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**EIGHTH SYMPOSIUM OF ASTACOLOGY**--The symposium dates are 22-26 April 1990. Place is Baton Rouge, Louisiana (USA) and host is the Louisiana State University Agricultural Center. The symposium will be held physically at the Baton Rouge Hilton Hotel which has arranged a very reasonable rate for participants (\$45 US single/double per night). A day long tour of the Louisiana crayfish industry is included as part of the meeting. Side trips to New Orleans and Louisiana-French Acadiana will be possible before and after the symposium. As of 17 September 1985, 85 titles of research papers had been received by the organizing committee. Additional information about the meeting will be enclosed with this newsletter and mailed separately to IAA members. Further information may be obtained from:

Mr. L. W. de la Bretonne, Jr.  
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**NINTH SYMPOSIUM OF ASTACOLOGY**--It is never too early to plan for a symposium. President-elect David Holdich is planning the Ninth Syposium of Astacology. Tentative location and dates are: Reading, England, 5-10 April 1992. It is, of course, premature to provide more information at this time.

**HONORARY LIFE MEMBERS**--IAA recognizes significant contributions to our association by conferring honorary life membership on distinguished members at our international symposia. Those wishing to nominate someone for this honor may do so by sending a letter of nomination with justification to President James F. Payne, Department of Biology, Memphis State University, Memphis, Tennessee 38152 USA. Nominations will be reviewed and approved/rejected by the IAA Board.

**AMERICAN SOCIETY OF ZOOLOGISTS ANNUAL MEETING, BOSTON, MASSACHUSETTS, USA**--IAA is, again, a cosponsor of this meeting beginning 27 December 1989. For further information, contact: Mary Adams-Wiley, American Society of Zoologists, 104 Sirius Circle, Thousand Oaks, California 91360 USA, phone 805-492-3585.

**Procambarus clarkii UPDATE**--(1) Past President Ossi Lindqvist (P.O.B. 6, SF-70211 Kuopio 21, Finland) has been informed by a reliable source that *P. clarkii* is widely distributed in farm dam ponds in Zimbabwe. It is his understanding that the species is not yet present in major watersheds in that country. (2) Past President Pierre Laurent (I.N.R.A., F-74203 Thonon les Bains Cedex, France) has sent a brief note by member Jaques Arrignon describing a well entrenched *P. clarkii* population in a small lake near Paris, France. The reference is: Arrignon, J. 1987. L'Ecrevisse rouge des marais de Lousiane *Procambarus clarkii* aux portes de paris dans l'etang communal de Sarcelles (Seine-Saint-Denis). Bull. de Liasison du Consei Superieur de la Peche No. 49 - 50, October 1987. According to the note, red swamp crayfish is well established in the small lake and is actively being fished by the local anglers. (3) Member Bernard Petrosky reports that *P. clarkii* is being cultured in a number of earthen ponds in the state of Delaware (USA). The species is apparently able to complete its life cycle and proliferate in this northeastern region of the USA.

**ASTACOLOGISTS ORGANIZE IN PEOPLE'S REPUBLIC OF CHINA**--Member Shu Xinya (Hubei Fisheries Science Research Institute, No. 18 Donghu Road, Wuhan, People's Republic of China) writes that the Preparatory Committee of the Chinese-Wuhan Association of Astacology was established on 6 August 1989 in Wuhan. Dr. Shu is a member of the 5 person committee. A modest quantity of *Procambarus clarkii* is now exported from the PRC to Europe. Dr. Shu invites communication from fellow astacologists and is hopeful that he will be able to attend the 8th Symposium of Astacology in April 1990.

**Procambarus clarkii** INVADES NAIROBI (KENYA)--This was the heading on a letter received from member C. Marcus French (P.O. Box 40813, Nairobi, Kenya). According to Dr. French's letter, "Following my last report November 1988 I showed pictures of my catches in Uganda. I was told that similar creatures existed in the rivers and dams around Nairobi, but was unable to confirm this. Recently, the long rains (March-May) have been exceptionally heavy and large numbers of *Procambarus clarkii* have emerged. In some areas large numbers (50-100) per acre of their corpses are found in gardens.

"I have caught several, the largest being 10.5 cms. in length and find they differ markedly from those in Lake Naivasha, by being black to jet black in colour. I wonder if this might be due to the deposition of the black clay soil of Nairobi in the exoskeleton. The mystery is how they escaped from Lake Naivasha. Two possibilities exist:-

- a) That a few specimens were brought by humans either from curiosity or escaping during transfer to the airport for exportation.
- b) A natural spread which would involve a movement of 80-160 kms. depending on the route. More dramatic is that they would have to ascend the 300 m high wall of the Great Rift Valley. This water-shed means there is no direct river or stream link from Naivasha to Nairobi. However, if the ascent were made at the right time transfer from the rivers flowing to Nairobi might be made through the seasonal marshes at the crest of the Rift.

"It would be interesting to investigate the marshes and rivers at the crest of the Rift to determine if specimens exist supporting theory but funds do not permit this at present.

"Whatever the explanation it is likely that these will soon pose major problems due to their burrowing habits by destroying earth embankments for drainage or daming. It may be fanciful but even Nairobi Dam itself constructed of earth in the early fifties may be in danger."

