DISTRIBUTION AND SEASONAL ABUNDANCE OF BENTHIC MACROINVERTEBRATES IN A SUBTROPICAL FLORIDA LAKE

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Abstract

We studied the distribution and seasonal abundance of benthic macroinvertebrates from July 1975 through September 1976 in a hypereutrophic lake in subtropical Florida. The benthic community was comprised principally of oligochaetes (56.1%), chironomids (37.1%), and chaoborids (5.7%). Numbers of taxa and mean densities correlated negatively with depth and positively with mean grain size of the substratum and dissolved oxygen concentration at the mud-water interface. Seasonal abundances and life history information obtained for the predominant species of Chironomidae *(Polypedilum halterale, Glyptotendipes paripes, Chironomus crassicaudatus, Cryptochironomus fulvus, C. blarina, Cladotanytarsus* sp., *Procladius culiciformis,* and *Coelotanypus concinnus)* indicated that all of these species are multivoltine with rapid generation times. Larval lengths of life at summer temperatures, 27-31°C, ranged from 14-22 days indicating that sampling in subtropical lakes should be at short intervals (approximately 3 days) if the life cycles, ecology, and function of the components of the benthic community is to be understood.

Introduction

Numerous studies of the distribution and abundance of benthic invertebrate populations in relation to environmental factors (temperature, dissolved oxygen concentration, pH, ionic concentration, depth, water type, substratum, etc.) have been conducted in lakes (e.g., see literature reviews by Curry, 1965; Oliver, 1971; and Beck, 1977). Other studies have shown dramatic seasonal changes in the benthic community which occur as a result of different life history parameters (growth rates, numbers of generations per year, emergence patterns, etc.) of individual species (e.g., Heuschele, 1969; Iovino & Miner, 1970; Ward & Cummins, 1978). Moreover, life cycles and the number of generations per year show considerable variation with latitude or climatic zone. Thus, it is important to relate the distribution and abundance of benthic invertebrates to lake type (trophic level), physical-chemical characteristics, and life cycles and growth patterns of the major taxa.

Studies emphasizing the above have been conducted primarily in northern, cold temperate lakes. Tropical and polar lakes have received more attention in recent years, but subtropical studies generally are lacking. This study examines the distribution and seasonal abundance of benthic macroinvertebrates in a subtropical Florida lake. A second objective was to collect preliminary data on the life cycles of the chironomid community which could be used in the design of field experiments to determine factors influencing microdistribution (spatial heterogeneity) and functional responses.

Description of study area

Lake Thonotosassa (Fig. 1) is located in northeast Hillsborough County, Florida (T28S, R20E). It has a surface area of 345 ha., is 2.5 km long and 1.5 km wide at the broadest point. Surface water levels are maintained between 10.5 and 11.1 m MSL by the Southwest Florida Water Management District. The mean depth is 3.5 m with a maximum depth of 5.1 m. Below 4 m in depth, the bottom sediment is comprised principally of small-grained sand (< 63 μm), silt and organic matter; above this depth larger grained sand particles predominate.

The annual range of water temperature in Lake Thonotosassa is 14-34°C, with a mean of approximately 25°C. Short term thermal stratification (less than 5°C from surface to bottom) and hypolimnetic oxygen deficits occur in the deeper parts of the lake during the warmer months (May-October). Cowell, Dye & Adams (1975) studied the physical, chemical and biological characteristics of the lake in 1970 and found it to be in advanced stages of eutrophy due to 15 years of artificial enrichment by organic wastes from domestic sewage and citrus processing plants. A secondary sewage treatment plant (5.5 MGD extended aeration) was installed in 1970 to process both wastes but

