Nearctic chironomids as indicators of lake typology

OLE A. SÆTHER

With 1 figure and 2 tables in the text

The validity of chironomid communities as indicators of trophic levels in areas outside Europe is treated by Brundin (1956). He shows that the typology founded on chironomids probably has a world-wide validity, and not only with regard to causal ecological principles, but also with regard to most of the different types of members of indicator communities chosen. The species may not be the same, but they are replaced by species within the same species group or at least by species within the same genus or closely related genera. The use of chironomids as indicators of the trophic level of lakes has, in North America, barely passed the first stage when the lakes were classified according to the genera found. The lack of knowledge of the specific identities of the typologically more important forms has prevented the development of valid lists of indicator communities with the exception of the ultraoligotrophic communities described by Oliver (1963, 1964). The paucity of information on the zoogeographic distribution and general ecology of these species has further limited their prospective usefulness. Recent and ongoing revisions in chironomid taxonomy, new descriptions and more material (SÆTHER 1973, 1975 a, b, c, d) have, however, made it possible to develop the first lists of indicator communities for North America (Tab. 1). Comparison with European indicator communities show a remarkable similarity in species composition. (The ecology of the European species is primarily based on Brundin 1949, 1952, 1956; Fittkau 1962; Reiss 1968 a, b; Reiss & Fittkau 1971.) Often the same closely related species will occupy a similar niche on both continents. Profundal species common to Europe and North America are the ultra-oligotrophic Protanypus caudatus (EDW.) and a new genus near Hydrobaenus Fries, the ultra- to moderately oligotrophic Micropsectra groenlandica Ann., Paracladius quadrinodosus Hinv, and Lauterbornia coracina Kieff., the moderately oligotrophic and mesotrophic Stictochironomus rosenschoeldi (ZETT.), Monodiamesa bathyphila (KIEFF.) and Phaenopsectra coracina (ZETT.), the more eutrophic Chironomus anthracinus ZETT. and Chironomus plumosus L. and the dystrophic Zalutschia zalutschicola Lip. (syn. Trissocladius naumanni (BRUNDIN)). (The identification of the Nearctic specimens of Protanypus caudatus (EDW.), Stictochironomus rosenschoeldi (ZETT.) and Phaenopsectra coracina (Zett.), however, is not quite certain.) Of these species, however, Stictochironomus rosenschoeldi (Zett.), Monodiamesa bathyphila (KIEFF.) and Chironomus anthracinus ZETT. all appear to have their Nearctic occurrences shifted towards more oligotrophic conditions. However, there are some indications that not only the temperature regime but also the light regime to a large part is governing their distribution. Thus, if this is the case, species from northern and central Europe can be expected to be restricted primarily to Canada which has a colder climate and lower number of eutrophic lakes than European areas of similar latitude (Fig. 1). The difference in ecology may thus only be apparent. The presence of competitors in Nearctic lakes which are lacking in the European lakes may also cause differences in occurrence. In Europe there are only 6 species of Stictochironomus and only one of them is a profundal inhabitant, while in North America there are 11 described species of the genus and probably 2-3 profundal inhabitants. In North America, Chironomus decorus Joh. is much more common and widespread than Chironomus anthra-

Tab. 1. Characteristic profundal chironomids in Nearctic (----) and Palaearctic lakes (....). (After this paper went to press I found that the specimesn called *Paracladius alpicola Zett*. mostly belong to *P. quadrinodosus* Hirv. *Chironomus attenuatus* Walk. is a nomen dubium and should be replaced by *Chironomus decorus* Joh. in the tables)

