INTERNATIONAL ASSOCIATION
OF ASTACOLOGY
I.A.A.

NEWSLETTER OF THE INTERNATIONAL ASSOCIATION OF ASTACOLOGY

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Jay V. Huner, Editor, P.O. Box 10809, Southern University, Baton Rouge, Louisiana 70813 USA

STATUS OF DIRECTORY OF ASTACOLOGISTS--Response from delinquent members who are active astacologists has been slow to the last call for payment of dues. Directory forms obtained to date have been entered into computer files but the Directory will not be published until the reclairant members are given one last opportunity to pay dues and complete forms. At this point, we anticipate actually publishing the Directory in early October. We regret this delay but simply do not want to move on this matter until long standing members are given a final opportunity to extend their affiliations with IAA.

FRESHWATER CRAYFISH VII: A JOURNAL OF ASTACOLOGY--Editor Pierre Goeldlin writes that publication is expected in the autumn and that price will be approximately 60 Swiss Francs. For more information, contact Professor Goeldlin care of: Musee Zoologique, Place Riponne 6, Case Postale 448, CH-1000 Lausanne 17, Switzerland.

IAA TO CO-SPONSOR THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF ZOOLOGISTS ET AL.--IAA will again be a co-sponsor of this event that includes a number of American zoological associations. The meeting is scheduled for December 27-30, 1988 for San Francisco's (California, USA) Hilton On hotel. For further details, write to Mary Adams-Wiley, American Society of Zoologists, 104 Sirius Circle, Thousand Oaks, California 91360 USA.

AQUACULTURE LOS ANGELES CONFERENCE--IAA will be a "minor" co-sponsor of this meeting scheduled for 12-16 February 1989 in Los Angeles, California USA. A flyer providing details about the meeting was included in the mailing with the last IAA Newsletter. IAA is also co-sponsoring a special session on crayfish culture and topics are: (1) Historical Overview of Crawfish Culture Intensification; (2) European Crawfish Culture

Intensification; (3) Australian Crawfish Culture Intensification; (4) New Advances in Crawfish Forage Management; (5) Intensification of Crawfish Culture with Supplemental Feeds; and (6) Potential for Genetic Improvement in Crawfish Culture. For more information about the "Aquaculture Los Angles 89'" meeting, contact: Aquaculture '89, c/o Crest International, 940 Emmett Avenue, Suite 14, Belmont, California 94002. Phone (415) 595-2704.

EIGHTH SYMPOSIUM OF ASTACOLOGY, APRIL 1990--It is not too early to start thinking about our next international IAA meeting. The Eighth Symposium of Astacology is scheduled for mid-April 1990 in the heart of Louisiana crayfish country, Baton Rouge. IAA's host will be the Louisiana State University Agricultural Center and co-organizers are Board Member L. W. de la Bretonne, Jr. and Robert P. Romaire. Their addresses and phone numbers are: de la Bretonne-Louisiana Cooperative Extension Service, Knapp Hall-Louisiana State University, Baton Rouge, Louisiana 70803 USA/(504) 388-4141 and Romaire-School of Forestry, Wildlife and Fisheries, Louisiana State University, Baton Rouge, Louisiana 70803 USA/(504) 388-4208.

ARCHIVE OF SIGNIFICANT NORTH AMERICAN ASTACOLOGISTS--IAA member J. F. Fitzpatrick, Jr. (Dept. of Biological Sciences, University of South Alabama, LSB 124, Mobile, Alabama 36688 USA) writes that Horton H. Hobbs, Jr. and he are collecting materials for an archive of significant North American astacologists. This is to be deposited eventually in a suitable place such as the Smithsonian Institution where they will be available to historians and other interested parties. Direct inquiries about this matter to Dr. Fitzpatrick.

