and it is postulated that these compounds might be related to the physiological drive for social status within a group of crayfish, we maintain the crayfish in individual plastic shoe boxes to standardize the behavioral status as isolates. A short section of plastic pipe, for the crayfish to seek shelter, and a few pebbles or a small amount of sand is also provided. All the animals were held in individual small tanks measuring 15 cm x 30 cm, and 9 cm in height. The water level was maintained at a 5 cm depth. A lid was kept on the tank. The tank water is replaced weekly and at the same time the animals are fed. Food in the form of dry pellet fish food was provided. The fish food pellets sink to the bottom of the tank.

The food was obtained from a local pet store and the brand (Aquadine) of fish food is marketed as "shrimp and plankton sticks: sinking mini sticks". Additional feeding sometimes occurred throughout the week. A small amount of dried crushed chicken egg shell was added as a calcium source. The local city (Lexington, KY) uses chloramines for water purification which requires us to use carbon based filters for aquaria water. In addition, we use a light cycle of 16:8 (light:dark) with lighting produced by full spectra lights (full spectra lights, General Electric). The crayfish were obtained from Raceland, LA, USA.

In the recent occurrence (January, 2002) of self-mutilation, the position of the animal on its side and its slow movement to a tap on the tank is what attracted our attention. The crayfish was lethargic and appeared close to dying. Upon closer examination, the crayfish had removed the rostrum and dorsal cuticle above the eye stalks. The internal body cavity was thus exposed. To determine if the crayfish could indeed inflict this upon itself, we moved the chelae to the same positions as the wound. With ease of moving the joints and opening and closing the chelae it became apparent that the animal could have readily caused it own injury. If fact, where the posterior wound had stopped was the limit to where we could move the chelae. In addition no healing or repair of the cuticle was apparent. The damage was recent.

The one early case was observed in 1999 but was discarded as a prior wound before being held in captivity. At that time it was noted that it was amazing that an animal could live for any length of time with the internal cephalic cavity exposed to the tank water. The wound was of the same type as this recent observation. So in retrospect, it is assumed that it was also a case of self-mutilation.

In social and economic terms, the fact that the new exploited population, or one which it is desired to exploit, is characterised by individuals of commercially viable size, will cause very important economic repercussions for local people, giving rise to a very fast increase in its fishery.

Pedro J. Gutiérrez-Yurrita[1]
José María Martínez[2]
[1]Department of Biology, University of Querétaro, México
[2]Department of Ecology, University of Madrid, Spain

References

Gutiérrez-Yurrita, P. J. & J. M. Martínez. 2002. Analyse ecologique de l'impact ambiant de la population du ecrevisse rouge (*procambarus clarkii)*, a Tenerife, Îles Canaries, Espagne, et ses formes de minorizer. L'Astaciculteur de France (in press).
Gutiérrez-Yurrita, P. J. & C. Montes. 1997. El cangrejo americano es una especie clave en la ecología de la marisma dulce del Parque Nacional de Doñana. Zones Humides i Meditérranies (RED-HUM), 1:11-12.
Malmqvist, B. A. N. Nilsson, M. Baez, P. D. Armitage & J. Blackburn. 1993. Stream macroinvertebrate communities in the Island of Tenerife. Arch. Hydrobiol., 128(2): 209-235.
Malmqvist, B., A. N. Nilsson & M. Baez. 1995. Tenerife's freshwater invertebrates: status and threats (Canary Islands, Spain). Aquatic Conservation: Marine and Freshwater Ecosystems, 5:1-24.

Louisiana crawfish season improves

IAA general manager **Jay Huner** sends the following update on the 2001-2002 crawfish season in Louisiana.

The Louisiana 2001-2002 crawfish season shapes up to be much better than the two previous seasons. Significant quantities of crawfish have been harvested from the 90,000 acres of ponds, down at least 20% from past seasons because of the two poor preceding seasons. Everything shapes up for a "normal" pond crawfish season. Conditions for the natural fisheries seem favorable - water filling nursery areas in the Atchafalaya Basin; however, water must be high and sustained in the Mississippi River system from mid-March through mid-June for a decent natural fisheries. This cannot be predicted with current technology so it is currently anyone's guess as to what will happen.

A major problem continues to be imported product from China, both peeled tail meat and whole boiled, frozen crawfish. Despite the fact that tariffs were instituted for "unfair" dumping of tail meat, no tariffs have been collected to this date and product is retailed at prices below production costs of domestic product. If there is significant production of crawfish from the state's natural fisheries this season, there could be chaos in the industry because there are very few processors left to peel excess whole crawfish for tail meat.