		1	E 01				IGOHUMIC:				MESO-	POI,Y
		1	Γ		IGO)-·	PESO-	. 1	EUTF	OTHIC	11	11
SPECIES:		-	L	ultra	4		ļ			extreme	HUMIC	HUM
	1	1	-		1						1	
PSEUDODIAMESA NIVOSA GOETGH.	×		x .				l	- 1				11
PSEUDODIAMESA ARCTICA (MALL.)	- 1	Ί.	٦Ľ							1	II	11
*GEN. N. NEAR HYDROBAENUS		١,	.L	•	J			- 1		1	ll	11
MONODIAMESA FKMANI BRUND.		١,	Ŷ٠.					- 1			II	11
PROTANYPUS CAUDATUS (EDW.)	1	-1"	ÇĿ				1	- 1		1	11	11
HETEROTRISSOCLADIUS SUBPILOSUS (KIEFF.)	-	Ι.	Ŷ.		٦.		İ	- 1		1	H	11
*HETEROTRISSOCIADIUS OLIVERI SAETH.	-	ľ	^[7	• • • • • • • • • • • • • • • • • • • •	1				11	11
HETEROTRISSOCIADIUS MAEAERI BRUND.	- 1	١,	J٦		Π.		1	- 1		1	ll .	11
PROTANYPUS FORCIPATUS EGG.	l _×		^۲		J.		1	- 1			II	11
*PROTANYPUS HAMILTONI SAETH.	- 1	1	-		ľ		1	- 1		į	1	11
	ال	١.			Τ.		l	- 1		-	11	H
MICROPSECTRA GROENLANDICA AND.	×	1	^		-1 -			- 1		l	11	11
MONODIAMESA ALPICOLA BRUND. TANYTARSUS PALMENI LIND.		١,	J	••	1.	• • •	1			1	11	
		ď		.:	1:	•	1	- 1		1	II	11
PARACLADIUS ALPICOLA (ZETT.)	1^	1	^		_		1	- 1			II	
CEN. NEAR TRISSOCLADIUS (SAETHER 1970)	12	ı,			Τ.					1	11	11
LAUTERBORNIA CORACINA KIEFF.		.,			1.	• • • • • •	1			1	11:	11
TANYTARSUS LUGENS KIEFF.	x		^	••••	1.	• • • • • • •	1	- 1		1	1	Н
MICROPSECTRA CONTRACTA REISS	- 1	1		• • •	7.	• • • • • • •	l	- 1		1	II .	11
PARACLADOPELMA OBSCURA BRUND.	×	: >	×	• • •	٠٠	• • • • • • •				1	11	11
*PROTANYPUS RAMOSUS SAETH.	-	1		-	╁							#
*HETEROTRISSOCLADIUS SP. A NEAR SUBPILOSUS		1	1	-	+-	-		- 1		1	11	11
*HETEROTRISSOCLADIUS SP. B NEAR MAEAERI		1		-	+ -	-					H	ll .
MACROPELOPIA FEHLMANNI (KIEFF.)	×										11	11
TANYTARSUS BATHOPHILUS KIEFF.	×	>	×	• •	·•			-		l	l)	[]
MONODIAMESA TUBERCULATA SAETH.	1	1	1		+			- 1			11	11
STICTOCHIRONOMUS ROSENSCHOELDI (ZETT.)	×				٠.	• • • • • •	<u></u>	٠,		1	L	11
MONODIAMESA BATHYPHILA (KIEFF.)	×	1>	ĸ	1	<u>. </u> •	2	• • • • · · ·	∤.			F	11
*HETEROTRISSOCIADIUS CHANGI SAETH.		1			+						H-	11
HETEROTRISSOCIADIUS SCUTELLATUS (COETGH.)	×		1		٠.		• • • • • •				H	11
HETEROTRISSOCIADIUS GRIMSHAWI EDW.		>		• • • • • • • • • • • • • • • • • • • •	+.	•••••	• • • • • • •				II	11
PROTANYPUS MORIO ZETT.	×	1	ĸ	•••••	٠.			٠			H	H
MONODIAMESA SP. POSS. PROLILOBATA SAETH.		1			-							
HETEROTRISSOCLADIUS SP. D NEAR CHANGI					-							ll
PARACLADOPELMA SP. OBSCURA TYPE		1			 			-			1	1
TANYTARSUS DECIPIENS LIND.	1 1	×	۲)		1	.						l
MONODIAMESA NITIDA (KIEFF.)	×	İ	1					- 1	1			1
PROTANYPUS SP. A NEAR MORIO					1	-			1		1	I
PROTANYPUS SP. B NEAR MORIO					1	- 1						l
TANYTARSUS SP. N. LESTAGEI AGGL.					1			-				1
MONODIAMESA DEPECTINATA SAETH.					1			-1			11	1
CHIRONOMUS ATRITIBIA MALL.	11	1	1		L.			╝.)	ì
PHAENOPSECTRA CORACINA (ZETT.)	×				Ŀ.		• • • • • •	ш.				
TANYTARSUS INAEQUALIS GOETCH.					١							1
TANYTARSUS GREGARIUS KIEFF.	×	×	۱,		ļ		• • • • • •					1
CHIRONOMUS PLUMOSUS-SEMIREDUCTUS	11		1									
CHIKCHOMUS ANTHRACINUS ZETT.	×	×	ا		1						l	1
CHIRCHOMUS ATTENUATUS WALK.	11							1			7-	
CHIRONOMUS PLUMOSUS L.	×	×	ا		1	7					r- I	1
ZALUTSCHIA ZALUTSCHICOLA LIP.		×			ļ			٠ ۲		mm		1
CHIRONOMUS TENUISTYLUS BRUND.		x			Γ-			1			hn. 11.1	1
	11	1	1			i i		-	1			• • • • •
						1		1	1			1
			1	j		1						
			1	[1	1					1	1
			1			1			1		1	1
	11		1						l		1 1	l
	11		1	1		- 1		1	1	1	1 1	1

