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AMPHIPOD NEWSLETTER 8

October 1976

This issue of A.N. is long overdue and I apologize for the delay which is entirely my own fault, and caused by a combination of too much work and not quite good enough health. For the same reasons, some of you also have had to wait too long for my reply to their letters, and again I apologize.

Jerry Barnard has contributed a further essay on the Chonos Stam Tree and its connection with amphipod evolution, and Diana Laubitz sent an extensive review of Vassilenko's Caprellid monograph. For the rest this issue is mainly dedicated to the usual columns.

The group of regional editors and "collectors" is fortunately growing steadily and payment via these colleagues appears to be the most effective way of minimizing the administrative inroads on our subscription money due to international bank transactions. Earlier Akira Taniguchi (Japan), Les Watling (eastern USA, new address: Dept of Oceanography, Univ. of Maine, Walpole, Maine 04573) and W.D. Williams (Australia-N. Zealand) had offered their assistance. New regional editors are John Chapman (Bodega Marine Laboratory, P.O. Box 247, Bodega Bay, Cal. 94923, U.S.A.) for the western U.S.A., Diana Laubitz (Museum of Natural Sciences, Canadian Oceanographic Identification Centre, Ottawa KIA OM8, Canada) for Canada, and Mike Thurston (Inst. of Oceanographic Sciences, Wormley, Godalming, Surrey, UK) for Great Britain.

I plan to print a new complete list of subscribers in the next newsletter, and will therefore ask everybody to check carefully whether the address on this newsletter is the correct one, and to send me corrections. I am very grateful to those of you who send me reprints of their recent papers; this is of much help as I seem to get less and less time for keeping abreast with the amphipod literature via primary and reference literature.

Deadline for A.N. 9 will be 1. may 1977.

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THE AMPHIPODA AND THE CHONOS TREE

(a reply to John Luther Mohr about collar ciliotes)

Jerry L. Barnard

I pointed out several times on pp. 21-30 of USNM Bull. 271 (1969) that there is virtually no objection to the utilization of the Corophioidea (which includes Ampithoidae, Corophiidae, the aorids, isaeids, photids) etc. as the basic amphipod and that this group may actually represent a more primitive (or at least equivalent) state than the Gammarid-like groups. Something more than we know about the simple and gross morphology of amphipods will be required to reach conclusions about this because of the massive parallels in morphology between Gammarids and Corophioids. Gammarids are only basic because the vast majority of Gammaridea has laminar telsons in contrast to the Corophioids which have fleshy telsons. The fleshy telson is a far better generalized antiquity in crustaceans than the laminar cleft form so that I have no objection to visualizing the primitive corophioids (such as Gammaropsis) as basic. On first sight these animals can scarcely be distinguished from gammarids. They are, of course, domicolous, meaning that they have web spinning glands, lost in all other amphipods except Ampeliscidae (where they appear to have been recreated) and this is not a very parsimonious attribute. However, the attribute is lost even within the Corophioidea and I don't want to suggest that living primitive corophioids are the absolute ancestors of everything else, i.e., the living link.

John Mohr is also correct about his antipodean implications. Much has gone on there. Bousfield's elegant classification of Gammaroids (in press, Crustaceana) isolates the Crangonychoid group composed of Notogean gammarids, those from South Africa, the strict Crangonychids of Holarctica plus the east Asian Pseudocrangonychids, all of which have sternal gills. (Note, the sternobranchiate Paramoeras must be added to the scheme). I note that the plesiomorphic Notogean representatives are almost identical to certain Palearctic plesiomorphs except for the simpler transverse setation on the urosome. If we visualize a world of Pangea in early Mesozoic times and propound a cool temperate purely freshwater pathway from southern Africa to Palearctica we can scatter Crangonychoids pandemically (except Neotropica). Now if we move into later Mesozoic times with Australia fully disjunct, with South America shifted more than a few score miles away from Africa, and with North America also escaping Laurasia, we can visualize a Palearctic cycle of crangonychoid emergence into the sea (or the brackish embryo of the North Atlantic) with concomitant loss of sternal gills and then reinvasion of Palearctica en masse. Australia and South

Africa are left with crangonychoids never to be challenged by the new gammarids because of distance and probable emergence of new climatic zonation. North America has pulled away too far to permit more than a token invasion of the gammarid form, thus leaving Neotropica dominated by crangonychoids. In fact the gammarids there may be quite late in arrival. The new gammarids plus invasive niphargids from the sea almost fully extirpate crangonychoids from Palearctica, leaving the east Asian groups contracted but under pressure.

All this does not imply that Notogea was the source of crangonychoids, but that it is their main refuge in plesiomorphic condition. The Nearctic crowd is mostly very derived or advanced,though a few plesiomorphs remain in the southeast. At least one of the Notogean taxa has developed the marine kind of uropod 3 (Phreatogammarus) which is reflected in the Ceradocids, Hadziids, Bogidiellids and Kergueleniola etc. Barnard (1972, 1972a, 1974) and Barnard and Drummond(in prep.) show that many other things have occurred in Auatralia or that Australia contains the refugial evidence of these events, such as the elaboration of phoxocephalids and dexaminids.And yet to be explored but in progress, are some of the strange events in telsonic morphology tied up in the Gammaropsis-to-marine-Gammaroid cycle (originally described by Thomson).

