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CHIRONOMUS

MITTEILUNGEN AUS DER CHIRONOMIDENKUNDE

4th International Symposium on Chironomidae
Ottawa, Ontario, Canada
August 10-12, 1970

Arrangements have been completed to hold the symposium on the campus of Carleton University. A beautiful complex of new buildings will provide all the facilities we will need. The residencial and dining areas are less than 5 minutes walk from the lecture theatre.

The Entomology Research Institute is about 10 minutes drive from the campus of Carleton University. Transportation will be available for those who wish to visit the Institute during the symposium. We hope some of you will plan to spend a few days with us either before or after the symposium - working on the chironomid collection, collecting in the area surrounding Ottawa or just visiting. University housing and meal service will be available.

In the last communique we expressed our hope to have the papers presented at the symposium published as a group. We still hope to do this and keep the costs to a minimum. It may be necessary to limit the number of pages to less than seven we originally suggested. Mr. J. A. Downes is investigating several possibilities. A communique will be sent out soon.

Dr. A. L. Hamilton will be contacting you in the near future about field trips.

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Chironomid larvae in a lake with a long ice-cover period

by D. Armitage

An intensive study was made between September 1964 and September 1966 of the chironomid larval fauna of Kuusijärvi, a shallow, mesohumic, woodland lake in south Finland. The lake has an area of 7.35 hectares and a mean depth of 1.6 metres. Sampling was carried out weekly during open water periods and every other week during the ice-cover (which lasted 5 months), at a littoral station at 150 cm depth and one in the centre of the lake at a depth of 230 cm. The chironomid fauna is dominated numerically by Tanytarsini forming 34 % of the fauna (with *Cladotanytarsus* spp being more abundant than *Tanytarsus* spp, 80 % and 20 % of the total Tanytarsini numbers, respectively). *Pagastiella orophila* (Edw.) was next in abundance forming 29 % of the total chironomid numbers, followed by Tanypodinae 16 %, and *Limnochironomus pulsus* Walker 13 %. The remaining 8 % of the fauna was made up of 7 species of Chironominae and *Orthocladius naumanni* Brundin.

This account discusses the possible factors controlling the number of larvae present. Unfortuneately due to the difficulties of sampling it is not easy to obtain the information necessary to analyze fully the changes in population numbers as has been done for pest-insect populations (see, Clark et al, 1967) and for natural terrestial insect populations (Varley and Gradwell, 1968). However it should be possible to outline the main features responsible for control of numbers.

Numerical change in populations is due to influences on birth and death rate. These influences have been discussed by Clark et al, (1967). Factors affecting the birth rate are average fecundity and fertility of females, the sex ratio, and environmental factors. The inherent fertility and sex ratio of a species will remain relatively constant but environmental factors may alter the sex ratio at both adult and larval stages. Miller (1941) has noted the effect of water temperature on the development of certain chironomids, the males emerging first. Palmén (1955) also noted the earlier emergence of males but *Cladotanytarsus* did not appear to show this feature. At Kuusijärvi males of Cladotanytarsus spp did not emerge before females and the proportion of the two sexes emerging at one time was very variable. At the adult level environmental factors will have a differential effect on the sexes due to the swarming of males and the less active behaviour of females. Mundie (1956) and Lindeberg (1964) have noted the effect of wind on swarms. Lindeberg also cites examples of Tanytarsus species at high levels, sometimes above the tree tops where wind effects will be greater. Syrjämäki (1964) has observed that the swarm shape is altered by even 'the smallest puff of wind'. In addition to wind effects Lindeberg (op. cit.) notes that changes in light intensity cause swarming on abnormal sites and at unusual times. So it is clear that the environment will affect the sex ratio by acting differentially on the two sexes. After mating, oviposition takes place and the success of this will be influenced strongly by water conditions and general weather factors.

Mortality in populations is influenced by ageing, low vitality, accidents, physico-chemical conditions, natural enemies, shortage of food, and shelter. The stage spent in the aquatic environment may be divided into: - egg, planktonic instars, settled summer larvae, winter larvae and pupae. Each of the above mentioned mortality factors will affect the listed stages differently.