A: IN EUROPE, ALPINE

cinus Zett. and C. decorus Joh. appears to have take the ecological niche occupied by C. anthracinus Zett. in Europe. The value of the easily recognizable Zalutschia zalutschicola Lip. as a member of the communities characteristic for dystrophy may also be restricted by a limited distribution (Fig. 1). Limited distribution pattern is also found in Monodiamesa bathyphila (Kieff.) with one record from South Indian Lake in northern Manitoba and one new record from Alaska.

B: IN EUROPE, BOREAL

^{*:} NEW SPECIES OR NEW COMBINATION, IN PRESS

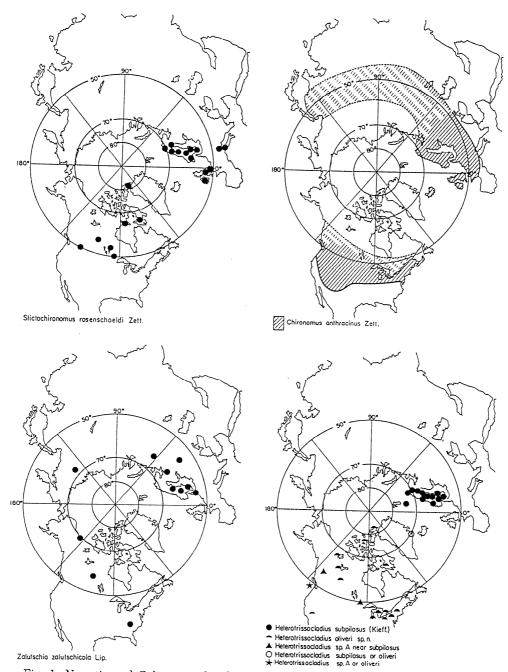


Fig. 1. Nearctic and Palaearctic distribution of some chironomids (the broken lines give approximate distribution for *Chironomus anthracinus Zett.*).

In most cases when the species are not Holarctic, a Palaearctic species or a pair of Boreal and Alpine species are, in North America, substituted by one or two sister species or at least by species within the same genus. The Palaearctic ultra-oligotrophic

Pseudodiamesa nivosa Goeton. appears to be replaced by the Nearctic Pseudodiamesa arctica (Mall.). The Palaearctic Protanypus morio Zett. common in oligotrophic lakes appears in North America constituted by two closely related species known only from larvae. The Palacarctic Protanypus forcipatus Egg. is replaced by Protanypus hamiltoni SÆTH. and Protanypus ramosus SÆTH. Particularly interesting in the distribution of the groups of Heterotrissocladius (Fig. 1). The species giving the ultra-oligotrophic Heterotrissocladius subpilosus community its name is limited to Fennoscandia, Bear Island and possibly East Greenland. Its close Nearctic sister species, H. oliveri Sæth. similarly ultra-oligotrophic is limited to the arctic and subarctic areas of Canada with relict occurrences in the Great Lakes, in Cayuga Lake, New York, and in Lake Tahoe, California. A third species as yet known only from immatures seemingly occupies the area between. In the Heterotrissocladius maeaeri group, H. maeaeri Brund. is northern European while a sister species only known from larvae is present in the Great Lakes and Cayuga Lake. In the H. grimshawi group, one species, H. scutellatus (GOETCH.) is found in the Alps, one, H. grimshawi EDW. in Northern Europe, one, H. changi SATTI. in several lakes in and east of the Rocky Mountains including the Great Lakes, Lake Winnipeg, and Cayuga Lake, and one only known from immatures from Okanagan Lake west of the Rocky Mountains. In both the H. maeaeri and the H. grimshawi group the sister species appear to occupy exactly the same niche in different geographical areas.