I am not surprised at and am very receptive to the idea that Ampithoidae (as part of the Corophioidea) have the more generalized (or primitive?) collar ciliates. This is the kind of information we need to solidify any theory about evolutionary deployment in Amphipoda. The morphology of Palearctic Gammarids, Notogean Crangonychoids, and generalized Corophioids is so strongly parallel that some other input must be made. Gammarids are the most parsimonious group because they have laminar telsons and lack sternal gills, and spinning glands. Corophioids and Crangonychoids are equivocal because they each carry a rarity, spinning glands or sternal gills. If Corophioids are the more primitive group then sternal gills were a new but transitory attribute quickly lost in the bulk of the descendents but providing the taxonomist with a marker to show the freshwater cycle. Early corophioids need not be saddled with spinning glands, we could suppose that only those corophioids with glands survived the onslought of the later gammarids and their descendents or even various descendents of corophioids.

Unless we get some molecular evidence, new fossils or undiscovered living links we may have to settle for a philosophic view on a Corophioid primordiality, based on attendant commensals and parasites and a forthcalling of probabilities about the telson.

John Mohr's evidence certainly helps and I hope he will put this into the official literature in a form directed to the attention of amphipodologists. Anyway, I've been working on an evolutionary essay along these lines for several years and it has finally turned into a small book nearing completion. John Mohr's note has reminded me to look into this business so that a bare mention of it can be included.

LAST MINUTE ADDITIONS

BENSON, J.A. & R.D. LEWIS, 1876. An analysis of the activity rhythm of the sand beach amphipod, Talorchestia quoyana.___ J. comp. Physiol. 105: 339-352 (Not seen)

DORGELO, J., 1976. Salt tolerance in Crustacea and the influence of temperature upon it.____ Biol. Rev. 51: 255-290 (More will be said about this interesting paper in A.N. 9).

FLOESSNER, D., 1976. Biomasse und Produktion des Makrobenthos der mittleren Saale.____ Limnologica 10: 123-153.

HOLLAND, D.G., 1976. The distribution of the freshwater Malacostraca in the area of the Mersey and Weaver River Authority.____ Freshw. Biol. 6: 265-276 (Not seen)

HOLLAND, D.G., 1976. The inland distribution of brackish-water Gammarus species in the area of the Mersey and Weaver River Authority. ____ Freshw. Biol. 6: 277-285 (Not seen)

KIRILLOVA, L.M., 1974. (Effects of chlorophos and enterobacterin on Gammarus pulex, a member of nektobenthic fauna.)____ Pp 20-23 in L.A. LERNIKOV (ed). (Effects of pesticides and petroleum products on aquatic organisms). Izv. Gos NICRKh 98, 1974. (In Russian, not seen. Chlorophos caused no mortality at conc. of 0.06 mg/l and below, over 50% mortality at 0.5 mg/l, 100% after 25 h. at 6.25 mg/l, and 100% after 2 h. at 100 mg/l. Enterobacterin was not toxic at conc. up to 40 mg/l.)

KOSTALOS, M. & R.L. SEYMOUR, 1976. Role of microbial enriched detritus in the nutrition of Gammarus minus (Amphipoda).____ Oikos 27: 512-516 ("Evidence indicates that the nutrition of G. minus is based on a food chain of detritus and the associated fungi")

REVIEW

CAPRELLIDS OF THE SEAS OF THE USSR AND ADJACENT WATERS. S.V. VASSILENKO, 1974. KEYS TO THE FAUNA OF THE U.S.S.R. 107. LENINGRAD, 288 p.

Diana Laubitz.

Dr. Vassilenko's monograph will be welcomed by all who are interested in northern faunas, particularly in view of the incredible abundance of the caprellids in certain areas (up to 95,000/m^2).

The introductory morphological section rightly emphasizes variable characters. Some of the statements are perhaps too general: eg. the ornamentation of brood plates and of mx. 1 outer plate does differ, and may prove to be of taxonomic significance. Similarly, although the abdomen of non-Paracercopid families usually is considerably shorter than pereonite 7', it can be as long (Aeginina, Mayerella)or even longer (Protoaeginella). Conversely, Vassilenko suggests that the ornamentation of the body is sufficiently specific to serve as a systematic character, a statement which, if interpreted in its narrow sense, is hard to accept.

Relationships within the Caprellidea are still obscure, despite the efforts of Vassilenko, and McCain (1970). In the evolutionary section, the families and subfamilies have been modified but they are still far from satisfactory. Some of the diagnostic characters are of doubtful nature, such as abdomen, 'pseudochelae' (prehensile pereopods) and degree of cephalization. Assuming a podocerid-caprogammarid provenance of the caprellids, reduction of the abdomen was not fundamental to the evolution of the suborder (Barnard 1969). In its present vestigial and presumed nonfunctional form, it is possibly only of generic significance, except where it is obviously segmented. Prehensile pereopods may be of some significance, but they are also obviously related to habit: many deep water species from various genera normally showing prehensility have lost this character, presumably as an ecological adaptation. The head suture of caprellids is highly variable between genera; even within the Paracercopidae it may be complete (Cercops holboelli) or absent (Pseudocercops kussakini),throwing into doubt its use as a higher taxonomic character.

Families Paracercopidae (surely there is a strong case for this to have been named Cercopidae) and Phtisicidae are homogeneous groupings, although I agree with Vassilenko that Caprellinoides and Pseudaeginella are probably mis-assigned to Dodecadinae. Family Caprellidae, as she acknowledges, is still badly in need of revision. Subfamilies, here based on degree of cephalization, would have had very different consti-

tuent genera had they been based on certain mouthpart characteristics. However, I sincerely hope that no further revisions are attempted until we have more accurate knowledge of some of the more obscure genera, such as Noculacia.