[Editor's note: *P. clarkii* constructs rather simple burrows and rarely makes them deeper than 1.5 m with 0.5-1.0 m being more common. Large numbers of burrows do, however, wreak havoc on poorly constructed earthen irrigation systems.]

**PALEONTOLOGIST STUDIES CRAYFISH BURROWS**--Member Stephen T. Hasiotis (Univ. of Buffalo, Dept. of Geology, 4240 Ridge Lea Road, Buffalo, New York 14260 USA) is studying the burrowing patterns of modern crayfishes to compare them with burrows of Triassic decapods from the Colorado Plateau (USA). The decapods found within the burrows resemble modern crayfishes similar to the genus *Cambarus*. Mr. Hasiotis has sent a manuscript that will

be published this month in the Journal of Sedimentary Petrology. Authors and title are: Hasiotis, S. T. and C. E. Mitchell. Lungfish burrows in the upper Triassic Chinle and Dolores formations, Colorado Plateau - New evidence suggests origin by a burrowing decapod. Mr. Hasiotis allowed *Procambarus clarkii* to burrow in aquaria filled with soil and compared the burrows with the fossil burrows that he has been studying. His description of the comparison follows: "I set up two aquariums with different soil types and environments that resembled overbank deposits along a stream and a pond's edge. Four burrows were constructed in the aquariums, described and measured, and casted with fine-grained dental plaster. I then compared the casts to the burrows of the Triassic (210 mya) burrows made by the decapod crustaceans. They are very similar to each other in terms of surface morphological features and textures. The diameters were also similar including what limited architecture was available for comparison."

In a somewhat later communication, Mr. Hasiotis added more observations on burrowing of *P. clarkii*, "The crayfish that were allowed to burrow in the aquaria recently hatched many juveniles in the burrows. The juveniles have begun to burrow in the bottom of the parents' burrow, with architectures that appear to be a little more complex than the parents'. It also appears that the juveniles were hatched at staggered intervals. Maybe this is a way in which the offspring will not all be lost if hatched during adverse conditions?"

**FURTHER UPDATE ON CRAYFISH SITUATION IN JUGOSLAVIA**--W. Budhina (Zupanciceva 9, 61000 Ljubljana, Yugoslavia) has forwarded the following information to supplement his comments published in the last newsletter (Vol. 11, No. 3, pp. 4-5). The information was based on the situation in Slovenia, the northwest part of Yugoslavia. *Orconectes limosus* is not native to Yugoslavia and is not present in the country. The commercial fishery in Slovenia for *Astacus astacus*, males only, extends from 15-2 until 1-12 each year with a size limit of 12.0 cm total length. Distribution data for various species have been obtained from Dr. M. Karaman. Genus *Austropotamobius* [Danube River system and Adriatic River System]. *Austropotamobius torrentium* nacio *macedonica* (Karaman) [Macedonia-Vardar, Drina river system, Monte Negro-tributaries of Skadar Lake]. *A. t. torrentium* [all of Yugoslavia]. *A. t. danubica* (Karaman) [Croatia, Serebia]. *Austropotamobius italicus italicus* [Adriatic coast and rivers in islands]. *A. i. carasicus* (Karaman) [Bosnia]. Genus *Astacus* [Danube River system]. *Astacus astacus* [Croatia, Monte Negro, Slovenia]. *A. leptodactylus* [Croatia, Bosnia, not in Slovenia]. *A. colchicus balkanicus* (Karaman) [Macedonia].

**NORWEGIAN CRAYFISH NOTES**--Board member Jostein Skurdal (Oppland County Environmental Administration, Statsetatenes hus, N-2600 Lillehammer, Norway) sends two items of interest. (1) On the lighter side, Donald Duck's neighbor is working in his own garden and asks Donald "Did you get rid of the water weed?" Donald's

reply is "yes." In the next panel, Donald's neighbor looks into Donald's backyard and sees a garden full of weeds and upraised crayfish chelae. Donald is looking at the garden and says "...but now I have got the crayfish plague!" (2) On the more somber side, Jostein also sent information about the spread of the crayfish fungus plague in Norway and the efforts to stop it. Posters are now found wherever crayfish are being harvested showing a dead crayfish under a red "stop" sign with a list of do's and don'ts to stop the plague's spread. The do's are: -read all available information; -license from the veterinary authorities; -disinfect the equipment before the season; -disinfect the equipment before using it in another water course; -mark the equipment; -report diseased crayfish; -report irregularities. The don'ts are: transfer dead or live crayfish to another watercourse; -deposit dead or diseased crayfish in a watercourse; -import unboiled crayfish; -import equipment that has been used for crayfish fishing abroad; -keep crayfish in aquaria; -fill water containers in one watercourse and pour the water into another watercourse. According to Jostein, "the plague struck during the summer in 1987 in the river Glomma, in Lake Vingersjoen and in Lake Storsjoen. So far no other areas have been infected. The crayfish in the rivers draining into Glomma have been protected by natural barriers or small dams. However, we have just now received information that dead crayfish have been seen in the Lake Stora Lee which is situated on the border between Norway and Sweden. Preliminary examinations point to crayfish plague as the death agent. Thus, we are not overly optimistic on the future of the native Astacus astacus populations in Norway. In Norway we have decided not to introduce foreign species such as signal crayfish to replace our own noble crayfish. This may be of some help in order to reduce potential spread of the plague fungus as infection easily spreads by stocking of signal crayfish. In the border area this is a problem since there are no bans in Sweden against stocking signal crayfish in watercourses close to the Norwegian border."