MORE NEWS FROM ALABAMA--J. F. Fitzpatrick, Jr.(address immediately above) has sent some information about his work in the southern USA. Joint work with Dr. Craig Busack of the University of Mississippi to distinguish, by electrophoretic means, various species of Cambarellus has been discontinued as Dr. Busack has moved to the state of Washington and ended his work, at this time, with crayfishes. Dr. Fitzpatrick, however, has completed a description of a new species in the genus Hobbseus which is now in press.

Dr. Fitzpatrick notes that members may be interested to learn that the Mississippi (USA) Natural Heritage Program and the Mississippi Museum of Natural Sciences (both in Jackson, Mississippi), have been keenly interested in the crayfishes in that state. They have funded studies of the status of species of "concern" to ascertain their status, and both have been studying the species associated with pitcher plant bogs/savannahs and recovery--by reinvasion or substitute populations--of disturbed prairie environments. Dr. Fitzpatrick has been a member of the team doing this work and inquiries should be directed to him.

CRAYFISH CULTURE EXPANDS IN FINLAND--IAA Board Member Ossi Lindqvist (Department of Applied Zoology, University of Kuopio,

P.O.B. 6, SF-70211 Kuopio 21, Finland), writes that there are now some 40 enterprises in Finland practicing crayfish culture. He states that their combined capacity is on the order of "several million" young. Most of the crayfish are Astacus astacus.

CRAYFISH IN IRELAND--IAA Board Member, Julian Reynolds (Trinity College, University of Dublin, Dublin 2, Ireland) sends the following material about crayfish in Ireland.

"The white-clawed crayfish Austropotamobius pallipes is the only species found in Ireland, where it is widespread. Growth rate is relatively fast for this species; lake specimen grow larger than those in streams, reaching exceptionally 12 cm in length.

"Crayfish in Ireland are relatively well-studied but almost unexploited. All crayfish introductions are banned, because of their implications for Ireland's valuable sports fisheries and aquaculture industries. However, there is much interest expressed in introducing signal crayfish for culture, but almost no in developing indigenous stocks (there is a single farm in operation). Market research shows a large potential for crayfish sales within the country; the expense of transport to European markets would require export business on a relatively large scale to be viable.

"A recent problem is the discovery of crayfish plague, which affected a crayfish pilot crayfish farm in central Ireland in October 1987. The outbreak was traced to a local lake from which stocks were harvested, and other lakes in the Boyne system are apparently also affected. This outbreak appears to have been due to tourists using infected fishing apparatus rather than to introduced carriers, the normal mode of infection in Great Britain (Reynolds, J. D. (1988) Biological Conservation). Its extent and significance have yet to be ascertained."

NEWS FROM SPAIN--IAA Board Member Andres Habsburgo-Lorena (Fuentemilanos 2, E-28035 Madrid, Spain) has extracted some information published by the environmental publication, "Integral" (No. 102, June 1988), that applies to the significance of crayfish in Spain. It involves an interview between a Spanish academician and an outstanding author of philosophical studies. His translation and comments follow:

"Question: From your point of view to know how to live wisely is something which is born in a person or can you learn it during a lifetime?

"Answer: I think that the wisdom to live depends in a great part on the character of each person and that is given to us in our genes and of the environment in which we are born into. But I do think that education and formation helps a lot to learn how to enjoy life. I will tell you as an example that it seems to me that cooking is worthy to take in accout; it shows culture. Not eating like animals. Rather, the appreciation of flavours is the art. I am not a man who eats large quantities but what I eat I like to enjoy even if it is the most simple thing, a galic soup, some boiled potatoes. Well

in this point I have noticed a great improvement in the Spanish eating habit. The Spanish palate underwent an important education.

"Qustion: In what do you notice that?

"Answer: Look, when I was a child my mother brought river crayfish in the market. Then, nobody ate these queer animals. It was considered as a strange food item. Today, for one crayfish - *with these prices we will soon finish with the species* - you pay between 25 and 50 Pesetas [U.S. $0.29-0.57] each. The same happened with mushrooms, too."