The systematics section covers 75 species in 12 genera;11 new species are described. All of the species available to the author are well illustrated with clear, comprehensive, mostly original drawings; photographs, when used, have not reproduced well. The key to Caprella and Metacaprella (60 spp.) has been competently constructed, although covering only adult males. I am informed (Douglas Schamel) that it works very well, despite rather heavy emphasis on pereopods (alas, often missing).

In short, this monograph will be indispensible to anyone working with caprellids north of the tropics. A number of the Caprella species are obviously closely related, and I hope that a revision of this unwieldy genus may sometime be possible. If such a time comes, the task will be made easier by Dr. Vassilenko's extensive coverage of the species of the seas of the U.S.S.R.

REVIEW

KEY TO BRITISH FRESHWATER CRUSTACEA: MALACOSTRACA. T. GLEDHILL D.W. SUTCLIFFE & W. D. WILLIAMS, 1976. FRESHWATER BIOLOGICAL ASSOCIATION SCIENTOFIC PUBLS 32, 72 pp. Price to non-Members £ 1-00.

Reviewed by Wim Vader

This is an excellent and most useful booklet, packed with information and with a wealth of up-to-date references to the primary literature. It is relatively cheap and can therefore be recommanded also for people outside western Europe as a handy introduction to the fauna of this region and its literature. For colleagues working within the area the booklet is of course a must.

Treatment of the Amphipoda is curiously uneven, in that the publication gives both more and less than its title promises. That is, on one hand, the key to the genus Gammarus includes also the brackish-water and most marine species of this genus (but not Marinogammarus), on the other hand, a number of amphipods which can habitually be found in almost fresh water in Britain, such as Melita pellucida, Leptocheirus pilosus,

Corophium lacustre and C. multisetosum, are not mentioned at all. In the case of Corophium, this may easily lead to too facile identification of all animals found as C. curvispinum, as the description and illustration of this species are quite generalized, while neither Stock's description of C. multisetosum nor Hamond's paper on the Amphipoda of Norfolk are referred to in the bibliography.

The extensive key to British Gammarus species is most helpful and welcome, and will no doubt be much used. In the next edition one would therefore hope for the inclusion in the key of Stock's work on the species in the locusta-group and Rygg's paper on identification characters of juvenile specimens (both papers are mentioned). Also the exotic semi-terrestrial talitrids, among which at least Talitroides dorrieni occurs in freeland populations, seem worth at least a reference.

A next edition will actually be the third, as the present book is itself a much revised version of a similarly named publication in this series, published in 1960.

References.

HAMOND, R., 1967. The Amphipoda of Norfolk.____ Cah. Biol. mar. 8, 113-152 (see especially p. 142).

RYGG, B., 1974. Identification of juvenile Baltic gammarids (Crustacea, Amphipoda).____ Ann-zool. fenn. 11, 216-219.

STOCK, J.H., 1952. Some notes on the taxonomy, the distribution, and the ecology of four species of the amphipod genus Corophium (Crustacea, Malacostraca).____ Beanfortia 2 (21), 1-10.

STOCK, J.H., 1967. A revision of the European species of the Gammarus locusta-group.____ Zool. Verh., Leiden 90, 1-56.

PAPERS DEALING WITH AMPHIPODA IN 2 RECENT SYMPOSIA

Claude De Broyer has participated in two symposia this autumn and he has sent me abstract of those lectures in which amphipods played a significant role. It is people like Claude and their constant services which save A.N. from an untimely death, and again I must urge you all to "go and do likewise" (W.V.)

I. JOINT OCEANOGRAPHIC ASSEMBLY, EDINBURGH 13-24 SEPT. 1976.

COLWELL, R.R. & P. TABOR. Metabolic activities of Bacteria associated

with sediment, water and animals from deep ocean environments. ____ ("The intestinal microflora of deep-sea amphipods has been found to exhibit growth rates and substrate conversion approximately equal to, or greater than, atmospheric controls during short-term incubation, suggesting an important role of these microorganisms in biodegradation in the deep sea." The amphipod investigated is a Hirondellea n.sp. collected in baited traps)

GEORGE, R.Y. Pressure-temperature effects on deep-sea metazoans during retrieval and subsequent acclimation.____ (Postulates the hypothesis that true abyssal metazoans are strictly stenothermal and barophyllic. Most of the experimentation has apparenthy been carried out on abyssal amphipods and decapods, and information on their survival activity and respiration in relation to temperature and hydrostatic pressure is given).

HARBISON, G.R. & L.P. MADIN. A search for surfaces in the open ocean: hyperiid amphipods and gelatinous zooplankton as an illustrative system. ____ (Interactions between hyperiids and gelatinous zooplankton are of many types: parasitism, as in species of Lycaea on salps and Thyropus on siphonophores, commensalism, as in species of Vibilia on salps and Scina on siphonophores; and predation, as species of Oxycephalus on salps and ctenophores. Differences in morphology seem to be related to the specificity and nature of the interactions of hyperiid amphipods with gelatinous zooplankton.)

MACDONALD, A.G. The vertical distribution and pressure tolerance of deep sea animals.____ (Four deep-sea species, i.a. the amphipods Lanceola sayana, Orchomene sp.and Tmetonyx sp.show no pressure-induced hyperexcitability and/or marked resistance to pressure-paralysis).