Current programs that Jostein and his colleagues are engaged in include studying plague in the river Glomma system, assess the effects of acid rain on crayfish populations, and mapping genetic variation in A. astacus in Norway using electrophoresis.

**NOTES ABOUT THE CRAYFISH SITUATION IN ENGLAND**--President Elect David Holdich (Dept. of Zoology, Univ. of Nottingham, Nottingham NG7 2RD Great Britain) sends some information about exotics. According to David, Procambarus clarkii has not moved into the wild but they are selling for just under 8 English Pounds each as Red Lobsters in pet stores! However, Astacus leptodactylus seems to be faring very well in some areas. The 26 May 89 issue of the Evening Standard carried an item entitled "Our lunch delicacy crawls out of the canal." Apparently "1000's of the crayfish have climbed out of the canal and up the banks in the Grand Union Canal, W9. Local chefs are taking advantage of the situation to liven up their menus with fresh crayfish."

**BIBLIOGRAPHY OF CRAYFISHES IN ARGENTINA**--Daniel Roccatagliata (Universidad de Buenos Aires, Dept. de Biología, Ciudad Universitaria, 1428-Buenos Aires, Argentina) has sent the following references that may be of some interest to members: Bahamonde, N. 1951. Nuevos datos sobre el Parastacus spinifrons (Philippi), 1882. Bol. Mus. Nac. Hist. Nat. Chile 25:85-96. \*Cita localidad en la Argentina.

Berg, C. 1900. Datos sobre algunos crustaceos nuevos para la fauna Argentina. Comun. Mus. Nac. Buenos Aires 1(7):223-235. \*Trata Parastacus spinifrons.

Faxon, W. 1914. Notes on the crayfishes in the United States National Museum and the Museum of Comparative Zoology, with descriptions of new species and subspecies. Mem. Mus. Comp. Zool. Harvard Col. 40(8):347-427. \*Trata Parastacus spinifrons.

Milne, Edwards, H. y H. Lucas. 1843. Crustacees. En d'Orbigny, A.D. (ed.) Voyage dans l'Amerique meridionale (le Bresil, la Republique Orientale de l'Uruguay, la Republique Argentine, la Patagonie, la Republique du Chili, la Republique de Bolivie, la Republique du Perou), execute pendant les annees 1826, 1827, 1828, 1829, 1830, 1831, 1832 et 1833. 6(1):1-37. 17 plates. Pitois-Levrault et Cie., Paris.

Porter, C. E. 1904. Materiales para la fauna carcinologica de Chile. III. Algunos datos sobre dos parastacidos. Rev. Chilena Hist. Nat. 8(6):254-261. \*Contiene informacion sobre Parastacus agassii (hoy Samastacus spinifrons), con cita para la Argentina.

Riek, E. F. 1971. The freshwater crayfishes of South America. Proc. Biol. Soc. Washington 84(16):129-136. \*Cita material procedente de la Argentina.

Riguelet, R. A. 1949. La morfologia y el mecanismo de sujecion de las crías de Parastacus agassii Faxon. Not. Mus. La Plata Zool. 14(117):55-59.

**NEW AUSTRALIAN CRAYFISH AQUACULTURE BOOK**--"Australian Freshwater Crayfish: Handbook of Aquaculture" by member B. J. Mills is now available. Cost is \$45 Australian and bank drafts should be made out to B. J. and J. K. Mills. This current (1989) text is the first comprehensive book on the subject. It describes the basic requirements and procedures necessary to farm some of the Australian crayfish species. One main chapter deals with the aquaculture potential of Australian crayfish with specific species discussed being yabbie (Cherax destructor), marron (Cherax tenuimanus), and red claw (Cherax quadricarinatus). Other chapters deal with pond management, general biology, and economics and marketing.