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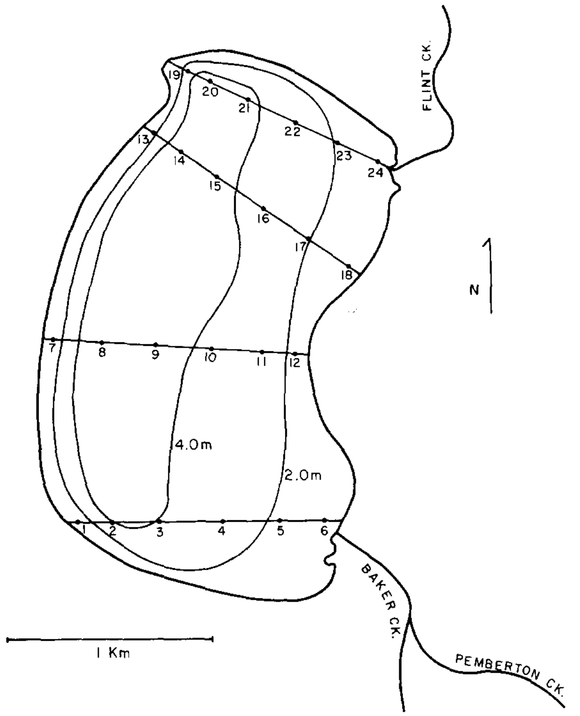

Fig. 1. Map of Lake Thonotosassa, Florida, showing depth contours and sampling stations.

since nutrient levels of the incoming creek are still high (1978), few changes have been noted.

Methods

Four transects were established in Lake Thonotosassa (Fig. 1). Each transect contained six sampling stations selected to include variations in depth and substratum composition. Benthic samples were collected, biweekly from July 1975 through September 1976, with a 15.2 x 15.2 cm (232 cm^2) Ekman dredge. Samples were sieved with a 23.6 mesh/cm (234 μm openings) screen and were preserved with a 10% formalin-rose bengal mixture (Mason & Yevich, 1967). The first instar larvae and the second instars of small species of Chironomidae are not retained by the 234 μm sieve. However, in a comparison of sieved and unsieved samples we noted (similar to Ramcharan & Paterson, 1978) that excluding these early instars did not change the species composition or relative abundance of each species; only absolute densities were affected.

Larvae and nymphs of aquatic insects were separated from sediment and detritus by floatation in sugar solution of 1.12 sp. gr. (Anderson, 1959). The residue also was searched for larvae and pupae still in their tubes and for invertebrates which do not float. All organisms were preserved in 70% ethanol. Slides and identifications of larval chironomids were made using techniques and keys of Beck (1975, 1976).

Sediment samples for particle size and organic matter analyses were collected in July 1975 with a 5 cm, inside diameter, core sampler. The upper 8 cm of each core was used to determine percentages of sand, silt, clay and organic matter since Hunt (1953), Mundie (1957), Ford (1962) and Oliver (1971) indicated that freshwater benthic organisms rarely occur at deeper depths. The pipette procedure of Barnes (1959) was used for sand, silt and clay analyses and organic content was determined by ignition in a muffle furnace for 4 hrs at 550°C. Comparisons of these data with those from two dates in 1970 (Cowell, Dye & Adams, 1975) showed only small variations, so additional collections were not made.

We used an IBM 360 computer and DATPUN and ORDANA computer programs (Bloome Santos and Field, 1977) for benthic community analyses. The DATPUN program compiles and organizes raw data, and computes simple statistics (mean, standard deviation and coefficient of dispersion) for each station. ORDANA performs classification and ordination analyses with multiple options. When statistical procedures were employed, numbers of organisms (x) were transformed using ln (x + 1) to meet basic assumptions.

Results

Similarity Analyses

Classification of site data may be used to produce discrete groups or patterns of species co-occurrence. We used Czekanowski's Quantitative Index (Field & MacFarlane, 1968), based on natural log transformed data, and group average clustering for normal classification (this clustering algorithm is used widely in marine benthic ecology). This hierarchial grouping of sites shows three groups which reflect depth and sediment characteristics (Fig. 2). Group A (75-95% similarity) contains 8 shoreline stations, all less than 2 m deep, with large-grained ($>$ 125 μm) sand substrata. Group B (75-90% similarity) consists of 7 stations, mean depths ranging from 2.0 to 4.2 m, with large-grained sand substrata. Group C (62-94% similarity) contains 9 stations in the deepest part of the lake, 3.1 to 4.7 m, where the substrata are principally fine-grained sand ($<$ 125 μm),