POLK, P. The sluice-dok at Ostend. ____ (With data on the colonization of Polydora mud by Jassa falcata along the coast, but by Corophium insidiosum in the sluice-dock)

WOLFF, T. Utilization of plant remains, mainly seagrass, by deep-sea animals. ____ Data on collections of plant remains from the Puerto Rico and Cayman trenches and the Carabean, i.a. a probably new Onesimoides sp.feeding on plant remains. See also Wolff's paper on the subject in Aquat Bot 2, 161-174, 1976.

II 11th EUROPEAN SYMPOSIUM ON MARINE BIOLOGY, GALWAY (IRELAND), 5-11 OCTOBER 1976.

ANDERSIN, A.B. & J. LASSIG. Community structure of soft-bottom macrofauna in different parts of the Baltic.

CEDERWALL, H. Annual macrofauna production of a soft bottom in the northern Baltic proper.____ Macrofauna almost totally dominated by 5 species, i.a. the amphipods Pontoporeia affinis and P. femorata, which were the most abundant. Production of P. affinis per year/m^2 3.2 g dryweight or 71 Kj, of P. femorata 1.4 g dryweight or 31 Kj per year (The 3 other common species together produced 1.2 g). Pontoporeia species are deposit feeders and have a life cycle of 2 years.

KNIGHT-JONES, E.W. & A. NELSON-SMITH. Sublittoral transects in the Menai Straits and Milford Haven.____ With many ecological and biological data an the amphipods of the transects; noted in the abstract are Caprella linearis, C. fretensis, Apherusa jurinei and Tritaeta gibbosa.

LEVINTON, J.S., G.R. LOPEZ, H.N. LASSEN & U. RAHN. Feedback and structure in deposit-feeding marine benthic communities. ____ A study from New England, concerned with grazing by Orchestia grillus and a gastropod in a Spartina marsh. The authors find a) that transfer of nitrogen from the detrital fraction to the microbial fraction is accelerated by amphipod grazing and b) that microbial standing crop, measured by ATP per milligram detritus, increases with increased grazing. Orchestia does not ingest fecal pellets directly, only ingesting sediment after pellets have been broken down. Food limitation is therefore not only predicated on the absolute amount of microbial food, but may often be limited by the rate of breakdown of fecal pellets.

MOORE, P.G. Organization in simple communities: observations on the natural history of Hyale nilssoni (Amphipoda) in high littoral seaweeds. ____ A most interesting study on the virtual "monocultures" of Hyale in the high eulittoral seaweed Pelvetia canaliculata.

NEXT GAMMARUS AND NIPHARGUS SYMPOSIUM

The first circular letter concerning the 4th International Colloquium on Gammarus and Niphargus, which will be held in Blacksburg, Virginia, U.S.A. in 1978 (10-16th September) has been sent out by professor Buikema (for the Groundwater part) and Holsinger(for the amphipod part)in October 1976 and every-

body interested can get further data by contacting John R. Holsinger, Associate Professor of Biological Sciences, Old Dominion University, Nordfolk, VA 23508, U.S.A.

In accordance with the wishes of the Schlitz participants, the organizers are attempting to get funds to assist with the travel expenses of our colleagues from Eastern Europe. The conference will cover five full days, of which the first two will be devoted to amphipod papers, the third will be an all-day field excursion to selected springs and Karst areas, and the last two will contain the Groundwater Symposium.

NEWS FROM COLLEAGUES

Claude DE BROYER. The following papers are in the press: 1. "Analysis of the gigantism of Antarctic and Sub-Antarctic Gammaridean Amphipoda" in Proc. 3d Symp. Antarct. Biol. This work is an analysis of relative gigantism at the intrageneric level of all the species belonging to genera occurring in the Southern Ocean and in at least one other zoogeographical region.2."Revision des genres Ambasiopsis K.H. Barnard et Neoambasia Dahl" in J. nat. Hist.

Gary W. DICKSON: I am a graduate student completing my M.Sc degree in biology under Dr. John Holsinger (See elsewhere in this issue). I will be starting a doctoral program this June in the Dept of Zoology at the Univ. of Georgia. I hope to continue research on some aspect of the amphipod-fungi feeding relationship. I have one other paper in press:

Dickson, G.W. & P.W. Kirk Jr., 1976. Distribution of heter-trophic microorganisms and their relation to detritivore populations in Virginia caves.____ In R.A. Paterson & M.K. Roane (eds). The distributional history of the biota of the southern Appalachians. IV Algae and Fungi. Univ. of Virginia. Charlotteville, Va (in press).

Iraida I GREZE: I am now studying the amphipods of the Mediterranean from the samples collected during our expeditions of 1970 and 1974. I shall analyze the list of amphipods, their ecological distribution and some biological data.

My monograph "Amphipoda of the Black Sea and their biology" is now in the press.

John R. HOLSINGER: For the past two years I have been studying samples of subterranean amphipods from an artesian well at San Marcos in Hays Co., Texas (USA). The specimens are being obtained through an extensive sampling program being carried on by Dr. Glenn Longley and his associates at the Aquatic Station of Southwest Texas State University. Amphipods, along with many other forms of subterranean animals, are coming out of this well almost daily. Specimens are being collected in a fine mesh net which has been placed over an outlet pipe. The amphipod fauna in this well is truely phenomenal, both in density and diversity of species. To date it includes what appears to be five families (Crangonychidae, Hadziidae, Bogidiellidae and two undescribed ones), six genera (four undescribed), and eight species.Two of these species, Stygonectes flagellatus and Mexiweckelia texensis,have been described previously. M. texensis, however, on closer study appears to represent a new genus closely related to Mexiweckelia which is otherwise found only in Mexico.