Andres notes that the interview shows that (1) crayfish are available, (2) there is a growing consumer market, and (3) prices are high so that each merchant involved in the trade can make a profit. The point denoted by astrics represents the speaker's personal opinion related to overfishing of the native species. According to Andres, this "unqualified opinion of his and from other public or politic personalities are the main reason for the serious and increasing stunting problem, primary in the size, of the crayfish coming from ricepaddies in the region of Seville." He further notes that there continues to be little backing for crayfish aquaculture in Spain.

MORE FROM SPAIN-ECONOMIC VALUE OF PROCAMBARUS CLARKII--Andres Habsburgo Lorena (address immediately above) has sent some most interesting news about the value of red swamp crayfish in Spain and the socio-political controversy that such introductions can cause. His letter follows:

"Bureaucratic Battles Due to Crayfish

"As you know since 1978, Spain has been divided into 18 politically and administrative autonomic governments. Each has a separate name and for our purpose, I will name only three, Andalucia, Castilla y Leon and Extremadura.

"On January 1st of this year, the regional government of Castilla y Leon prohibited the import of live Procambarus clarkii.

"Now the regional T.V. offered a program on June 17th exposing the tremendous impact resulting from this new law of Castilla y Leon on the autonomy of Andalucia.

"It was mentioned that the crayfish capturing fishermen have less income and that the autonomy of Andalucia has a deficit of 900,000,000-Pesetas = US 8,180,000,--.

"That Castilla y Leon consumed in the past years 60 per cent of the production of Andalucia.

"That the yearly income in Andalucia, through crayfish sales, was about 1,500,000,000,--Pesetas = US $ 13,600,000,--.

"That the expected production this year could be 5,000,000 kilograms.

"Finally, it was said in the T.V. program that the regional government of Andalucia is exposing this law of Castilla y Leon to the Supreme Court as it is obvious that laws of this kind are against the Spanish Constitution.

"Present prices paid to fishermen: in Sevilla Ptas, 50,--= US $ 0.45/kg in Badajoz Ptas, 500,-- = US $ 2.72/kg."

SHELLFISH AQUACULTURE CONFERENCE IN AUSTRALIA--This conference

is scheduled for 25-27 October 1988 in Perth. Organizer is IAA member Dr. Louis H. Evans (School of Medical Technology, Curtin University of Technology, GPO Box U 1987, Perth, Western Australia 6001, Australia). Freshwater crayfish will be heavily emphasized. Australian astacologists will provide the latest information about the various cultured species and several astacologists from North America and Europe will make presentations, too.

CRAWFISH REPORT TO THE INDUSTRY & FIELD DAY--The Louisiana State University Agricultural Center and the Louisiana Crawfish Farmers' Association have jointly sponsored the aforementioned meeting for several years now at the LSUAC's Rice Research Station in Crowley, Louisiana. This event provides crawfish producers with the latest information about crawfish research at all state universities. This year's meeting will be held in mid-November (exact date not set). Inquiries should be directed to Dr. Martin Brunson, Rice Research Station, P.O. Box 1429, Crowley, Louisiana USA.

FIVE YEAR OLD PROCAMBARUS CLARKII--Your editor collected a number of very small, newly released P. clarkii in the Baton Rouge, Louisiana USA area in very early July 1983. These were confined individually in small plastic containers approximately 10 cm x 10 cm in size. The last animal died in early June at a size of about 6.5 cm total length at an estimated age of 5 years. This species is relatively short lived. Does any reader have a record of a longer lived individual of this species? Direct responses to Jay Huner, P.O. Box 10809, Southern University, Baton Rouge, Louisiana 70813 USA.