The mortality of eggs will be determined by accidents to females during egg-laying e.g. wing wetting, by the transport of eggs away from suitable areas by water currents and by predation. Planktonic instars due to lack of shelter will be vulnerable to predation and accidents (by transport away from the optimum area). It is unlikely that food will be in short supply at this stage. The mortality of settled summer larvae will be affected by crowding causing accidents e.g. wounding of neighbours and possibly by shortage of food, particularly in very selective larvae such as P. orophila and Cryptochironomus (diatom feeder and obligate predator, respectively (Armitage, 1968). Predation at this stage will only be an important factor of the larvae perform vertical migrations or leave their tubes regularly. Hamilton (1965) noted that almost all chironomid species found in trout stomachs were found in the plankton at some stage. Physical and chemical conditions were never so extreme at Kuusijärvi as to cause mortality of larvae but low temperatures and shortening of the daylight period may induce the start of the next stage i.e. winter larvae. These latter have low vitality, with the exception of Tanypodinae, and are prone to attack by parasites and pathogens. This was clearly seen in the Tanytarsini which at this stage formed tightly sealed-off tubes and were subject to nematode and fungi infections. Food shortage may affect mortality in certain of the resting forms but it is likely that these will have a supply of food reserves and this will therefore not be a serious factor. The mortality of pupae may occur through accidents i.e. failure to leave the tube correctly and failure to open wings etc. on emergence. This latter will be affected by environmental factors such as wind and humidity. Palmén (1955)has noted the adaptive significance of nocturnal emergence when wind speeds are generally lower and humidity higher. Predators may also be less active at this time both in the air and in the water.

It would be a gross oversimplification to single out one or two factors to explain control of larval density since all interact and may differ from year to year, but it would seem that environmental influences acting on adults and young larvae and not on winter larvae, determine population size. The ice-cover appears only to induce a resting stage in some species and does not affect larval numbers, this is borne out by the relative constancy of winter populations. Food availability in general determines development time and will therefore also be a factor in the control of larval numbers. It should also be emphasised that fluctuations in larval numbers in any one place do not accurately represent changes in population density. In order to do this it would be necessary to sample from the whole lake area as this would reveal horizontal movements of the population resulting from wind-induced shifts in oviposition sites and dispersal of young larvae by water currents.

This study of the chironomid larvae of Kuusijärvi has shown that variation in the ecology of the component species was most pronounced, even between closely related forms and that work not taking this into account will give misleading results. Similarly the food selected by certain larvae shows a seasonal variation and analyses should be made throughout the year to get a true picture of larval requirements. It is clear therefore that detailed studies at the species level will reveal facts which would be obscured in word dealing with higher levels. Future investigations could profitably employ the type of detailed studies made by Klomp (1966) and Varley and Gradwell (1968) on terrestrial insects. The problems of this approach lie in sampling (due to the different environments) and taxonomy for it would be necessary to study a single species. Examinations such as these should not prove impossible and would make up for the labour involved by the increase of information obtained. The value of working at the species level has already been mentioned and the intensive sampling programme adhered to during this study ensured that no major fluctuations were missed. To this can be added the advantage of studying areas differing in depth by only a few centimetres (80) as this again brings out the variations in the ecological requirements of morphologically similar species.

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Chironomid Research in Australia

The Chironomid fauna of Australia has been largely neglected until the late 1950's when threee independent investigations began. Dr. P. FREEMAN at the British Museum, revised the adult taxonomy of the Family, providing a basis for the work on ecology and genetics which was beginning at that time.

Dr. D.H.D. EDWARD, at the University of Western Australia, began by describing the immature stages as a necessary preliminary step to the study of their ecology. Included amongst the species he examined were three parthenogenetic species; *Lundstroemia parthenogenetica*, *Limnophyes vestitus*, and *Corynoneura scutellata*. With an expanding group of students he is proceeding now with a study of the ecology of species such as *Allotrissocladius amphibius* and *Paraborniella tonnoiri*. These species are occupying an equivalent ecological situation to that utilised by the African chironomid *Polypedilum vanderplanki*, the larvae of which have been shown to be cryptobiotic. The Western Australian species however are not cryptobiotic and persist in the dry summer pools through a number of behavioural and physiological mechanisms. Mr. A.L. DYCE, at the CSIRO McMaster Laboratories in Sydney, has also made some investigations of eastern populations of these species.