There are, however, a few instances where an ecological equivalent within the same species group or genus seem to be lacking. A Nearctic sister species of the Alpine Monodiamesa alpicola Brund, and the Boreal M. ekmani Brund. is M. prolilobata SÆTH. However, the last species appears to have a far wider ecological range than the first two ultraoligotrophic species. European ecological equivalents of the oligotrophic to mesotrophic Heterotrissocladius latilaminus SÆTH. as well as of the primarily moderately oligotrophic and mesotrophic Chironomus atritibia Mall. have not been found. The ecology as well as the larval morphology of the Tanypodinae and the Tanytarsini is not well enough studied to draw any conclusions. However, in most cases there appears to be Nearctic ecological equivalents. The Chironomus plumosus-semireductus type in North America is a typical Chironomus plumosus L. in male, female and pupae, but has shortened blood-gills in the larvae. Even the chromosomes are apparently identical to C. plumosus L. However, the distribution of this type often within the same lake as C. plumosus L., but without any intermediates and in more oligotrophic parts of the lakes make it clear that the two at least should be regarded as different forms. C. plumosus-semireductus have been mentioned by CHERNOVSKI (1949) as typical in several Russian lakes and has also been found in a eutrophic lake in Norway. However, the Palaearctic specimens have not been definitely associated and are not incorporated in the table.

Following the scheme of Brundin the corresponding Nearctic indicator species communities can be outlined.

Europe (Brundin 1949, 1956)

North America

Harmonic Lakes

I Heterotrissocladius subpilosus-lakes

II Tanytarsus lugens-lakes (with Heterotrissocladius grimshawi or H. scutellatus) Heterotrissocladius oliveri-lakes

I Tanytarsus sp. ?-lakes (with Monodiamesa tuberculata and Heterotrissocladius changi)

·II/III	Stictochironomus rosenschoeldi	II/III	Chironomus atritibia and Phaenopsectra coracina-lakes
III	a) Chironomus anthracinus-lakesb) Chironomus plumosus-lakes	III	a) Chironomus decorus-lakesb) Chironomus plumosus-lakes
Disha	rmonic (Dystrophic lakes)		
IV	Chironomus tenuistylus-lakes (with Zalutschia zalutschicola)	IV	Chironomus sp. ?-lakes (with Zalutschia zalutschicola)

The sublittoral and littoral zones do not characterize a lake as a whole in the same way as the profundal zone, but merely a local habitat of the lake. The gradation in Tab. 2 thus refers only to this habitat and not to the lake as a whole. This table is an even more selective list than Tab. 1 and primarily gives known stenotopic species as well as the most common more eurytopic species with known autecology. The most conspicuous feature of the table is that while there are some coldstenothermic species of the sublittoral-littoral zones in the arctic-subarctic ultra-oligotrophic lakes which are restricted to merely this type, there are no eutrophic species which also do not have occurrences in the mesotrophic or even moderately oligotrophic habitats. The coldstenothermous profundal species may in the arctic-subarctic or alpine lakes be present in the littoral, and stenoxybiont species can in the littoral zone occupy more eutrophic biotopes. As in the profundal chironomid fauna the sublittoral-littoral fauna shows a remarkable similarity of species composition with the European fauna. A number of species are Holarctic and appear to have the same ecology on both continents. It should be noted that Polypedilum laetum (MEIG.) has not been regarded as Nearctic since the species so called in North America probably is a different species (see Brundin 1949, p. 770).] Other Palaearctic species are, in North America, replaced by one or two species within the same genus and apparently similar ecology. For instance in oligotrophic and dystrophic lakes the Palaearctic Zalutschia tornetraeskensis (EDW.), Z. mucronata (BRUND.), Heterotanytarsus apicalis (Kieff.) and Pagastiella orophila (EDW.) are replaced by Zalutschia trigonacies SETH. and lingulata SETH., Z. obsepta (WEBB), Heterotanytarsus perennis SÆTH. and nudalus SÆTH., and Pagastiella ostansa (WEBB), respectively. A few species do not seem to have an ecological equivalent on the other continent. To a large extent, however, this is a result of inadequate knowledge of the Nearctic fauna.