AN EXPLANATION FOR THE DECLINE IN CRAYFISH POPULATIONS IN LAKE NAIVASHA, KENYA--IAA Member C. J. Grubb (P.O. Box 60287, Livingstone, Zambia) sends the following explanation for the decline in the Procambarus clarkii populations in Lake Naivsha. "The Lake Naivasha fishery might be declining through the water level dropping and of course the vegetation getting more scarce. For some unknown reason the water drops to an extra low over a period of 30 years and then starts a gradual rise again. Many settlers did not know this in the early years and put their farms on the waters edge. When I was a railroad engineer on the East African railways I saw avenues of trees submerged and asked why. At that time the water was on the rise. I know that it should be falling again now. I hope you will find this explanation correct. Also the water has a high soda content which could be getting more concentrated if the water is getting lower."

CRAYFISH CONSULTANCY--IAA member B. J. Mills (RSD 778, Lymington, Tasmania 7109, Australia) writes to announce that he has organized a new firm named "Freshwater-Crayfish Aquaculture Research and Management." Services include: site evaluation; design of hatcheries; nurseries and growout ponds; systems development and operation; management procedures and analysis of farm performance; experimental design for continual

development of farming operations; economic procedures; marketing information and development; information on suppliers of aquaculture equipment; literature searches and lists of refernce articles; etc.

FRESHWATER CRAYFISH: BIOLOGY, MANAGEMENT AND EXPLOITATION--Co-edited by IAA President Elect David Holdich and R. S. Lowery, this book is the most complete reference currently available about freshwater crayfishes.

The purpose of this book is to fill this gap by bringing together contributions from international experts on crayfish biology on the culture of species of economic importance. The first part of the book examines the general biology of crayfish and includes details of their morphology and anatomy, evolution and geographical distribution, growth and reproduction, ecology and behavior, diet, pathogens, parasites and commensals, and internal defense mechanisms. The second part deals with crayfish of economic importance, namely the genera Procambarus, Orconectes, and Pacifastacus from North America, Astacus and Austropotamobius from Europe, and Cherax from Australia. The book is available from Chapman and Hall, 11 New Fetter Lane, London EC4P 4EE, Great Britain at 49.50 Pounds Sterling and from Timber Press, 9999 S. W. Wilshire, Portland, Oregon 97225 USA at $89.50 US plus $3.00 shipping and handling for the first book and $2.00 for each additional book.The book is a reference that all IAA members will find useful and to which they will constantly refer.

THE CRAYFISHES AND SHRIMP OF WISCONSIN--IAA members H. H. Hobbs, III and Joan P. Jass have co-authored this very informative and useful book about crayfishes in the state of Wisconsin (USA). It is exceptionally well illustrated and includes numerous photographs of crayfish habitats. The authors include excellent summaries of their own observations and material available in the literature on life history and ecology of the various species present in Wisconsin. The cost of the book is $14.95 U.S. plus $2.00 (domestic orders) and $3.50 (foreign orders) for postage and handling.

NEW SOFT-SHELL CRAYFISH VIDEO AVAILABLE--"The Ins and Outs of Soft Crawfish" is a 25 minute video on the production of soft crawfish in tray shedding systems including the steps from harvesting to packaging. Produced by the Louisiana Sea Grant College Program, the video is intended as an aid to producers in marketing Louisiana's newest seafood product. Available formats include: 3/4" tape or 1/2" tape at $US 20.00 each or send blank tape(s) and $10.00 each. Make checks (US banks) payable to Louisiana Sea Grant and mail to Louisiana Sea Grant Program, Communications Department, LSU Center for Wetland Resources, Baton Rouge, Louisiana 70803-7507 USA. (Note Baton Rouge residents add 7 % tax and other Louisiana residents add 4 % tax.)

NEW CRAWFISH CULTURE VIDEO--The Louisiana Cooperative Extension Service hs completed a video on "Crawfish Aquaculture'. The

tape is on 1/2" VHS videotape, standard for home viewing (USA systems) and the cost is $US 30.00. Length is 21 minutes 21 seconds. Order from John Brooks, Louisiana Cooperative Extension Service, 128 Knapp Hall - LSU, Baton Rouge, Louisiana 70803 USA. Phone number is: (504) 388-2262.