Information on *Procambarus clarkii* in Brazil

P. clarkii has been sold as pets not only in Sao Paulo, but also in Rio de Janeiro. Probably it is being sold in other larger cities in the southeastern and southern Brazil. I have no information about this species being used for food or fish bait. We have material from a pond located in a city park within the urban area of Sao Paulo and a rumour of its occurrence in a stream near the city of Sao Paulo (we are trying to get some specimens from this area in order to confirm that).
Source: Dr Célio Magalhães
Email: celiomag@inpa.gov.br

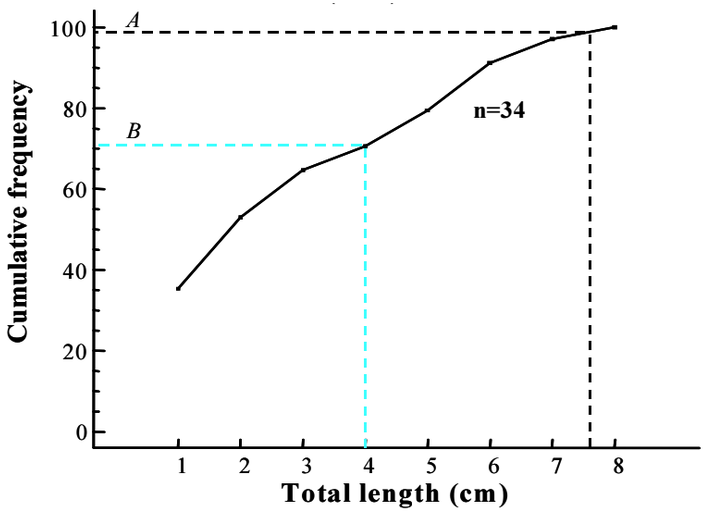


Figure 2. Cumulative size classes frequency for females. (*A*) Dashed line shows the mean reproductive size, while (*B*) dashed line shows the minimum size with gonadal development.

The problem with these activities is that the fishery methods used are not environmentally friendly (Dutch traps; handling by removing stones and destroying aquatic vegetation; and hand nets that could crash macrophytes, remove sediments and catch other macroinvertebrates). Therefore, it is necessary that management of crayfish populations are in line with other management plans to preserve the ecological processes of the ecosystems involved at the basin level (Gutiérrez-Yurrita & Montes 1997).

Crayfish environmental impacts are of greater importance in Tenerife because this Island has many rare and endemic benthic and macrophytes species; thus, because *P. clarkii* is a key species in the functioning of San Andrés aquatic ecosystems, their direct impact on the ecosystem should be considered from three perspectives or scales: 1) *Ecosystem level*: *P. clarkii* potential for altering the total production of the ecosystems controlling the mean energy routes and nutrient cycling. In addition, red swamp crayfish has been demonstrated to be an engineer species of the ecosystem, physically transforming its environment and altering the availability of resources for other species; 2) *Community level*: as a major consumer, *P. clarkii* may perform a significant role ingesting large quantities of detritus. At high crayfish densities or at high percentage of small size animals in their populations, foraging may be so extensive as to modify the habitat totally, destroying the microbial and the macrophyte beds, leading some species to reduce their populations (particularly in headwaters); 3) *Population level*: the role of crayfish as the prey of other invertebrate and vertebrate animals must be considered.

The cause of self-mutilation of limbs in primates, in some cases, is known to be associated with sensory loss of the appendage. In addition, there are metabolic diseases (i.e. Lesch-Nyhan syndrome) in humans that are known to induce self-mutilation (Cusumano et al., 2001). An alteration in one gene in rats results in excessive grooming and lesions (Greer and Capecchi, 2002). In humans, neurosurgery is sometimes imposed for sever cases of self-mutilation with underlying obsessive-compulsive disorder or schizoaffective disorder by cutting a region of the limbic system within the central nervous system (Price et al., 2001). In a particular species of birds, it is thought that an increased activity of a dopamine production and turnover might be the cause of a obsessive compulsive disorder that results in excessive self-feather picking.

In addition, it is postulated that this condition in birds may be genetically linked (Jenkens, 2001). In birds this odd behavior is thought to be induced by the lack of other objects in the environment to peck at since they are held in isolation. Might the isolated conditions of our crayfish be the cause? Possibly other factors that are selective to a particular crayfish, such as a heavy infestation of internal parasites, might damage sensory function to induce this behavior.