With proper considerations to the zoogeographical distribution, temperature regimes as well as other ecological niche parameters, the species composition of the chironomid community of a lake can help evaluate both lake types and stresses occurring within a lake. However, much remains to be done in North America both with regard to taxonomy, autecology and zoogeography of the chironomids and this paper should be regarded just as representing a beginning stage in the use of North American chironomids for lake typological work.

References

Brundin, L. 1949: Chironomiden und andere Bodentiere der südschwedischen Urgebirgsseen. Ein Beitrag zur Kenntnis der bodenfaunistischen Charakterzüge schwedischer oligotropher Seen. — Rep. Inst. Freshw. Res. Drottningholm 30, 1—914.

Tab. 2. Characteristic sublittoral and littoral chironomids of habitats in Nearctic (----) and Palaearctic lakes (....). (See Tab. 1)

	Λ	В			Mt:S0-	POLY			
SPECIES:			ultra ot.	FGO -	MISO	LUTROPI	extreme	HUMIC	110511
HETEROTRISSOCIADIUS SUBPLLOSUS (KIEFF.)		×	• • • • • • • •					1	
*HETEROTRISSOCLADIUS OLIVERI SAETH.	1	J				1		1 1	
ABISKOMYIA VIRGO EDW.		Ŷ				1	1	1 1	1
ORTHOCLADIUS (O.) TRIGONOLABIS EDW. ORTHOCLADIUS (P.) CONSOBRINUS HOLMGR.		Ü				İ	1	1 1	1
HETEROTRISSOCIADIUS MAEAERI BRUND.		×				1	ŀ	1 1	1
OEKLANDIA BOREALIS KIEFF.		×	<u></u>			ŀ	i	1 1	1
*HYDROBAENUS FUSISTYLUS (GOETGH.)						j	1	1 1	
*ZALUTSCHIA TRIGONACIES SAETH.						i	1	1	
*GEN. N. NEAR HYDROBAENUS SP. N.	1	×				1	1]	1
*HYDROBAENUS MARTINI SAETH.		×				1	i]	l
*HYDROBAENUS CONFORMIS (HOLMGR.)		×				1	i	1 1	1
*HYDROBAENUS C. LABRADORENSIS SAETH.	, ,					I	1	1 . 1	
*ZALUTSCHIA TORNETRAESKENSIS (EDW.)	1	×				1		1 1	1
MONODIAMESA EKMANI BRUND.	J	3				1	1	1 1	l
TANYTARSUS LUGENS KIEFF. PARACLADOPELMA OBSCURA BRUND.	1.	1							1
STICTOCHIRONOMUS ROSENSCHOELDI (ZETT.)	×	×					1	1 1	1
PARATANYTARSUS HYPERBOREUS BRUND.	^	Ŷ				1		1	
TANYTARSUS NIGER AND.	Н	×	• • • • • • •	• • • • • • • • • • • • • • • • • • • •				[]	
PARACLADIUS ALPICOLA (ZETT.)	×	×	• • • • • • •						
MICROPSECTRA GROENLANDICA AND.	×	×							
ARCTOPELOPIA BARBITARSIS (ZETT.)	×	×						}	
LAUTERBORNIA CORACINA KIEFF.	×	×	• • • • • • •					1	1
HETEROTRISSOCIADIUS MARCIDUS (WALK.)	×	×	• • • • • • • • • • • •	• • • • • • • •					
PROTANYPUS MORIO (ZETT.)	×	×						· · · · · · · · · · · · · · · · · · ·	
PHAENOPSECTRA CORACINA (ZETT.)		×	• • • • • • •	*******				1 1	
PARATANYTARSUS NATVICI (COETCH.)		×	• • • • • • •	•••••	*******			1 1	1
THIENEMANNIMYIA FUSCICEPS (EDW.)		×	••••	•••••				1 1	1
MESOCRICOTOPUS THIENEMANNI (COETCH.)		×	· · · · · · · · · · · · · · · · · · ·				1	} • • • •	1