INFORMATION FROM MOROCCO--Dr. Mohammed Melhaoui (University Mohamed Ier, Dept. of Biology, Faculty of Science, Oujda, Morocco) has written to say that he is working on the ecology and biology of the crayfish Astacus astacus. He reports that there are two species of crayfishes in Morocco in the middle Atlas mountains. These are A. astacus and Orconectes limosus. Dr. Melhaoui would welcome correspondence with fellow astacologists.

INFORMATION FROM PORTUGAL--Dr. M. Margarida Menezes-Ferreira (Dept.of Biology, Universidade de Evora, Apartano 94, 7001 Evora Codex, Portugal) sends information about crayfish in Portugal. She reports that "As you probably know, crayfish (Procambarus clarkii) was introduced in Spain some years ago and moved on to our rivers in Portugal. It is totally adapted to our environment and is already considered a local species. Because of its economic value for the region where our University is located, I decided to initiate a project on the physiologic mechanisms of regulation of reproduction in this species." Dr. Menezes-Ferreira invites correspondence with fellow astacologists who are involved in similar studies.

PSOROSPERIUM HAECKELI IN CANADA--IAA Member George E. Morgan (Ontario Ministry of Natural Resources, P.O. Box 500, Bancroft, Ontario K0L 1C0, Canada) sends the following information about this crayfish "parasite."

"We (Walter Momot & myself) found P. haeckeli present in unexploited (Shallow Lake) and exploited populations (Dock Lake) of Orconectes virilis in northwestern Ontario, Canada (in 1985). The most interesting thing about this parasite is that all individuals (in both populations) examined (around 1000 crayfish) were 'infected' ....from young-of-the-year to age III+, males and females (100% prevalence). We found this parasite by gross examination of the gonads, digestive tract,k and musculature ("squashing the tissue between two microscope slides") under a dissecting microscope. I don't think this 'parasite' causes any harm to these O. virilis populations.

PACIFASTACUS LENIUSCULUS HARVESTS CLIMB IN OREGON, USA--Mr. Ray Temple (Dept. of Fish & Wildlife, P.O. Box 59, Portland, Oregon 97207 USA) reports the following production data for Oregon. Rapid increases have been caused by demand from European markets and there is concern about possible overexploitation of wild populations by commercial interests. Studies have been initiated to follow the effects of exploitation of the resource.

1977 - 32,494 lb	1981 - 83,904	1985 - 196,241
1978 - 11,286	1982 - 115,504	1986 - 217,829

1979 - 25,211	1983 - 125,365	1987 - 355,562
1980 - 78,359	1984 - 104,745	

AUSTASIA AQUACULTURE MAGAZINE FEATURES FRESHWATER AUSTRALIAN CRAYFISHES--Volume 2, No. 9 of AAM includes the following topics dealing with Australian crayfishes including the following titles: Many Species - Few with Potential; Production Low - Good Future Predicted; Yabbie Farming In Australia; Margaret River Marron Farm Expands; Local Crayfish "Saves" Industry; W. A. Marron Farming; Marron Farming in the U.S.; and Freshwater Crayfish News. Further information about Austasia Aquaculture Magazine may be obtained from the editor, Mr. David O'Sullivan, care of AustAsia Aquaculture, P.O. Box 1275, East Victoria Park, Western Australia 6101, Australia.

Perusal of this issue suggests that production of Cherax species will be in the 30-60 metric ton range in the 1988-89 season along with 15,000,000+ hatchlings and larger juveniles. Much emphasis will be placed on the Red Claw Marron, Cherax quadricarinatus; however, considerable work continues with marron, Cherax tenuimanus, and yabbie, Cherax destructor.