**ASTACOLOGICAL COMMUNICATIONS FROM AROUND THE GLOBE**--(1) Member Mohamed Melhaoui (University Mohamed 1<sup>er</sup>, Faculty of Science, Oujda, Morocco) writes that he is studying the introductions and subsequent development of Astacus astacus and Orconectes limosus in his country. (2) Member Richard Musgrove (Zoology Dept., Univ. of Adelaide, G.P.O. Box 498, Adelaide, South Australia 5001, Australia) writes that he has taken up a PhD position to work on the energetics and nutrition of Cherax destructor. This work is similar to work that he did in New Zealand with Paranephrops zealandicus (see Publications of Interest to Astacologists, below). He states that he is interested in the juvenile phase, its feeding strategies, energy budget, and nutrition with special reference to improving growth and increasing survival in crayfish culture. (3) M. C. Evodio Merino (Instituto de Limnología U.I. de G., Apdo. Postal 310, Chapala, Jalisco, Mexico) writes that he is studying the possibilities of culture the native crayfish (ACOCIL or CAPHO), Procambarus digueti from the basin of Chapala Lake. So far his work has involved laboratory studies. This species has a maximum length of 12 cm and it is well accepted for human consumption and widely marketed in the region. (4) Jay E. Mittenthal (Dept. Cell & Structural Biol., Univ. of Illinois, Urbana, Illinois 61801 USA) writes that he is no longer doing crayfish limb grafting experiments; however, he has at least 4 manuscripts in various forms of preparation describing unpublished work in this area that will be published in the next year or so. (5) Dennis L. Claussen (Dept. of Zoology, Miami Univ., Oxford, Ohio 45056 USA) writes that he is no longer with thermal responses of crayfishes. His last, unpublished work, was with dwarf crayfish, Cambarillus shufeldtii from Louisiana. He had expected to find that they would exhibit exceptional heat tolerance. In fact, their thermal response proved to be quite ordinary and similar to that of species collected in Ohio. (6) Maria Helena Adao (Universidade de Evora, Apartado 94, 7001 Evora Codex, Portugal) writes that she is working with the sexual cycle and population dynamics of Procambarus clarkii in southern Portugal. (7) Biol. David N. De Leon (Universidad de Guadalajara, Facultad de Ciencias, C. Aurelia Guevara 2579, Guadalajara, Jalisco 44810, Mexico) is also working with Procambarus digueti in the River Duero in the State of Michoacan. His interest are in exploitation of this species. (8) Member T. Kawai (Kuji District Promotion Fisheries, Yokanachi 2-156-1, Kuji City, Iwate Prefecture, Japan) studies Cambaroides japonicus. He has sent some very interesting pictures of the mating behavior of this species as well as its natural environment. (9) Member Dag Hessen (Norwegian Institute for Water Research, P.O. Box 33, Blindern, N-0313 Oslo 3, Norway) is studying calcium uptake from food and water in Astacus astacus. He finds that food, especially bottom sediments, is a very important source of calcium. (10) Dr. Mostafa Mouslih (Centre National de Recherches en Hydrobiologie et Pisciculture, B. P. 11, Azrou, Morocco) is involved with fish and crayfish aquaculture projects and has been studying the status of introduced Orconectes limosus populations in natural lakes in the Atlas Mountains. He is interested in making contact with

aquaculturists. [Information about Dr. Mouslih from J.F. Fitzpatrick, Jr.] (11) New members Martin Smallridge (9 Torrens Ave., West Hindmarsh, South Australia 5007) and Michael Geddes (Dept. of Zool., Univ. of Adelaide, P.O.Box 498, Adelaide, South Australia 5000) are both studying aspects of commercial grow out of yabbie, Cherax destructor. In addition, Dr. Geddes is also studying the potential for restocking of the Murray River Crayfish, Euastacus armatus, into the lower Murray River.

**ASTACOLOGISTS SEEKS POSITION**--Member W. Ray McClain (Dept. of Wildlife & Fisheries Sciences, Texas A&M University, College Station, Texas 77843 USA) anticipates receiving his Ph.D. in December of this year. He is, at this point, seeking employment. His background has involved commercial production of Procambarus spp. His Ph.D. Dissertation will be entitled, "Nutrient Composition of Forage-Based Food Systems and Their Utilization by Juvenile Crawfish (Procambarus clarkii).

**HUNGARIAN CRAYFISH WORK**--Member Thuransky Miklos (25 Belgrad rkp., 1056 Budapest, Hungary) writes that Astacus leptodactylus culture may have a good future in Hungary. He says that his colleagues and he have been harvesting A. leptodactylus from an 200 ha artificial pond and exported 2 tons to Switzerland over a 3 week period. He reports that there are several ponds with good populations of this species. Furthermore, work is proceeding with stocking Astacus astacus into ponds, as well. As an aside, Miklos visited with member Dr. Max Keller in West Germany as a consequence of an announcement in an earlier newsletter that he wished to study crayfish culture outside of Hungary. It is good to hear that the newsletter was of use to him.

**NEWS FROM J. P. FITZPATRICK, JR.**--Dr. Fitzpatrick (Dept. of Biological Sciences, Univ. of South Alabama, LSCB 124, Mobile, Alabama 36688 USA) sends two items. (1) Dr. Fitzpatrick has begun a long-term study to record the crayfish fauna of the Tombigbee Basin. This is to help establish a baseline to evaluate the impact of the union of this basin and the Tennessee River via the Tenn-Tom Waterway. The first article, describing a new subspecies of Procambarus vioscai will appear in the American Midland Naturalist. (2) Dr. Fitzpatrick is completing a review and compilation of the status and distribution of all species and recognized subspecies of North American crayfishes for inclusion in the central tracking databases of the Nature Conservancy. This list (whose nomenclature is based largely on the standard names for decapods to be published this year by the American Fisheries Society) will be singular in that it will contain for each species a list of the states and/or provinces in which it occurs; the accepted scientific and common (if any) names; its taxonomic standing; and global, national, and state "ranks" and supporting information documenting the rarity status of the species. These priority ranks and other information, stored in the Conservancy's central databases, will be used by the Conservancy in its ongoing efforts to preserve critical habitats and to support North American Natural Heritage programs in their activities.