*ZALUTSCHIA LINGULATA SAETH.								I	1
HETEROTANYTARSUS APICALIS (KIEFF.)	×	×						1	1
PARATANYTARSUS PENICILLATUS GOETGIL		×						F.: 1	1
*HETEROTRISSOCLADIUS HIRTAPEX SAETH. STEMPELLINELLA MINOR (EDW.)	×	×						1	
	×	×						.	
*HETEROTANYTARSUS MUDALUS SAETH.	1	^	l					L I	1
*HETEROTANYTARSUS PERENNIS SAETH.								- 1	1
*ZALUTSCHIA OBSEPTA (WEBB)			ĺ						1
STEMPELLINA BREVIS EDW.	×	×		• • • • • • •					
*STEMPELLINA SP. N. NEAR ALMI BRUND.		1	· ·					1 1	1
PAGASTIELLA OROPHILA (EDW.)	×	×		• • • • • • •				1	† • • • •
PAGASTIELLA OSTANSA (WEBB)									1
*HETEROTRISSOCLADIUS LATILAMINUS SAETH.		١.	_						1
CRYPTOCLADOPELMA EDWARDSI (KRUS.)	×	×						1	1
CRYPTOCLADOPELMA VIRIDULA (FABR.)	×	I.	1 ::						1:::::
	×	×	"					[::::]	1
PSECTROCLADIUS (P.) PSILOPTERUS KIEFF. PSECTROCLADIUS (P.) SIMULANS (JOH.)	1^	1	-						
MONODIAMESA DEPECTINATA SAETH.		1							1
HARNISCHIA CURTILAMELLATA (MALL.)	×	×			• • • • • • • •	•••••	-		1
CHIRONOMUS PLUMOSUS-SEMIREDUCTUS									
CHIRONOMUS ANTHRACINUS ZETT.		×		• • • • • • • •	• • • • • • • •	• • • • • • •	• • • • • • • •	l	
DEMICRYPTOCHIRONOMUS VULNERATUS (ZETT.)	×	×		 .	• • • • • • •	• • • • • • •	• • • • • • • • • • • • • • • • • • • •	H • • • • • • • • • • • • • • • • • • •	
CHIRONOMUS ATTENUATUS WALK.		1							
STICTOCHIRONOMUS HISTRIO (FABR.)	×	×	1		• • • • • • •				
CHIRONOMUS PLUMOSUS L.	×	×			• • • • • • • •	• • • • • • • • • • • • • • • • • • • •	• • • • • • • •		
GLYPTOTENDIPES PARIPES EDW.	×	×	1				• • • • • • • •		
Intilia I dicili simila (i miai)							•••••		
EINFELDIA DISSIDENS (WALK.)	×	×			}	• • • • • • •	• • • • • • •		1
EINFELDIA SP.		1.							1
CHIRONOMUS TENTANS FABR.						• • • • • • • •	********		1
CLADOTANYTARSUS WEXIONENSIS BRUND.	×	×					• • • • • • •		
CLADOTANYTARSUS SP.	l	1.	1					1	1
POLYPEDILUM LAETUM (MEIC.)	×	×	1					U I	
TAMVIADORE REMARKS PAC	Č	×				37777.			l
TANYTARSUS USMAENSIS PAG.	1^	×			·····			[]	1
POLYPEDILUM NUBECULOSUM (MEIG.)					T				1
POLYPEDILUM NUBECULOSUM (MEIG.) ZALUTSCHIA ZALUTSCHICOLA LIP.					,			۱۲۰۰۰۰۹	1
POLYPEDILUM NUBECULOSUM (MEIG.) ZALUTSCHIA ZALUTSCHICOLA LIP. MONOPELOPIA TENUICALCAR (KIEFF.)	×								
POLYPEDILUM NUBECULOSUM (MEIG.) ZALUTSCHTA ZALUTSCHTOOLA LIP. MONOPELOPIA TEMUICALCAR (KIEFF.) LABRUNDINTA LONGIPALPIS (GOETGH.)	×	×							
POLYPEDILUM NUBECULOSUM (MEIG.) ZALUTSCHIA ZALUTSCHICOLA LIP. MONOPELOPIA ZALUTSCHICOLA LIP. LAURUNDINIA LONGIPALPIS (GOETCH.) PSECTROCLADIUS (A.) PLATYPUS EDW.	1								
POLYPEDILUM NUBECULOSUM (MEIG.) ZALUTSCHTA ZALUTSCHTOOLA LIP. MONOPELOPIA TEMUICALCAR (KIEFF.) LABRUNDINTA LONGIPALPIS (GOETGH.)	1	×							