The purpose of communicating this report is to determine if others in the field of crayfish aquaculture have noted self-induced mutilation in crayfish or other crustaceans so that possible causes can be determined. So please respond if you have any further information to add.

Dr. Robin L. Cooper and Ms. Ann-Simone Cooper, Department of Biology, University of Kentucky, Lexington, KY 40506-0225
Email: RLCOOP1@pop.uky.edu

References

Cusumano FJ, Penna KJ, Panossian G. (2001) Prevention of self-mutilation in patients with Lesch-Nyhan syndrome: review of literature. ASDC J Dent Child.68(3):175-178.

Greer JM, Capecchi MR. (2002) Hoxb8 is required for normal grooming behavior in mice. Neuron 33(1):23-34.

Jenkins JR.(2001) Feather picking and self-mutilation in psittacine birds. Veterinary Clin North Am Exot Anim Pract.4(3):651-667.

Price BH, Baral I, Cosgrove GR, Rauch SL, Nierenberg AA, Jenike MA, Cassem EH. (2001) Improvement in severe self-mutilation following limbic leucotomy: a series of 5 consecutive cases. J Clin Psychiatry. 62(12):925-932.

New crayfish association formed — *"forum flusskrebse"*

IAA member **Manfred Pöckl** sends the following information about the newly formed association.

Because of the great success of the international symposium on freshwater crayfish in September 2000 held in Klagenfurt (Carinthia), a subsequent Symposium was held in Gaming (Lower Austria) in September 2001. Symposium volumes are available from the President's address.

A draft programme was drawn up comprising well-organised workshops and roundtable discussions on further conservation efforts of native crayfish.

During this Symposium in Gaming the international association *"forum flusskrebse"* was founded. It shall bring to-

gether German speaking astacologists, crayfish farmers, landowners, fishermen, researchers, conservationists, and managers.

The permanent secretariat is managed by Jürgen Petutschnig, who is the president of the organisation. His address is:
Bahnhofstraße 39/2,
A-9020 Klagenfurt, AUSTRIA.
Tel. 0043 463 51 66 14,
Fax. 0043 463 51 66 149,
E-mail: oekuplan@aon.at
Web-page: www.forum-flusskrebse.com

Vice-President is **Thomas Stucki**, an astocologist from Aarau, Switzerland.
E-mail: thomas.stucki@ag.ch

Current *"forum flusskrebse"* officers:

Max Keller of the first Bavarian crayfish hatchery from Augsburg, Germany.

Delegates to the 12th Symposium of the IAA (1998) will surely remember Max Keller, his family and team, as well as the city of Augsburg.
E-mail: keller-krebs@my-box.de

Leopold Füreder is a zoologist and limnologist at the University of Innsbruck, Austria.
E-mail: Leopold.fuereder@uibk.ac.at

Birgit Oidtmann is an expert on crayfish diseases, especially crayfish plague, and works at the University of Veterinary Medicine, Munich, Germany.
E-mail: b.oidtmann@zoofisch.vetmed.uni-muenchen.de

Reinhard Pekny is a breeder and farmer of noble crayfish (*Astacus astacus*), white-clawed crayfish (*Austropotamobius pallipes*) and stone crayfish (*A. torrentium*). Göstling an der Ybbs, Austria. E-mail: reinhard.pekny@aon.at

Manfred Pöckl is an expert in the field of nature conservation and works for the Federal State Government of Lower Austria and the ecological institute of the University of Vienna. Golling an der Erlauf, Austria. He is editor of the periodic newsletter.
E-mail: manfred.poeckl@noel.gv.at

Ralf Schulz is an expert in molecular biology and genetics at the University of Braunschweig, Germany.
E-mail: r.schulz@tu-bs.de

Gerhard Woschitz is a fishery biologist from Vienna, Austria. Treasurer of the Association.
E-mail: woschitz@fischerei-verband.at

Annual membership fees:

Ordinary membership	30 € (Euro)
Student membership	15 € (Euro)
Institutes, organisations, supporting members	60 € (Euro)

Currently an information and membership-recruitment campaign has been started.

Aims, area, and activities:

The major aim of *"forum flusskrebse"* is to preserve populations of native crayfish species and their habitats, to control and manage nuisance populations of non-native or alien species, and to use crayfish wisely.