Interested parties can obtain access to the information through their respective state Natural Heritage programs. Information concerning the Conservancy and its programs is available from its Headquarters Office (1815 North Lynn St., Arlington, Virginia 22209 USA, phone 703-841-5300).

**ADDITIONAL CITATIONS FROM FRESHWATER CRAYFISH VII, A JOURNAL OF ASTACOLOGY 1988**--The following citations were not published in the last IAA Newsletter.

- (1) Hessen & Skurdal. Food consumption, turnover rates and assimilation in the noble crayfish (Astacus astacus). 309-317.
- (2) Lahti. On the muscle and hepatopancreas weight in crayfish (Astacus astacus L.) in Finland. 319-325.
- (3) Reynolds. Options for crayfish culture and exploitation in Ireland. 327-331.
- (4) Burba. Exploratory-searching behaviour of Astacus leptodactylus Esch. juveniles. 335-342.
- (5) Cukerzis. On the origin of freshwater crayfish Astacura. 343-349.
- (6) Doroshenko. Socioethological aspects of sexual behavior of the signal crayfish Pacifastacus leniusculus Dana introduced in the Lithuanian SSR. 351-356.
- (7) Grubb. Crayfish farming in Livingstone, Zambia. 357-358.
- (8) Karafezlieva-Avramova. The influence of water temperature on the feeding intensity of Astacus (Pt.) leptodactylus to the age of one year in artificial conditions. 359-362.
- (9) Keller. Research on the incubation period of Astacus astacus L. under natural conditions. 363-367.
- (10) Kossakowski. Some remarks on the biology of the crayfish Pacifastacus leniusculus. 369-376.
- (11) Mackeviciene & Chibisova. Testosterone, estradiol and progesterone at separate stages of the intermolt cycle in the crayfish Astacus astacus L. males. 377-383.
- (12) Mickeniene. Anaerobic microorganisms in the digestive tract of the crayfish Pacifastacus leniusculus Dana. 385-389.
- (13) Xinya. Crayfish and its cultivation in China. 391-395.
- (14) Tankeviciene. Growth and development of juveniles of the native and introduced species of freshwater crayfish. 396-400.
- (15) Vilarreal. Culture of the Australian freshwater crayfish Cherax tenuimanus (Marron) in eastern Australia. 401-408.

**RED SWAMP CRAYFISH EXPLOITATION REVIEWS PUBLISHED BY NATIONAL SHELLFISH ASSOCIATION**--The Journal of Shellfish Research (1989 Vol. 8 No. 1) has published the review papers presented at the 1988 NSA meeting in New Orleans. These are the most current references now available. Citations follow:

- (1) Proceedings of the Special Symposium: Crayfish Industry Status and Trends, Presented at the 1988 Annual Meeting of the National Shellfisheries Association, New Orleans, Louisiana June 26-30, 1988. 255-256.

- (2) Huner, J.V. Overview of international and domestic freshwater crayfish. 259-266.
- (3) de la Bretonne, L.W., Jr. & R.P. Romaine. Commercial crayfish cultivation practices: A review. 267-276.
- (4) Brunson, M.W. Forage and feeding systems for commercial crayfish culture. 277-280.
- (5) Romaine, R.P. Overview of harvest technology used in commercial crayfish culture. 281-286.
- (6) Culley, D.D. & L. Duobinis-Gray. Soft-shell crayfish production technology. 287-292.
- (7) Moody, M.W. Processing of freshwater crayfish. 293-302.
- (8) Roberts, K.J. & L. Dellenbarger. Louisiana crayfish product markets and marketing. 303-308.
- (9) Eversole, A.G. & R.S. Pomeroy. Crayfish culture in South Carolina. 309-314.

**REDCLAW - MARRON DEBATE CONTINUES**--The Australian government is seeking to determine an appropriate common name for the Australian crayfish, Cherax quadricarinatus. This species has been called the Red Claw, Tropical Blue Crayfish, Queensland Marron, and Red Claw Marron. In an article entitled "Red Claw and QLD Marron Debate - The AQIS View" [Austasia Aquaculture Magazine, 3(12):4-5. 1989], Garry Graham of the Fish Export Standards Section, Australian Quarantine and Inspection Service [GPO Box 858, Canberra City, ACT 2601, Australia] discusses how his agency views the debate over an appropriate common name for the species. He concludes his article stating, "...This will effectively mean that C. quadricarinatus may be labelled either as "freshwater crayfish", or "redclaw" (this being the only name used widely for this species)..." However, Mr. Graham's agency is soliciting public comment on the subject of common names and has taken its current position prior to receiving public comment to ensure that crayfish and crayfish products being exported from Australia are properly labeled. The agency's position may change after that comment is received and some other common name(s) may be used to describe the species.

**CRAYFISH IMPORTS TO FRANCE AND SWEDEN IN 1988**--France: Live, Spain 18.4 t, Turkey 129.7 t, USA, 95.7 t, Yugoslavia, 0.2 t, Greece, 14.5 t, and others, 3.2 t; frozen, Spain, 162.4 t, Turkey, 136.7 t, USA, 5.5 t, Yugoslavia, 2.5 t, Greece, 1.5 t, and others, 1.7 t [Source: L'Astaciculteur de France, 1989, No. 19]. Sweden: USA, 852 t, Turkey, 249 t, Spain, 229 t, New Zealand, 93 t [probably not freshwater crayfish!], China, 19 t, Finland, 13 t, USSR, 12 t, and Norway, 7 t. [Source: Fiskgrossisterna, Stockholm, Sweden].