- Brundin, L., 1952: Zur Kenntnis der Taxonomie und Metamorphose der Chironomidengattungen *Protanypus* Kieff., *Prodiamesa* Kieff. und *Monodiamesa* Kieff. *Ibid.* 37, 5—185.
 - 1956: Die bodenfaunistischen Seetypen und ihre Anwendbarkeit auf die Südhalbkugel. Zugleich eine Theorie der produktionsbiologischen Bedeutung der glazialen Erosion. — Ibid. 37, 186—235.
- FITTKAU, E. J., 1962: Die Tanypodinae (Diptera: Chironomidae). Abh. Larvalsyst. Insekten. 6, 1—453.
- OLIVER, D. R., 1963: Entomological studies in the Lake Hazen area, Ellesmere Island, including lists of species of Arachnida, Collembola, and Insecta. Arctic 16, 175—180.
- 1964: A limnological investigation of a large arctic lake, Nettilling Lake, Baffin Island. Ibid. 17, 69—83.
- Reiss, F., 1968 a: Verbreitung lakustrischer Chironomiden (Diptera) des Alpengebietes.
 Ann. Zool. Fenn. 5, 119—125.
 - 1968 b: Ökologische und systematische Untersuchungen an Chironomiden (Diptera) des Bodensees. Ein Beitrag zur lakustrischen Chironomidenfauna des nördlichen Alpenvorlandes. Arch. Hydrobiol. 64, 176—323.
- Reiss, F. & Fittkau, E. J., 1971: Taxonomie und Ökologie europäisch verbreiteter Tanytarsus-Arten (Chironomidae, Diptera). Ibid. Suppl. 40, 75—200.
- SAETHER, O. A., 1973: Taxonomy and ecology of three new species of Monodiamesa Kieffer, with keys to Nearctic and Palaearctic species of the genus (Diptera: Chironomidae). J. Fish. Res. Board Can. 30, 665—679.
 - 1975a: Two new species of Heterotanytarsus Spärck, with keys to Nearctic and Palaearctic males and pupae of the genus (Diptera: Chironomidae). Ibid., 32, 259—270.
 - 1975 b: Two new species of *Protanypus* Kieffer, with keys to Nearctic and Palaearctic species of the genus (Diptera: Chironomidae). *Ibid.*, 32, 367—388.
 - 1975 c: Nearctic and Palaearctic Heterotrissocladius (Diptera: Chironomidae). Fish. Res. Board Can. Bull., 193, 1—67.
 - 1975 d: Revision of Hydrobaenus Fries, Trissocladius Kieffer, Zalutschia midae). Ibid., 194.

Discussion

WIEDERHOLM: In Europe the genus *Micropsectra*, closely related to *Tanytarsus*, is apparently more important than *Tanytarsus* in lakes of the *Tanytarsus* type. Could you comment on the significance of *Micropsectra* compared to *Tanytarsus* in the Nearctic regions?

Sæther: Micropsectra groenlandica And. is present in North America but has so far only been found in the arctic regions. It is not unlikely that this species also is present in the Great Lakes where Micropsectra spp. plays the same significant role in the profundal benthos as it does in European lakes. However, in the lakes from west of the Rocky Mountains as well as in Lake Winnipeg Micropsectra, although present, plays a numerically insignificant role. As in Europe the genus Tanytarsus as a whole is common in a wide range of lake types and it is necessary to go to the specific level to make particular use of its species as members of indicator communities.