The major area of *"forum flusskrebse"* is the centre of mainland Europe where the native language is German (Austria, Germany, Switzerland, Liechtenstein). The Association shall bring together German speaking astacologists, crayfish farmers, landowners, fishermen, re-

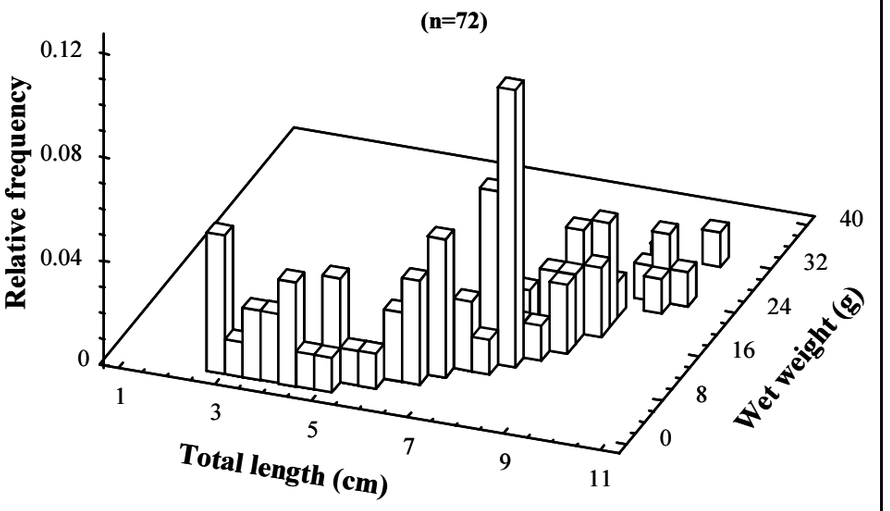


Figure 1. *Procambarus clarkii* size classes relative frequency distribution in "El Cercado de San Andrés", Tenerife Islan (Canarias, Spain).

low on macroinvertebrate benthic communities, but high at the ecological processes level. Whereas, in the headwater of the San Andrés River ecological impacts of crayfish population on macrophyte and macroinvertebrate communities would be high, because of the ecological peculiarities of these kinds of headwaters and high mountain streams (Malmqvist *et al*. 1993).

These habitats are also of great biodiversity importance because they have the greatest biological value invertebrate community, a lot of rare and endemic species (Malmqvist *et al.* 1995). And hence, the ecological impact of crayfish in these areas will be greater, particularly if *P. clarkii* changes the ecological functioning of the ecosystem.

The only ravine where crayfish migrated naturally is Las Huertas Ravine, because this ravine joins to San Andrés Ravine approximately 100m prior to flooding-out to the sea. It is very important to bear in mind that since *P. clarkii* is established in the hydrological basin of the Barranco de San Andrés, the action plans to control their populations must be focused in a 'well fishing device' in the permanent streams and ponds, especially in the headwaters and high mountain springs. These action plans should be combined with other management actions, such as: banning further introductions; keeping the water regime of the ravine; and legally protecting headwaters and springs of the ravine.

Although this is the first report of this population, crayfish were probably introduced into the Island in 1996/1997, because it has a great economical value to the local people; so, a future fishery for commercial and recreational purposes is expected.

Characterization of a pattern recognition protein, a masquerade-like protein, in the freshwater crayfish *Pacifastacus leniusculus*

So Young Lee and **Kenneth Söderhäll**, 2001, The Journal of Immunology, 166:7319-7326

A multifunctional masquerade-like protein has been isolated, purified, and characterized from hemocytes of the freshwater crayfish, *Pacifastacus leniusculus*. It was isolated by its Escherichia coli binding property, and it binds to formaldehyde-treated Gram-negative bacteria as well as to yeast, Saccharomyces cerevisiae, whereas it does not bind to formaldehyde-fixed Gram-positive bacteria. The intact masquerade (mas)-like protein is present in crayfish hemocytes as a heterodimer composed of two subunits with molecular masses of 134 and 129 kDa. Under reducing conditions the molecular masses of the intact proteins are not changed. After binding to bacteria or yeast cell walls, the mas-like protein is processed by a proteolytic enzyme. The 134 kDa of the processed protein yields four subunits of 65, 47, 33, and 29 kDa, and the 129-kDa protein results in four subunits of 63, 47, 33, and 29 kDa in 10% SDS-PAGE under reducing conditions. The 33-kDa protein could be purified by immunoaffinity chromatography using an Ab to the C-terminal part of the mas-like protein. This subunit of the mas-like protein has cell adhesion activity, whereas the two intact proteins, 134 and 129 kDa, have binding activity to LPSs, glucans, Gram-negative bacteria, and yeast. E. coli coated with the mas-like protein were more rapidly cleared in crayfish than only E. coli, suggesting this protein is an opsonin. Therefore, the cell adhesion and opsonic activities of the mas-like protein suggest that it plays a role as an innate immune protein.