**Astacus leptodactylus HARVESTED IN IRAN**--According to member Magnus Furst (Freshwater Res. Institute, S-170 11 Drottningholm, Sweden), A. leptodactylus has been harvested and eaten in Iran for some years now. An unknown quantity is currently being sent to Turkey where it is processed and frozen for export to Sweden.

OTTER CAUSES PROBLEMS IN ZAMBIAN CRAYFISH PONDS--Member C.J. Grubb (Box 60287, Livingstone, Zambia) cultures modest quantities of red swamp crayfish in small earthen ponds on his farm. He reports that "...we have a huge otter in the pond that seems impossible to catch. We have a leopard trap and about 20 snares to no avail. It makes a bigger pile of faeces than a great dane dog and my estimate is that it has polished off over 100 kg [of crayfish]...."

PUBLICATIONS OF INTEREST TO ASTACOLOGISTS--

- (1) Anonymous. 1988. Information from the Institute of Freshwater Research, Drottningholm. Scope of activities for the period 1986- 87. Inst. of Freshwater Res of the Swedish Nat. Bd. Fish. No. 14 (Drottningholm).
- (2) Arrignon, J. 1987. L'Ecrevisse rouge des marais de Louisiane *Procambarus clarkii* aux portes de Paris dans l'etang communal de Sarcelles (Seine-Saint-Denis). Bull. de Liaison du Conseil Superieur de la Peche. No. 49-50: 41.
- (3) Busack, C. A. 1989. Biochemical systematics of crayfishes of the genus *Procambarus*, subgenus *Scapulicambarus* (Decapoda: Cambaridae). J. North Amer. Bentholological Soc. 8:180-186.
- (4) Davies, I.J. 1989. Population collapse of the crayfish *Orconectes virilis* in response to experimental whole-lake acidification. Can. J. Fish. Aquat. Sci. 46:910-922.
- (5) Davies, I.J. & D.J. Ramsey. 1989. A diver operated suction gun and collection bucket for sampling crayfish and other aquatic macroinvertebrates. Can. J. Fish. Aquat. Sci. 46:923-927.
- (6) Feminella, J.W. & V.H. Resh. 1989. Submersed macrophytes and grazing crayfish: an experimental study of herbivory in a California freshwater marsh. Holarctic Ecol. 12:1-8.
- (7) Feminella, J.W. & V.H. Resh. 1986. Effects of crayfish grazing on mosquito habitat. Proc. & Pap. Conf. Calif. Mosquito & Vector Control Assoc. Inc. 54:101-104.
- (8) Fjeld, E., D.O. Hessen, N. Roos, & T. Tauqbol. 1988. Changes in gill ultrastructure and haemolymph chloride concentrations in the crayfish, *Astacus astacus*, exposed to de-acidified aluminum-rich water. Aquaculture. 72:139-150.
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- (10) Gydemo, R. 1989. Reproduction and growth in the noble crayfish *Astacus astacus* L. Ph.D. Dissertation, University of Stockholm, Stockholm, Sweden.
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**AUSTRALIAN CRAYFISH AND PRAWN DISEASES**--Member Louis Evans (Curtin Univ. of Tech., GPO Box U 1987, Perth, Western Australia 6001, Australia) has sent a prepublication manuscript authored by L. Owens and Dr. Evans entitled, "Common diseases of freshwater prawns (*Macrobrachium*) and crayfish (marron and yabbies) relevant to Australia." This paper is a must for those who wish to cultivate *Cherax* spp.

**CRAYFISH CULTURE IN MARYLAND USA**--An article entitled "Maryland is for crawfish. On the Eastern Shore, the bayou comes to back-yard farms" appeared in the July 5, 1989 issue of the Washington Post (Washington, DC USA). The red swamp crayfish is being cultured in earthen ponds in at least 50 locations in the state. This represents, then, a further expansion of the range of *Procambarus clarkii* which is not native to the east coast of the USA.

**SOME OBSERVATIONS ON THE ABUNDANCE OF CRAYFISHES IN SCANDINAVIAN WATERS**--Your editor spent 6-weeks in Scandinavia (3 weeks in Kuopio, Finland and 3 weeks in the Stockholm, Sweden area). I visited a lake extending over several hundred hectares in central Finland where *Astacus astacus* was so abundant that day time trap sets caught 0.5-1.5 kg after several hours. Most of these crayfish exceeded 9.0 cm in size. I later visited a lake of about 45 ha half way between Stockholm and Uppsala where we caught similar quantities of *Pacifastacus leniusculus*, but after dark. The abundance of these crayfishes seemed to be associated with relatively shallow waters and a paucity of predaceous fishes--the Finnish lake was clearly oligotrophic. However, the point to be made is that standing stocks clearly exceeded 100 kg/ha and probably approached 300 kg/ha in the Finnish lake. Thus, under the proper conditions, polytrophic, cold water crayfishes can proliferate dramatically.