The well is 426 meters deep, but the fauna is coming from an underground chamber at a depth of 58 meters. In addition to the rich amphipod fauna, are shrimps (Palaemonetes antrorum), isopods (Cirolanides texensis and Lirceolus smithii),thermosbaenaceans (Monodella texana), copepods (undescribed species), snails (Horatia spp.), planarians (Sphalloplana mohri), ostracods (undescribed species), dystiscid beetles (new genus and species being described), and salamanders (Typhlomolge rathbuni).In terms of diversity, density and endemism, this may be one of the richest subterranean aquatic habitats in the world. Nearby Ezells Cave, now a protected cave preserve, is presumably a part of the aquifer tapped by the artesian well and contains many of the same species.

The unique San Marcos aquifer is being studied by Dr. Longley, who is being assisted by a number of systematists working with the various undescribed taxa. My part of the project is concerned with the systematics of the amphipods. My main reason for writing this note is to determine from my colleagues whether a situation similar to the one in Texas exists anywhere else in the world. I am especially eager to find out if there are any other aquatic subterranean habitats in the world with an amphipod fauna consisting of eight different species, in particular one with this much taxonomic diversity. With the possible

exception of S. flagellatus, all other amphipod species are so far known only from the San Marcos aquifer.

Any information on comparable subterranean aquatic habitats anywhere in the world would be greatly appreciated and helpful in our interpretation of this system. I would like to have such information by the autumn of 1976, since we hope to begin preparation of a manuscript during late 1976 or early 1977.

In addition to the artesian well study, I am making fairly good progress with Part II of my revision of the subterranean amphipod genus Stygobromus. A manuscript is now being prepared which will contain descriptions of 31 new species from the Appalachian region of the United States. Three previously known species are being redescribed and new distributional data will be included on species from this region formerly assigned to the genus Stygonectes (now considered by me to be a synonym of Stygobromus for reasons given in the paper I presented at the Schlitz meeting). The manuscript for Part II is being prepared for publication in the Smithsonian Contributions to Zoology series.

Jeff HUGHES: My Master's Degree work, under the advisorship of Drs. Peter Jumars and Karl Banse, is a study of the life history and ecology of a dogielinotid amphipod on the outer coast of Washington State. This species frequents the upper intertidal and trades numerical dominance there with a haustoriid amphipod. I hope to finish my year-long field sampling program by this summer.

Krzystof JAŽDŽEWSKI sent a greeting from the southernmost landing place during the interesting First Polish Antarctic Marine Research Expedition, Palmer Station (64°46'S 64°05'W). " We have also visited King George Island (South Shetlands) and South Georgia __ I believe the most beautiful island in the world" he wrote.

Jim K. LOWRY: Suzanne Bullock and I have completed a catalogue to the 524 species and subspecies of marine gammaridean amphipods recorded South of 50° S latitude. A synonymical bibliography is included for each species, along with distribution and depth records. The catalogue is complete through 1974, and we are getting the 1975 literature together now. Hopefully it will be published in the not too distant future as a Bulletin of the Royal Society of New Zealand.

Don Horning and I are working on a revision of the genus Cerapus. We have four species from New Zealand and another probable new species from Australia. We are interested in seeing Cerapus from as many different areas as possible and would welcome specimens from anyone with Cerapus in their collections.

(Jim also wonders whether readers of the A.N. would be interested in a section on bibliographies of past amphipod workers. If so, he writes, I could supply one for Charles Chilton. Please let me know, if you are interested in this generous offer.W.V.)

David McGRATH: I now study the benthic amphipods in the Galway Bay area, West of Ireland.

Eric L. MILLS. I think you know of my year in Cambridge, 1974-75, studying A.M. Norman and the Shetland dredgings that took place under J. Gwyn Jeffreys' direction during the 1860's. I have also been at work on a manuscript on Edward Forbes' marine Biological work. Not much of this is related to amphipods, but while I was in Cambridge I finished a bibliography and biographical sketch (complementary to my paper of 1972) on T.R.R. Stebbing.

My main research in biology during the last year has involved the identification of the animals from a series of subtidal collections taken on the coast of Labrador at about 56° N. Most of the groups except the polychaetes and amphipods have been completed: I am hard at work identifying the amphipods, but it is slow going during the teaching year. This year I have begun to make collections along a transect of the Scotian Shelf SE of Halifax (to the edge of the slope) using grabs and trawls. Our purpose is to estimate biomasses, but I am also most anxious to have good collections of amphipods to compare with those from the Labrador coast.

Walter G. NELSON: At present, I am a graduate student at the Duke University Marine Laboratory in Beaufort, North Carolina working on the community ecology of amphipods associated with the eelgross Zostera marina. Through a series of field collections, field experiments, and laboratory experiments I am attempting to determine the regulatory mechanisms in this community, and in particular to determine the roles that predation, competition and physical disturbance may have on structuring the community. I am also interested in the reproductive

patterns or strategies of the amphipods I am studying and of the Amphipoda as a "whole".

K.R. SESHAGIRI RAO: I am a research student of Andhra University Post-graduate Centre, Guntur, and interested in the field of fresh-water gammarids.

G. STROOBANTS: The following paper is in the press "Description nouvelle d'Aroui setosus Chevreux 1910 (Crustaces: Amphipodes) et comparaison de l'evolution morphopogique d'Aroui setosus et de Scopelocheirus hopei". I selected some taxonomic characters which are stable throughout the life of the animals (from the marsupial young to adult males and females).

I am now working on the taxonomy of Gammarus fossarum and and G. pulex from Belgium. I should appreciate receiving specimens from colleagues, especially those who have worked on those species.