At the University of Melbourne the primary interest has been in cytogenetics of the Chironominae, particularly the genus *Chironomus* itself. However this work revealed the presence of many species groups and revisions of the genera *Chironomus*, *Kiefferulus*, *Polypedilum* and *Tanytarsus* have been undertaken to provide a sound taxonomic basis for the genetical investigations. Dr. Jon MARTIN has expanded his analysis of the cytogenetics and cytoevolution of the genus *Chironomus* from a purely Australian investigation to include material from all over the world. The North American part of this work, in collaboration with J.E., and Mary F. SUBLETTE and Prof. W. WÜLKER, has been previously reported in this bulletin. Through the generosity of many people, small samples have been obtained from Brasil, China, Fiji, Germany, Hawaii, Japan, Malawi and Singapore.

Mr. D. PORTER, also at Melbourne, has investigated the cytology and the mechanism of parthenogenesis in *Lundstroemia parthenogenetica* and begun a preliminary study of a parthenogenetic Tanytarsini from the Canadian Arctic kindly supplied by Dr. D.R. OLIVER of Ottawa. He is also involved in a study of the cytogenetics and cytoevolution of the genus *Polypedilum*.

For the past year Dr. W.R. ATCHLEY, a Fulbright Fellow from the University of Kansas and former student of J.E. SUBLETTE, has become interested in the population cynamics of the Chironomus nepeanensis group of two species. In addition he has assisted with computer analyses of the results of other studies.

Interest in the taxonomy and ecology of Chironomids has also recently arisen in Adelaide. Mr. B. GLOVER of the Bolivar Sewerage Works has found several new species of Tanytarsini which he is describing, and Miss Ingrid HERGSTROM, at the University of Adelaide, has begun a study of the ecology of the Orthocladiinae.

Finally, an outline of work on Australian Chironomids cannot omit reference to Dr. D.H. COLLESS who is responsible for curation of the Chironomidae in the Australian National Collection in Canberra. In addition he provides the other workers with identifications and material, and has collaborated in some studies.

Jon MARTIN (Australia).

Request for material:

In connection with a study of the cytoevolution of the genus Chironomus, material of any species from anywhere would be greatly appreciated. Mature larvae fixed in 3 parts absolute alcohol and 1 part glacial acetic acid should be sent airmail as the quality of chromosome preparations deteriorates unless this material is kept in a deep freeze. Pupae or adults for reference purposes would also be appreciated. These could be preserved in 70 % alcohol. Material of Camptochironomus pallidivittatus, Ch. thummi piger, Ch. dorsalis or Ch. luridus would be particularly welcome. Unfortunately live material cannot be accepted because of Australian quarantine regulations.

Material should be addressed to: Dr. Jon Martin, Genetics Department, University of Melbourne, Parkville, Victoria, 3052, Australia.

Chironomidenforschung in Bulgarien

Die Chironomidenforschung in Bulgarien nahm ihren Anfang um das Jahr 1935. Aus Brackwässern der bulgarischen Schwarzmeerstrandseen und aus Sumpfgebieten wurde Material gesammelt, und folgende Chironomidenlarven wurden bestimmt: Chironomus plumosus L., Chironomus salinarius-tipus, Chironomus sp. thummi, Eucricotopus sp., Trichotanypus sp., Cardiocladius sp., Glyptotendipes sp. (Valkanov A., 1935; Thienemann A., 1936). In der darauffolgenden Periode, bis etwa 1950, beschränkten sich die Untersuchungen verschiedener Autoren auf zufällige Funde, hauptsächlich aus Brackwässern.