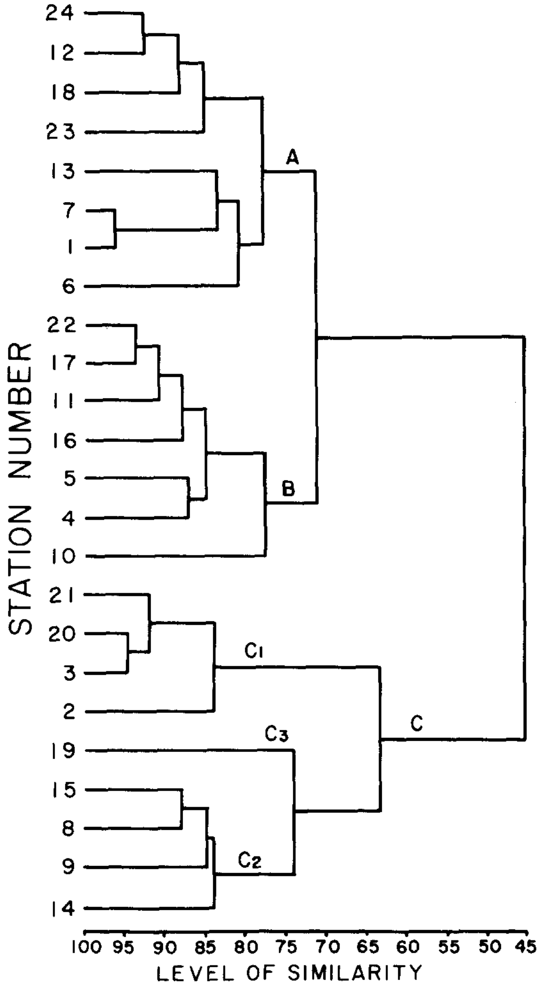

Fig. 2. Similarity dendrogram of benthic sampling stations in Lake Thonotosassa, Florida. Data from 31 sampling dates and Czekanowski's Quantitative Index were used to calculate similarity values. Station groups are: A = shallow (< 2 m) with sand substrata, B = deep (2.0-4.2 m) with sand Substrata; and C = deep (3.1-4.7 m) with silt and organic matter substrata.

silt and organic matter. The latter grouping can be divided into three subgroups corresponding with station location and depth: C_1 = stations at the north or south ends of the lake, close to shore, ranging in mean depth from 3.6 to 3.9 m (Stations 21, 20, 3, and 2); C_2 = mid-lake stations, 4.5 to 4.7 m (Stations 15, 14, 9 and 8); and C_3 = shoreline station, 3.1 m (Station 19). It is evident that Groups A and B are more similar to each other (70% similarity) than to Group C (45% similarity).

Spatial Abundances

On the basis of the above dendrogram, and with the knowledge that a single Edman grab may not constitute an adequate quantitative sample, we decided that daily and annual estimates of the relative abundances of individual taxa should be based on group means (Group A, B and C) rather than station means. Polar planimetry then was used to estimate the proportion of the lake represented by each group (Group A = 22.2%, B = 39.1%, C = 38.7%) and a weighted mean abundance for each taxon was calculated for the entire lake.

The numbers of taxa and mean densities of benthic macroinvertebrates showed marked differences between groups of stations which correlated negatively with depth and positively with mean grain size of the sediment. Numbers of taxa at Groups A, B and C were 42, 24 and 22 while mean densities were 12,255, 9,809 and 2,255/m^2, respectively (Table 1). Of the 25 taxa which occurred frequently in samples, 16 were most abundant at shallow, sandy stations of Group A (Oligochaeta, *Hyalella azteca, Caenis hilaris, Oecetis* sp., *Polypedilum halterale, Cryptochironomus blarina, C. fulvus, Procladius culiciformis, P.* sp., 4 species of *Tanytarsus*, *Palpomyia* sp., *Musculium* sp., and *Anodonta couperiana*); 5 were most abundant at deep, sandy stations of Group B *(Glyptotendipes paripes, Chironomus crassicaudatus, Cladotanytarsus* sp., *Popenais buckleyi,* and *Viviparus georgianus);* and only 3 species were most abundant at the deep, silt and organic matter substratum stations which comprised Group C *(Coelotanypus concinnus, Tanypus stellatus* and *Chaoborus punctipennis).*