Ester TARAMELLI: Our recent amphipod research projects include: 1. Amphipod crustaceans as fouling organisms in Civitavecchia harbour, and 2. Distribution and ecology of littoral amphipods.

Kris W. THOEMKE: As a graduate student at the University of fouth Florida, I am working on my PhD in biology. My thesis deals with benthic amphipods in Tampa Bay, Florida, and with the life histories of some of the dominant species from this area.

James D. THOMAS: I am working in the Florida Keys on systematics and ecology of local gammaridean amphipods.

Les WATLING: I have received an appointment as Assistant Professor of Oceanography at the Ira C. Darling Center, Univ. of Maine (May, 1976); (From a letter of Dec. 31. 1975, arrived just too late for A.N. 7) I am currently working on peracarids collected by the Virginia Institute of Marine Science on the continental shelf and upper slope along the coast of the U.S. between 38 and 40° N. (28 stations, 6 replicates per station). 16 of the stations are being sampled quarterly, and the remaining twice a year.

ABSTRACTS OF UNPUBLISHED THESES

I have received an abstract of Gary Dickson's M.Sc. thesis, and have chosen this general heading, in the hope that this will stimulate others to send similar contributions.

G.W. DICKSON, 1976. Variation in the ecology, morphology and behavior of the troglobitic amphipod crustacean Crangonyx antennatus Packard (Crangonychidae) from different habitats

Populations of the troglobitic amphipod Crangonyx antennatus living in two distinct aquatic habitats were examined for possible variations in their ecology, morphology and behavior. Collections were made seasonally for one year in 6 Lee Co., Virginia caves, 3 containing mud-bottom drip pools, and 3 with small gravel stream habitats. Environmental parameters thought to influence population variation were quantitatively and qualitatively recorded in each of the six caves.

Amphipod densities, body length, female maturity, clutch number and stream washout rates were found to be greater in drip pool habitat populations. Variation was also observed in body coloration and antennal segment-body length relationships. Differences in the amount and type of available food materials found in the two aquatic habitats was considered the most important environmental parameter affecting population variations.

The population variation of C. antennatus noted between habitats is viewed as indicative of the adaptive flexibility of this vagile troglobitic species.

REQUESTS FOR INFORMATION etc.

This column does not work as well as it ought to; most requests meet with little or no response. This really is a shame; if colleagues bother to formulate a request, and your editor uses his time to get it distributed, it can't be too much asked to help, if you are able to do so. One of the results of the scant success this column has had is that very few requests have come in this time.

Those of Jim Lowry and S. Stroobants are included in the News from Colleagues section (where I hope they won't be overlooked). Dr. Carlos VARELA, Instituto de Zoologia, Universidad Austral de Chile, Valdivia, Chile, wrote to thank all colleagues who have sent him reprints of the

amphipod fauna of his area, but he is still desperately in need of a copy of Schellenberg's famous 1931-paper (Swedish Antarctic Exped. 1901-1903, 290 pp), which of course is indispensable for him.

I myself am anxious to hear about a locality, preferably near a biological station, where it is possible to study the association of Allogausia recondita Stasek with the sea anemone, Anthopleura elegantissima. Can anybody help me out?

LIST OF SUBSCRIBERS (Supplement 6)

As noted elsewhere, I plan to print a complete list of subscribers in A.N. 9, so please let me know if your addresses as used now are incorrect or incomplete (e.g. without postal zip code).

Changes of address

93. (new address) Kenneth A. KIMBALL, 365 Sagamore Road, Ryc. N.H. 03870, U.S.A.

276 (new address) the Librarian, N.Z. Oceanographic Institute, P.O. Box 12346, Wellington North, New Zealand.

190 (new address), Les WATLING, Dept of Oceanography, Univ. of Maine at Orono, Walpole, Ma 04573, U.S.A.

New subscription

261 Gary W. DICKSON, Villa del Rio-Apt.1., 125 Cross Creek Place, Athens GA 30601, U.S.A.

262 Jan DIELEMAN, Inst. voor Taxonomische Zoologie, Pl. Middenlaan 53, Amsterdam, Holland

263 Jeff HUGHES. Dept of Oceanography, Univ. of Washington. Seattle, WA 98195, U.S.A.

264 Yukiyoshi KANIHIRA, Lab. of Planktology, Faculty of Fisheries, Hokkaido Univ., Hakodate, Hokkaido 040, Japan.

265 Clare McBARE (♀?), Zoology Dept, Spaulding Life Science Building, Univ. of New Hampshire, Durham, N.H. 03824, U.S.A.

266 Yasuhiro MORIOKA, Japan Sea Regional Fisheries Research Laboratory, Nishifunami-cho, Niigata 951, Japan.

267 Library, Moss Landing Marine Laboratories, P.O. Box 223, Moss Landing, CA 95039, U.S.A.

268 Walter G. NELSON, Duke University Marine Laboratory, Beaufort, N.CAR 28516, U.S.A.

269 Manole ORTIZ, Centre de Investigaciones Marina, Ave. 17a, No 2808 Miramar, La Habana, Cuba

270 Hitoshi SEMURA, Lab. of Planktology, Faculty of Fisheries, Hokkaido Univ., Hakodate, Hokkaido 040, Japan.

271 Ester TARAMELLI (♀), Istituto di Zoologia, Viale dell'Universita 32, 00100 Roma, Italia

272 Kris W. THOEMKE, Dept of Biology, Univ. of S.Florida, Tampa, FLA 33620, U.S.A.

273 James D. THOMAS, P.O. Box 170, Big Pine key, Fla 33043, U.S.A.

274 S.Carlos VARELA, Instituto de Zoologia, Universidad Austral de Chile, Valdivia, Chile

275 Thomas GLENNON, Normandeau Assoc., 15 Pickering Str., Portsmouth, N.H. 03801, U.S.A.

LAST MINUTE ADDITIONS

KOVALCHUK, T.V., 1976. (Production of Pontogammarus maeoticus (Sow) and P. crassus G.O.Sars implanted to the Dnieper reservoirs). ____ Gidrobiol. Zh. 12(3): 70-73 (In Russian, not seen).