Expected and potential ecological incidence of red swamp crayfish *Procambarus clarkii* in Tenerife Island, Canary Islands, Spain.

A population of red swamp crayfish *Procambarus clarkii* located in the Barranco de San Andrés, in Tenerife Island, was reported to the Environment Agency of Tenerife (EAT) by Gustavo Herrera in 1998. The EAT contacted us to develop a short study for gathering information concerning the possible ecological impacts of red swamp crayfish in the Island. The population dynamics of this population showed multiple recruitment classes with higher proportion of large animals than small animals (mean size is 7.07cm of total length and 10.42g of wet weight) (Fig. 1).

Figure 2 shows the cumulative size classes frequency for females indicating that the population was in pre-reproductive stage. This hypothesis was supported by gonadic observations of females, since there was approximately 30% of individuals with some degree of gonad development (Fig. 2), but only 3% of these females were apt for reproduction.

Population proportion in reproductive stage was approximately 15% for males. Sex ratio (Male : Female) was about 0.6. This population did not show symptoms of stress, because in addition to the great average size class, approximately 90% of the individuals examined had almost full stomachs, with a vigorous, dense and heavy hepathopancreas (Gutiérrez-Yurrita & Martínez 2002).

It is supposed that the crayfish effect on freshwater ecosystems would be very variable, depending of the kind of ravine and river section invaded. For instance, in the intermediate sections of the San Andrés Ravine, their incidence would be

searchers, conservationists, managers, aquaculturists, and hobby naturalists. Interested people in neighbouring countries with some knowledge of German are kindly welcome.

Good contact with the IAA (International Association of Astacology) is guaranteed as some of the officers are members of this global Association, and there should be a good co-operation between our local and the world wide Association.

Further important points:

- Promotion of scientific research focusing on the preservation of native crayfish species and their habitats;
- Information campaigns informing the public about the many threats to the native crayfish fauna, including degradation of habitats, water pollution, diseases and parasites, and alien crayfish species acting as vectors of the crayfish plague as well as outcompeting the indigenous species;
- Mapping and monitoring of crayfish distribution and abundance;
- Wise use and sustainable catching of crayfish populations;
- Habitat restoration: Mitigation measures to conserve crayfish populations and restore and enhance habitats, i.e. creation of new or improved habitat, following “in river” construction projects;
- Restoration of degraded habitats as a prerequisite for successful re-introductions and re-stockings;
- Construction of isolated freshwater bodies in the mountains for keeping some safe genepools of indigenous species outside human settlements;
- Breeding and hatching of juveniles of noble (*Astacus astacus*), white-clawed (*Austropotamobius pallipes*) and stone crayfish (*Austropotamobius torrentium*) for re-introduction exercises;
- Successful restocking of habitats with native crayfish species;
- Control and management of nuisance populations of non-native (alien) species of crayfish;
- Improvement and unification of the many different fisheries acts and species preservation acts (Federal, State, Bundesländer and Kantons) referring to freshwater crayfish; and
- Consulting activities for governmental and non-governmental organisations, companies and interested people.

Activities:

- Organisation of international symposiums relating to freshwater crayfish, provided that the official language is German. The next international Symposium of the *“forum flusskrebse”* will take place in Augsburg, Germany, in Autumn 2003. Symposium volumes will be printed and available.
- Co-organisation and encouragement of local, regional and national meetings in central mainland Europe.
- Editing a newsletter two to four times per year that is sent to all members, including a wealth of up to date information. Members are encouraged to contribute.
- Creating a home page that is a valuable source of information including further details of *“forum flusskrebse”*, a bibliography, links to other useful sources of crustacean information, contacts, etc.