**BURROWING CRAYFISHES IN NORTH CENTRAL OHIO USA**--Member Jim Norrocky (Rt. 1, Vickery, Ohio 43464 USA) has sent a most interesting manuscript entitled "Notes on the growth and habits of the burrowing crayfish *Fallicambarus (Creaserinus) fodiens* (Cottle) (Decapoda: Cambaridae)." Jim earns his living as a building contractor and studies crayfish zoogeography and ecology as a "hobby." The manuscript represents a compilation of a study

that has lasted some years now in which he has excavated numerous burrows and marked and recaptured 100's of a species that is rarely seen at the surface. Jim advises that he is willing to share this manuscript, prior to publication, with those interested in learning more about this species and its life history and ecology.

**Procambarus clarkii IN FLORIDA USA**--Member Michael Miltner (3900 Drane Field Road, Lakeland, Florida 33811 USA) has sent the a copy of the following report: Miltner, M. 1988. A survey of the range and distribution of *Procambarus clarkii* in Florida. Aquaculture Market Development Aid Program 1987-1988. Aquaculture Report Series, Florida Dept. of Ag. & Consumer Serv., Tallahassee, Florida 32399-0800 USA, No. M89T8. The principal conclusion is that the species is a non-native species except in drainages west of and including the Apalachicola River. The report notes Game and Fish Commission policy that "...Prior to granting a permit for commercial farming of a non-native species of crawfish, the commercial value of the native crayfish, *P. paeninsulanus*, should be thoroughly evaluated." This is, in fact, one of the projects in which Mike is now engaged. He is also studying the culture potential of *Procambarus alleni*. Note: *Procambarus paeninsulanus* is a member of the subgenus (*Scapulicambarus*) to which *P. clarkii* belongs. See the reference in Publications of Interest to Astacologists to Dr. Craig Busack's recent electrophoretic studies of the subgenus showing close affinities between the two species.

**CHANGES IN THE WAY THAT Procambarus clarkii IS CULTURED?**--The MS thesis by member Daniel J. Niquette (Carolina Ecrevisse, P.O. Box 1497, Moncks Corner, South Carolina 29461 USA) and directed by member Louis D'Abramo (Dept. of Wildlife & Fish. Sci., Mississippi State Univ., Mississippi State, Mississippi 39762 USA) is entitled "Population characteristics of pond cultured red swamp crayfish *Procambarus clarkii* and white river crayfish *P. acutus acutus* and preliminary evaluation of new management techniques." Dan's study demonstrated, at least on a small scale, the positive impacts of feeds and seine harvesting in crayfish ponds that are traditionally managed using plant detritus for food and hand checked traps for daily harvesting. Information on seasonal meat yield and gonosomatic index variation represents data not previously quantified.

**RAPUTALOUS 2000 RAPUTALOUSSEMINAAR JYVASKYLASSA 26.04.1988**--This publication includes 13 papers, 2 in English and 11 in Finnish, dealing with crayfish management in Finland. Over 150 people participated in the seminar. The two English language papers were: Crayfish aquaculture in Sweden by Magnus Furst and Fungal parasites and other diseases on freshwater crayfish by Kenneth Soderhall. Editors are Jarmo Kovanen and Riitta Lappalainen. Dr. Kovanen may be contacted at Keski-Suomen Kalastuspiirin, Kalastustomisto, PL 44, SF-40101 Jyväskylä, Finland for more information about the publication.

**RED SWAMP CRAYFISH CULTURE AREA DECLINES IN SEVERAL STATES IN THE USA**--According to news releases from Cooperative Extension Service offices in Louisiana, Texas, and Mississippi, area devoted to culture of red swamp crayfish has declined about 2,500 ha in Louisiana, at least that much in Texas, and about 50 ha in Mississippi. Low prices were largely responsible for the decline in Louisiana while drought and availability of low cost crayfish from Louisiana were causes for reductions in Texas and Mississippi. Pond area in Louisiana will probably still exceed 50,000 ha in Louisiana but that in Texas will be about 2,000 ha and that in Mississippi will be only 60 ha reflecting the relative lack of development of the "industries" in those two states.

**NEW MEMBERS/ADDRESS CHANGES--**

**New Members:**

Aroza, Mehar, University of Wisconsin-Stout, Menomonie, Wisconsin 54751 USA.  
Rohl, Erik, Bavarian Water Research Agency, Experimental Station, Demollstr. 31, D-8121 Wielenbach, West Germany.  
Collins, Keys, Aquaculture Center, Univ. of Idaho, Moscow, Idaho 83843 USA.  
de Hureauux, Daguerre, 25 rue Rochambeau, F-33000 Bordeaux, France.  
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Hasiotis, Stephen T. Dept. of Geology, Univ. of Buffalo, 4240 Ridge Lea Campus, Buffalo, New York 14260 USA.  
Kawai, Tadashi, Fisheries Division, Kuji District Promotion Bureau, T032, Yokamachi 1-2-156, Kuji City, Iwate Prefecture, Japan. Matthews, Milton, Ardeevin, Locan road, Chapelizod, Dublin 20, Ireland.  
Miltner, Michael R. Florida Game & Fresh Water Fish Comm., 3900 Drane Field Road, Lakeland, Florida 33811 USA.  
Musgrave, Richard, Zoology Dept., Univ. of Adelaide, GPO Box 498, Adelaide, South Australia 5001, Australia.  
Negrone, Gianluigi, V. Frassinago 15, 40123 Bologna, Italy.  
Roqueplo, Charles, C.E.M.A.G.R.E.F., 50 Avenue de Vezdun, F-33610 Cestas, France.  
Smallridge, Martin A. 9 Torrens Ave., West Hindmarsh, South Australia 5007, Australia.  
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**New Addresses:**