LANE, P.A., M.J. KLUG & L. LOUDON, 1976. Measuring invertebrate predati in situ on zooplankton assemblages.____ Trans. Am. microsc. Soc. 95:143-155 (The method used involves staining the prey animals with a fluorescent dye, acridine orange, and releasing them int a grazing chamber suspended in the lake. Predatorprey interactions canbe quantified from the number of fluorescent prey and predators recovered. Predation is indicated if a suspected predator possesses a fluorescent gut tube).

LESNIKOV, L. A., 1974. (Effects of chlorophos and entobacterin on different groups of aquatic organisms).____ Pp 14-19 in L.A. LESNIKOV (ed). (Effects of pesticides and petroleum products on aquatic organisms.) Izv. Gos.NIORKh 98. (In Russian, not seen).

MATSUMOTO, K., 1976. An introduction to the Japanese groundwater anima with reference to their ecology and hygienic significance.____ Int. J. Speleol. 8: 141-155 (Not seen. Contains apparently many data on amphipods).

PUSTOVOJT, A.G., 1974. (Effect of petroleum processing waste water on the benthic organisms Gammarus pulex L. and Chironomus dorsalis Meig.)____ Pp 66-72 in L.A. LESNIKOV (ed). (Effects of pesticid and petroleum products on aquatic organisms.) Izv. Gos NIORKh 9 (In Russian, not seen. Apparently toxicity was low).

BIBLIOGRAPHY

The promised review of the monographic paper of Tzvetkova has to be postponed once more, due to circumstances beyond the reviewer's control. Diana Laubitz' review of Vassilenko's books appears in this issue, and has in my opinion been well worth waiting for.

As usual, I have to thank Claude De Broyer and Jan Stock for their never failing assistance. A few colleagues have also sent me copies of overlooked papers of theirs. I hope more of your would do that; both the Newsletter and my reprint library would profit greatly.

It has not yet been possible to type the references in two columns, but we may manage to do this for A.N. 9.

I hope to get a review of Charles Griffith's book on S. African amphipods for the next Newsletter.

ABOLUNOSOVA, G.I., 1975. (Energy losses in respiration and egg-production in Gammarus oiivii from the Black Sea). ____ Biol. Morya 33: 68-73 (In Russian, not seen).

ARIMOTO, I., 1976. Heterocaprella clavigera n. gen., n.sp., a unique new caprellid with remarkable sexual dimorphism from the Korean Strait (Amphipoda, Caprellidae).____ Crustaceana 30: 43-48 (The males of this species have a long clavate projection on the ventral surface of pereonite 4, bearing a pair of pereopods and gills at the distal end).

BARNARD, J.L. & M.M. DRUMMOND, 1976. Clarification of five genera of Phoxocephalidae (Marine Amphipoda). ____ Proc. biol. Soc. Wash.88: 515-548.(The 5 genera of the title are Paraphoxus, Pontharpina, Parharpina Protophoxus and Trichophoxus. These are discussed extensively and diagnosed, with lists of species. Trichophoxus capillatus is redescribed, as is a new genus Birubius (with its type-species B. panamunus n.sp.) The present paper is the forerunner of a larger work, in prep., concerning 86 species in 23 genera of Australian Phoxocephalidae, among which 20 new genera and 80 new species.)

BATTAGLIA, B. & P.M. BISOL, 1975. Biochemical polymorphisms in marine crustaceans in relation to their ecology.____ Proc. 9th Eur. mar. Biol. Symp. (1975): 573-585. (Deals with Tisbe spp.(Harpacticoidea) and Gammarus insensibilis.In the latter, the esterase systems are polymorphic at the level of five loci).

BELLAN-SANTINI, D. & D.J. REISH, 1976. Utilisation de trois espèces de Crustacés comme animaux tests de la toxicité de deux sels de metaux lourds.____ C.R. Acad. Sci. Paris 282 D: 1325-1327 (i.a. Podocerus fulanus and Corophium acherusicum).

BENSON, J.A. & R.D. LEWIS, 1976. An analysis of the activity rhythm of the sand beach amphipod, Talorchestia quoyana. _____ J. comp. Physiol. 105: 339-352.

BETTISON, J.C. & J. DAVENPORT, 1976. Salinity preference in gammarid amphipods with special references to Marinogammarus marinus (Leach)____ J. mar. biol. Ass. U.K. 56: 135-142.

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BOLTT, R.E., 1975. The benthos of some southern African lakes 5. The recovery of the benthic fauna of St. Lucia Lake following a period of excessively high salinity. ____ Trans. roy. Soc. S.Afr. 41: 295-323.

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BOUSFIELD, E.L., 1976. A new terrestrial amphipod from Lord Howe Island. ____ Rec. Austr. Mus. 30: 118-122. (Not seen).