THE NEW YABBIE POSTAGE STAMP--According to an article in the April 1988 issue of AustAsia Aquaculture Magazine (Vol. 2, no. 9), a 37 cent Australia stamp showing two young boys "catching yabbies" was issued in a series of four stamps under the subject title of "Aussie Kids." IAA member Brian Mills was good enough to send the set of four "catching yabbie" stamps reproduced below from Tasmania. According AAM, the Aussie Kid stamp pack can be purchased for AU$3.16 from The Manager, Consumer Sales, Australia Post, GPO Box 9000, Perth, Western Australia 6001, Australia. However, Brian noted in his letter that the yabbie stamp is no longer available. So, do not get your hopes up if you are a stamp collector

HOW MUCH DOES IT COST TO PRODUCE SOFT-SHELL RED SWAMP CRAWFISH?--Dr. Kenneth Roberts, Louisiana Cooperative Extension Service, Knapp Hall-LSU, Baton Rouge, Louisiana 70803 USA, has developed a computer program for projecting the costs of production of soft-shell red swamp crawfish. One of the newest of aquaculture products, these are worth in excess of $8.00 per pound to the producer. Total production costs, according to Dr. Roberts, which includes payment for owner/operator labor at $10.00 per hour, are about $7.15 per pound for flow-through systems and $6.05 per pound for recirculating systems when operated at 100 % of capacity.

RECENT LITERATURE--

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15. Huner, J. V. 1988. Signal Crawfish. Farm Pond Harvest. 22(3):12-13.
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18. Laurent, P. J. 1988. Les orientations du marche de l'ecrevisse en France en 1987. L'Astaciculteur de France, Bulletin No. 14, Mars 1988, pp. 16-22.
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NEW BUSINESS MEMBER

IAA's newest business members are: (1) AgAqua Enterprises Pty Ltd, RMB 1637, Lima South, Victoria 3673, Australia [Bus: (057) 682460 AH: (057)682327.26 Dinsdale Street, Albert Park, Victoria 3206, PH: (03)6992182)]. The firm is involved in cultivation of Cherax. Contact is: Mr. Michael White.
(2) Ministry of Natural Resources, Fish & Wildlife Resources, P.O. Box 5080, 808 Robertson St., Kenora, Ontario P9N 3X9, Canada. The ministry is concerned with the development of natural fisheries for crayfish in Ontario. Contact is: Bruce Ranta.

POLICY ON BUSINESS MEMBERSHIPS--IAA values its business members as firms engaged in various astacological endeavors pay additional dues to help IAA pursue services to regular members. All business memberships will be announced in the newsletter as they are received and given specific reference in our Directory of Astacologists.

FRESHWATER CRAYFISH, A JOURNAL OF ASTACOLOGY--Volumes IV, V, and VI are still available. Ordering information follows.

1. Freshwater Crayfish IV - Prof. Pierre J. Laurent, Avonnex a Marin, F-74200 Thonon les Bains Cedex, France. Payment is 63 Swiss Francs (surface mail expenses included). Make payment to the International Association of Astacology's bank account, Credit Lyonnais, 1 Place Bel Air, Geneve, Switzerland, Compte No. 39128.4.00.001.

2. Freshwater Crayfish V - Van Nostrand Reinhold, 115 Fifth Avenue, New York, New York 10003 USA. (Originally published by AVI Publishing Co., Wesport, Connecticut USA). Cost is

approximately $35 US plus postage and handling. Check for exact price.

3. Freshwater Crayfish VI - Professor Per Brinck, Ecology Building, University of Lund, S-223 62 Lund, Sweden. Cost is $30 US plus $5 surface postage.

LOST MEMBERS--1. Ian Carstairs, Australia and 2. Darlene McGriff, California, USA. If anyone knows the whereabouts of these two colleagues, please send an address to the newsletter editor.