Drinkwater, A. C. (Bram), SMS-RIVO, Julianastraat 18, P.O. Box 135, NL-1790 AC Den Burg-Texel, The Netherlands.  
Feminella, Jack, Dept. of Fisheries & Wildlife, Ecology Center, Utah State University, Logan, Utah 84322-5210 USA.  
Harris, Mary Ellen, International Technology Corporation, 165 Fieldcrest Avenue, Edison, New Jersey 08837 USA.  
Hessen, Dag O., Norwegian Institute for Water Research, P.O. Box 33, Blindern, N-0313 Oslo 3, Norway.

Niquette, Daniel J., Carolina Ecrevisse, P.O. Box 1497, Moncks Corner, South Carolina 29461 USA.

**MEETINGS--**

8-12 December 1989 - Fish Farming Expo III, New Orleans, Louisiana USA. Contact: AquaCulture Productions, Inc., P.O. Box 5038, Brandon, Mississippi 39047-5038 USA, Phone 601-992-0760, FAX 601-992-1125. Seminars on production of both hard and soft shell crawfish will be featured and several crawfish production associations will be present.  
1 March 1990 - Annual Meeting, Louisiana Crawfish Farmers' Association, Lafayette, Louisiana. Contact: Louisiana Crawfish Farmers' Association - address immediately below.  
2 March 1990 - International Crawfish Tasting and Trade Show, Lafayette, Louisiana. Contact: Louisiana Crawfish Farmers' Association, P.O. Box 91544, Lafayette, Louisiana 70509 USA, Phone 318-235-7072.

**FRESHWATER CRAYFISH, A JOURNAL OF ASTACOLOGY**--Volumes IV, V, VI, and VII are available. Sources and costs: IV, P. J. Laurent, Avonnex a Marin, F-74200 Thonon les Bains Cedex, France, 63 Swiss Francs; V, Van Nostrand Reinhold, 115 Fifth Avenue, New York, New York 10003 USA, approximately \$35 US, check for price; VI, Per Brinck, Ecology Building, University of Lund, S-223 62 Lund, Sweden, \$35.00 US; and VII, Pierre Goeldlin de Tiefenau, Musee Zoologique Cantonal, Case postale 448, CH-1000 Lausanne 17, Switzerland, 63 Swiss Francs.

**MEMBERSHIP INFORMATION**--Membership in the International Association of Astacology is open to anyone interested in the study of freshwater crayfishes or their exploitation. Membership categories are: regular, \$25.00 US; student, \$12.50 US; and business, \$50.00 US. Members receive the quarterly IAA Newsletter and Directories of Astacologists as they are published. Current dues cover the period August 1987-April 1990. To apply for membership, send checks (US banks) or international money orders (US dollars drawn on a U.S. bank) made out to IAA to:

International Association of Astacology  
P.O. Box 44650  
University of Southwestern Louisiana  
Lafayette, Louisiana 70504 USA  
Phone: 318/231-5239 FAX: 318/231-5395

**EXPLANATION OF ARTWORK**--Swedes truly enjoy their crayfish parties in August. Parties include songs and the songs are often bound in song books. The crayfish song book cover artwork for the annual crayfish parties at the Freshwater Research Institute at Drottningholm has been done by Johan Hammar for some years now. The 1989 cover depicts the invasion of American signal crayfish with native Swedish noble crayfish resisting in the background holding the Swedish flag and a banner saying "Yanks go home."



DROTTNINGHOLM  
HAR ÅTER INVADERATS  
AV AMERIKANARE!



Krepsepesten sprer seg nå også i Norge, og truer våre krepsebestander. Ved å følge reglene nedenfor hjelper du til med å stoppe krepsepesten.

# KREPSEPESTEN

## Du må:

- Lese all tilgjengelig informasjon om krepising
- Ha tillatelse fra fylkesveterinæren for å krepse i Østfold, Akershus og Hedmark
- Desinfisere redskapen foran hver ny sesong
- Desinfisere redskapen på nytt hvis du skal krepse i et annet vassdrag
- Merke redskapen
- Melde fra om krepse du tror er syk
- Melde fra om overtredelser

## Du må ikke:

- Overføre død eller levende krepse til andre vassdrag
- Kaste død eller sjuk krepse ut i vassdrag
- Innføre ukokt krepse til landet
- Innføre garn, garnutstyr og utstyr til fangst av krepse som har vært brukt utenfor landets grenser
- Ha krepse i stueakvarier
- Ta vann i et vassdrag og slå ut i et annet

**FYLKESVETERINÆREN**