BRANCH, G.M., 1975. The ecology of Patella from the Cape Peninsula, South Africa. 5. Commensalism. ____ Zool. Afr. 10: 133-162. (Juvenile specimens of Hyale grandicornis are facultative inquilines which vacate their host at high tide. Calliopiella michaelseni is a commensal and shows a preference for certain limpet species; they feed on limpet faeces and algal fragments. A most interesting paper, containing many other biological data on especially Calliopiella).

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BUSDOSH, M. & R.M. ATLAS, 1975. Response of two arctic amphipods, Gammarus zaddachi and Boeckosimus (Onisimus) affinis, to variations in temperature and salinity. ____ J. Fish. Res. Bd Can. 32: 2564-2568. (The amphipods are from Nuwuk Pound, Alaska. The Gammarus is not G. zaddachi, but probably G. setosus (W.V.))

CALDWELL, R.S., 1975. Hydrogen sulfide effects on selected larval and adult marine invertebrates.____ Water Resources Res. Inst., Oregon State Univ., WRRI 31: 1-22. (Of the six species tested, 2 were amphipods, viz. Anisogammarus confervicola and Corophium salmonis. They were less resistant than the other species tested, an isopod, a larval crab, and two bivalves (one also as larva)).

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DÖRJES, J. & J.D. HOWARD, 1975. Estuaries of the Georgia coast, U.S.A. Sedimentology and biology. 4. Fluvial-marine transition indicators in an estuarine environment, Ogeechee River, Ossabow Sound. ____ Senckenb. marit. 7: 137-179.

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ELEFTHERIOU, A. & D.A. JONES, 1976. The genus Eurydice on the west coast of India._____ J. Zool., Lond. 178: 385-394 (With data on sand-beach amphipods).

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slavica n. sp. and Idunella pirata Krapp-Schickel, 1975. ____ Poljoprivreda i Šumarstvo 21: 31-48.

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LEVINGS, C.D., 1975. Analyses of temporal variation in the structure of a shallow-water benthic community in Nova Scotia. ____ Int. Rev. ges. Hydrobiol. 60:449-470. (Among the 20 most abundant species in this survey, 5 were amphipods, viz. Photis reinhardi (1), Orchomene minuta (8), Dulichia monacantha (9), Calliopius laeviusculus (11) and Metopella sp. (20))

LEVINGS, C.D. & J.-B. COUSTALIN, 1975. Zonation of intertidal biomass and related benthic data from Sturgeon and Roberts banks, Fraser River estuary, British Columbia. ____ Fish Mar. Serv. Res. Dev. Techn. Rept 468: 1-139 (Not seen, unfortunately).

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MICHAEL, A.D. & G.F. CROUCH, 1975. Report on benthic ecological studies, September 1974- May 1975. Section 2. Fauna. ____ Pp. 89-220 in "Marine ecology studies related to operation of Pilgrim station". Semi-annual Rep. Ser., no. 6. (Not seen).

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PATTERSON, M.M., 1974. Intertidal macrobiology of selected sandy beaches in southern California ____ Univ. S.Calif. Publ. SG 9-74: 1-44.

PERCY, J.A. & T.C. MULLIN, 1975. Effects of crude oil on arctic marine invertebrates. _____ Beaufort Sea tech. Rep. 11: 1-167. (An important paper, which also contains many biological data on the amphipods Onisimus affinis, Atylus carinatus and Corophium clarencence).

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RICHARDSON, M.G., 1975. The dietary composition of some Antarctic fish. ____ Br. antarct. Surv. Bull. 41/42: 113-120. (Amphipods-24 spp identified-were the most prominent components of the fish diets).

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STEELE, D.H. & V.J. STEELE, 1975. Egg size and duration of embryonic development in Crustacea. ____ Int. Rev. ges. Hydrobiol. 60: 711-715.

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STOYKOV, S., 1975. (On the biology of Orchestia bottae (M. Edw.) (Amphipoda, Talitridae)). ____ Ghidrobiologiya (Sofia) 2: 80-88. (In Bulgarian, not seen).

TARAMELLI RIVOSECCHI, E., 1974. (Preliminary researches on Civitavecchia harbour's wood-boring organisms). ____ Memorie Biol.mar. Oceanogr. 4: 555-557 (In Italian, abstract only. Full publication will be in Boll. Pesca Pisc. Idrobiol. After 3 months immersion panels had been attacked by the isopod, Limnoria tripunctata, associated with the amphipods, Chelura terebrans and Corophium acutum).

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THURSTON, M.H., 1976. New pelagic amphipods (Crustacea: Amphipoda) collected in the Sond cruise. ____ J. mar. biol. Ass. U.K. 56: 143-159. (Crybelocephalus birsteini n.sp., Halicoides discoveryi n.sp. and Scina wagleri atlantis n. ssp. Halicoides is upheld as a genus different from Halice).

THURSTON, M.H., 1976. The vertical distribution and diurnal migration of the Crustacea Amphipoda collected during the Sond cruise, 1965. 1. The Gammaridea. ____ J. mar. biol. Ass. U.K. 56:359-382 (off Fuerteventura, Canary Island, 450 specimens of 8 species were caught, with Cyphocaris anonyx, C. challengeri and Stenopleura atlantica most common).

THURSTON, M.H., 1976. The vertical distribution and diurnal migration of the Crustacea Amphipoda collected during the Sond cruise, 1965. 2. The Hyperiidea and general conclusions. ____ J. mar. biol. Ass. U.K. 56: 383-470 (78 species and ca. 4500 specimens of which 44% were Primno macropa. Also Scina borealis, Hyperioides longipes and Phrosina semilunata were common. For the many biological data I must refer to the paper itself).

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