MEMBERSHIP INFORMATION--INTERNATIONAL ASSOCIATION OF ASTACOLOGY--Membership is open to anyone interested in the study of freshwater crayfishes or their prudent 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(published irregularly). Current dues cover the period August 1987-April 1990. The next international symposium will be held in mid-April 1990 at Louisiana State University, Baton Rouge, Louisiana USA. To apply for membership, send checks (US banks) or international money orders (US dollars) made out to IAA to:

International Association of Astacology
P.O. Box 10809
Southern University
Baton Rouge, Louisiana 70813 USA

NEW MEMBERS INTERNATIONAL ASSOCIATION OF ASTACOLOGY, SINCE MAY 1988 THROUGH JULY 1988

AUSTRALIA
1. AQ-AQUA ENTERPRISES PTY. LTD., RMB 1637, Lima South, Victoria 3673 (business member: attention Michael White).
2. BISHOP, TONY, Wy-Wurrie, Box 287, Bordertown, South Australia 5268.
3. CLARKE, STEVEN, C/- Dept. of Fisheries, GPO 1625, Adelaide, South Australia 5065.
4. EVANS, LOUIS, Curtin University of Technology, GPO Box U 1987, Perth, Western Australia, 6001.
5. JONES, CLIVE, Department of Primary Industries, Research Station, Walkamin NQ 4872.
6. MOSIG, JOHN DAWNS, P.O. Box 270, Euroa, Victoria 3666.

CANADA
1. MINISTRY OF NATURAL RESOURCES, Fish & Wildlife Resources, P.O. Box 5080, 808 Robertson St., Kenora, Ontario P9N 3X9 (business member: attention Bruce Ranta).

ITALY
1. FAO/UN, Via delle Terme di Caracalla, 00100 Rome.
2. PETERLONGO, GIORGIO, Via Lomellina 41/C.P. 1851, 20101 Milano MI.

MEXICO
1. HUBERMAN, ALBERTO, Instituto Nacional de la Nutrcion, Depto. de Bioquimica, Calle Vasco de Quiroga No. 15, (Tlalpan), 14000 Mexico D. F.

NORWAY
1. SVENDSEN, GEIR, Briskebyvn 2 1 210, N-0259 Oslo 2.

SWEDEN
1. EKLUND, JAN, Stora Molla, S-26400 Klippan.
2. FJALLING, ARNE, Institute of Freshwater Research, S-170 11 Drottningholm.
3. GYDEMO, ROLF, University of Stockholm, The Asko Laboratory, S-106 91 Stockholm.

USA
1. JASS, JOAN P., Invertebrate Zoology, Milwaukee Public Museum 800 W. Well St., Milwaukee, Wisconsin 53233.
2. KONIKOFF, MARK, Department of Biology, P.O. Box 42451,, University of Southwestern Louisiana, Lafayette, Louisiana 70504.
3. MAGNUSON, JOHN J., Center for Limnology, 680 N. Park St., University of Wisconsin-Madison, Madison, Wisconsin 53706.
4. MONTI, MORRIS, 3701 Portage PL., Apt. A, Decatur, Illinois 62526.
5. STANSBERG, DAVID H., The Ohio State University, Museum of Zoology, 1813 North High Street, Columbus, Ohio 43210.
6. TALBOT, PRUDENCE, Department of Biology, University of California, Riverside, California 92521.

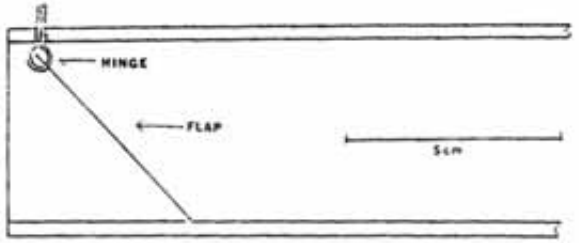

FIG. 1

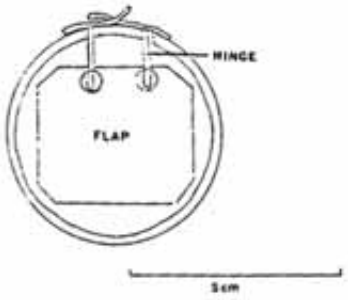

FIG. 2

Norrocky Burrowing Crayfish Trap

Jim Norrocky, Rt. 1, Vickery, Ohio
43464 USA

Fig. 1 Longitudinal cutaway of burrowing crayfish trap showing flap orientation and hinge wire in place but not twisted to permanent position.