Um 1950 begannen intensive Untersuchungen, die hauptsächlich ökologischen Charakter trugen. Die Erforschung der Chironomidenfauna in den bulgarischen Schwarzmeerstrandseen (Zwetkov L., 1955) führte zur Beschreibung von 38 Larvenformen, von denen 5 schon früher entdeckt worden waren. Als verhältnismäßig beständige halophile Formen werden Chironomus salinarius und Orthocladiinae No 1 bezeichnet, während Chironomus plumosus, Chironomus semireductus, Procladius, Cricotopus silvestris, Chironomus thummi, Limnochironomus nervosus, Cryptochironomus u.a. augenscheinlich imstande sind, einen gewissen Salzgehalt zu vertragen.

Mit der systematischen Erforschung der Süßwasserchironomiden verschiedener Gewässertypen (Flüsse, Seen, große und kleine Stauseen, Fischzuchtteiche) wurde in 1955 begonnen (Dimitrov M., 1957-1968). In den Flüssen Donau, Maritza, Tundscha, Iskar und Jantra wurden der Artenbestand, die Dynamik der Anzahl und der Biomasse der Chironomidenlarven erforscht. Anhand von Untersuchungen in den großen Talsperren "A. Stamboliiski", "G. Dimitrov", "Iskar", "Batak", "Studenn Kladenez", "Ivailovgrad", "Pjassatschnik" und "Ovtschariza" wurden Fragen der Bildung der Chironomidenfauna, ihrer qualitativen und quantitativen Dynamik sowie der Bedeutung der Chironomidenlarven für die Ernährung der Benthosfressenden Fische dieser Gewässer geklärt. Schließlich waren die periphytonen (phytophilen) Chironomiden, die sich auf der Weich- und Hartflora der stehenden Gewässer entwickeln, Gegenstand von Untersuchungen.

Am weitläufigsten und gründlichsten wurde der Benthos und die Gruppe derjenigen Chironomidenlarven erforscht, die sich in Karpfenteichen entwickeln, ihr Einfluß auf die natürliche Produktivität und auf die Fischerträge der Teiche. Auf Grund von Versuchen einer "Gründüngung" der Fischteiche - gesäter Hafer und abgemähte Hartflora dienten dazu - wurde deren Wirkung auf die mengen- und wertmäßige Entwicklung der Chironomidenfauna festgestellt, die sich massenhaft auf den faulenden Pflanzen entwickelt. Ebenso wurde die Bedeutung einer Stickstoff- und Phosphatdüngung und deren Einfluß auf Artenbestand und mengenmäßige Entwicklung der Chironomiden erforscht. Die Auswirkung winterlicher Trockenlegung der Karpfenteiche auf die Überlebensquote der im feuchten Schlamm verbliebenen Chironomidenlarven wurde beobachtet.

Dr. M. Dimitrov
Stanzia po sladkovodno ribarstvo
PLOVDIV - Bulgarien

Diversa

In November/December 1969 Prof. L. Brundin, Stockholm, and Dr. F. Reiss, Plön, made together a collecting travel to South Chile. Prof. Brundin intended to complete his former collections mainly by material from the brooks of the coast-cordillieres. Dr. Reiss concentrated at the catch of Tanytarsini. He hoped to find forms that could clarify the phylogenetic relations within this tribe. The material has not yet been worked up completely.

Personalia

A notice from Florida:
On July 1, 1969, the government of the State of Florida was completely reorganized. This resulted in the transfer of all persons in the State working with air or water pollution control to the newly organized Department of Air and Water Pollution Control. My own transfer to the new location took place on November 1, 1969. Shortly after my transfer to Tallahassee I was appointed Professor of Aquatic Entomology at Florida A a. M University, where I now have a laboratory. Consequently I have two new mailing addresses, one for State of Florida busi-

ness and another for scientific exchange. Both are listed below and the appropriate one for your use is checked.

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U.S.A.

William M. Beck, Jr.
University P.O. Box 111
Florida A a. M University
Tallahassee, Florida 32307
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For those of you who have corresponded with both of us, my wife's address is very much as it was.

Adressen: Änderungen und Ergänzungen

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