IAA 14 preliminary programme

(as at 24 February 2002)

SUNDAY, 4 AUGUST

15:00 – 19:00	Registration	Lobby, Hotel Fiesta Inn (HFI)
19:00 – 20:00	Welcome cocktail	Patio de los Naranjos (HFI)
	Official welcome Rubén Pineda López Director of the Faculty of Sciences, UAQ	Patio de los Naranjos (HFI)

MONDAY, 5 AUGUST

8:30 – 10:30	Oral session	Salón Corregidores (HFI)
10:30 – 11:00	Coffee break	Foyer del Salón Corregidores (HFI)
11:00 – 13:00	Oral session	Salón Corregidores (HFI)
13:00 – 14:00	Lunch	Galería del Patio de los Naranjos (HFI)
14:00 – 16:00	Oral session	Salón Corregidores (HFI)
16:00 – 18:00	Coffee break and Poster session	Foyer del Salón Corregidores (HFI)
18:00 – 21:00	IAA Board meeting	Salón E (HFI)

TUESDAY, 6 AUGUST

8:00 – 9:00	Registration	Auditorium Fernando Díaz, UAQ
9:00 – 9:30	Opening ceremony Pedro J. Gutiérrez, IAA 14 Organising committee Ambrosio Martínez, Director of the CONCYTEQ Glen Whisson, IAA President Jay Huner, IAA General Manager	Auditorium Fernando Díaz, UAQ
9:30 – 10:00	Host country lecture	Auditorium Fernando Díaz, UAQ (Instantaneous translation into English)
10:00 – 10:30	Coffee break	Auditorium Fernando Díaz, UAQ
11:00 – 13:00	Oral session	Salón Corregidores (HFI)
13:00 – 14:00	Lunch	Galería del Patio de los Naranjos (HFI)
14:00 – 16:00	Oral session	Salón Corregidores (HFI)
16:00 – 18:00	Coffee break and Poster session	Foyer del Salón Corregidores (HFI)
18:00 – 20:00	Querétaro sightseeing tour	Foyer de banquetes (HFI)

WEDNESDAY, 7 AUGUST

9:00 – 9:45	Sture Abrahamsson Memorial Lecture	Auditórium Fernando Díaz, UAQ (Instanteneous translation into Spanish)
10:00 – 10:30	Coffee break	Foyer del Salón Corregidores (HFI)
10:30 – 13:00	Oral session	Salón Corregidores (HFI)
13:00 – 14:00	Lunch	Galería del Patio de los Naranjos (HFI)
14:00 – 16:00	Oral session	Salón Corregidores (HFI)
16:00 – 18:00	Coffee break and Poster session	Foyer del Salón Corregidores (HFI)
	Symposium banquet	
19:30 – 20:00	Buses to the restaurant	Foyer de Banquetes (HFI)
20:30 – 23:30	Revolución mexicana style banquet	Hotel Fiesta Inn Galindo
23:30 – 24:00	Buses to Querétaro	Hotel Fiesta Inn Galindo
24:00 – 24:30	Back to Querétaro	Foyer de Banquetes (HFI)

THURSDAY, 8 AUGUST

8:00 – 11:00	Conference field trip to Teotihuacán	Foyer de banquetes (HFI)
11:00 – 13:00	Visit to the Pyramids Conference Photograph	Teotihuacán
13:00 – 14:00	Lunch	Prehispanic Restaurant
14:00 – 15:00	Crayfish ancient uses forum	Hall of the Colony Restaurant
15:00 – 17:00	Visit to crayfish places	State of Hidalgo
17:00 – 20:00	Back to Querétaro	Foyer de Banquetes (HFI)

FRIDAY, 9 AUGUST

8:30 – 10:30	Oral session	Salón Corregidores (HFI)
10:30 – 11:00	Coffee break	Foyer del Salón Corregidores
11:00 – 13:00	Oral session	Salón Corregidores (HFI)
13:00 – 14:00	Lunch	Galería del Patio de los Naranjos
14:00 – 16:00	Oral session	Salón Corregidores (HFI)
16:00 – 18:00	Coffee break and Poster session	Foyer del Salón Corregidores (HFI)
18:00 – 19:00	IAA General Assembly	Salón Corregidores (HFI)
19:00 – 20:00	Poster removal	Foyer del Salón Corregidores (HFI)

SATURDAY, 10 AUGUST (TO BE CONFIRMED PENDING MINIMUM NUMBER)

9:00 – 11:00	Post-Conference field trip	Foyer de Banquetes (HFI)
11:00 – 15:30	'Discovery' and lunch in this Colony City (declared Heritage of the Humankind by UNESCO)	Guanajuato City
15:30 – 16:00	Buses to Cerro del Cubilete	Guanajuato City Centre
16:00 – 17:00	Sightseeing of the Sierra de Guanajuato	Cristo del Cubilete
17:00 – 19:00	Back to Querétaro	Foyer de Banquetes (HFI)