Fig. 2 Cross section view of burrowing crayfish trap showing flap and permanent wire hinge positions.

Fig. 3 Cutaway showing burrowing crayfish trap in position in burrow which has been excavated enough to allow trap placement and support.

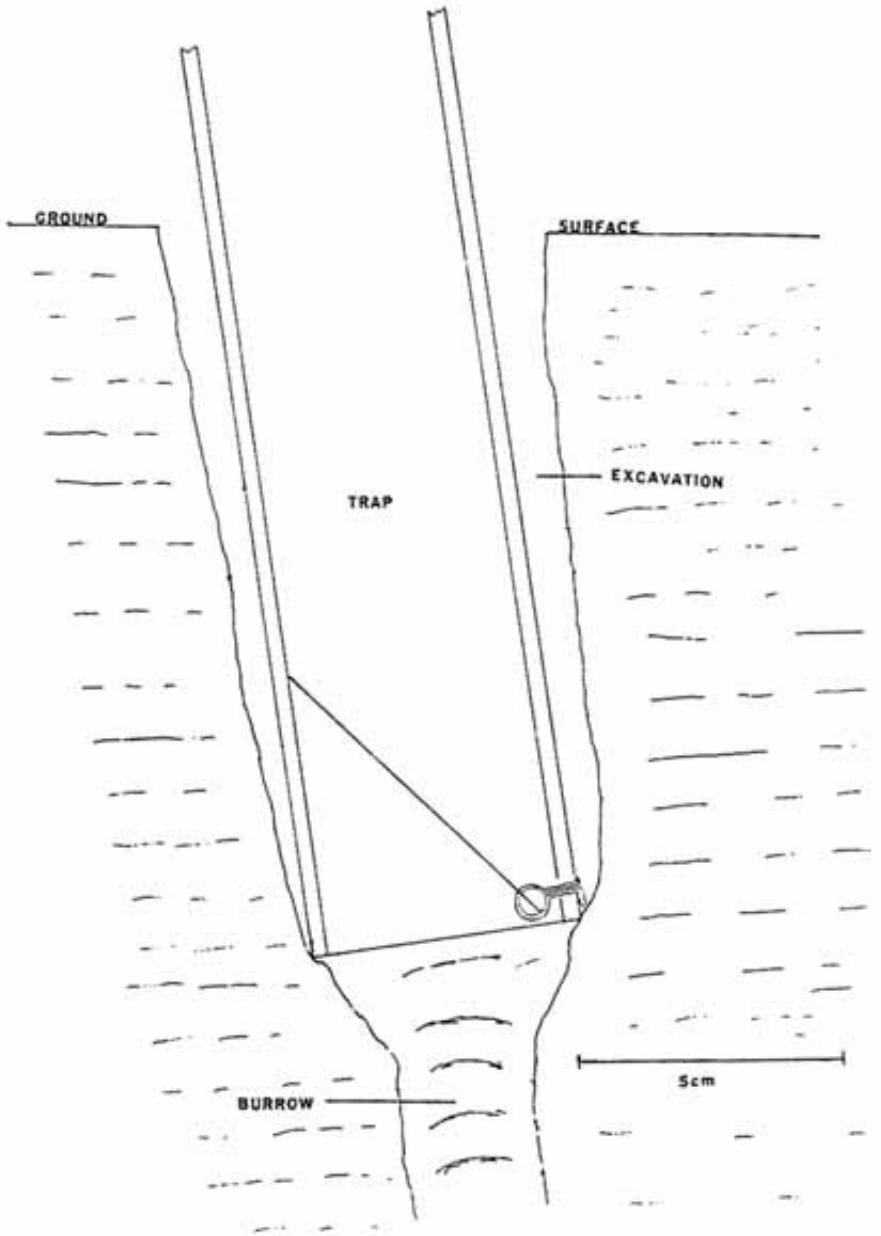

FIG. 3