The weighed annual mean density of macroinvertebrates for the entire lake was 7,424/m^2 and was comprised principally of oligochaetes (56.1%) and chironomids (37.1%). The predominant oligochaetes were *Limnodrilus* sp. and *Tubifex* sp. Ten species comprised 99.6% of the total Chironomidae collected (Table 1). These included five species of the tribe Chironomini (subfamily Chironominae): *Polypedilum halterale* (Coquillett), 37.2%; *Glyptotendipes paripes* (Edwards), 21.7%; *Chironomus crassicaudatus* (Malloch), 13.2%; and *Cryptochironomus fulvus* (Johannsen) and *Cryptochironomus blarina* (Townes) which together comprised 5.8%. In addition, *Cladotanytarsus* sp. of the tribe Tanytarsini (subfamily Chironominae) made up 10.4% and three species of the subfamily Tanypodinae, *Coelotanypus concinnus* (Coquillett), *Procladius culiciformis* (Linnaeus) and *Procladius* sp., comprised 11.4%.

Seasonal Abundances

The seasonal abundances of oligochaetes and chironomids are shown in Fig. 3. Oligochaete densities were relatively

Table 1. Annual mean densities of benthic macroinvertebrates at three groups of stations in Lake Thonotosassa, Florida and the weighted mean for the entire lake. Station groups are: A = shallow (< 2 m; $\bar{x} = 1.4$ m) with sand substratum, B = deep (2.0-4.2 m; $\bar{x} = 3.1$ m) with sand substratum, C = deep (3.1-4.7 m; $\bar{x} = 4.1$ m) with silt and organic substratum.

	Mean Density in Number per M^2			
Taxon	Group A N = 216	Group B N = 189	Group C N = 243	Weighted Mean
Oligochaeta	6,683	6,127	835	4,202
Hirudinea	1	0	0	T[1]
Amphipoda				
Hyalella azteca	7	T	1	2
Insecta				
Ephemeroptera				
Caenis hilaris	43	3	0	11
Trichoptera				
Oecetis sp.	6	1	0	2
Diptera				
Chironomidae				
Polypedilum halterale	3,748	488	9	1,026
Glyptotendipes paripes	116	1,474	4	598
Chironomus crassicaudatus	129	581	276	363
Cladotanytarsus sp.	416	499	1	288
Coelotanypus concinnus	55	61	327	163
Cryptochironomus spp.	386	188	6	161
Procladius spp.	517	63	26	150
Tanytarsus spp.	13	1	1	4
Tanypus stellatus	T	0	3	1
Other Chironomidae[2]	6	2	2	3
Total Chironomidae	5,386	3,357	655	2,757
Ceratopogonidae				
Palpomyia sp.	57	14	12	23
Chaoboridae				
Chaoborus punctipennis	54	306	752	423
Miscellaneous Insecta[3]	6	T	T	1
Mollusca[4]	12	1	T	3
Total Organisms	12,255	9,809	2,255	7,424

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1. T = trace amounts, less than 1 per M^2

2. Group A: *Chironomus attenuatus*, *Einfeldia* sp., *Dicrotendipes nervosus*, *Eukiefferiella* sp., *Harnischia edwardsii*, *Rheotanytarsus* sp., *Coelotanypus tricolor*, and *Labrundinia johannseni*. Group B: *Chironomus attenuatus*, *Kieferellus dux*, *Pseudochironomus* sp. Group C: *Chironomus attenuatus*, *Coelotanypus tricolor* and *Harnischia edwardsii*.

3. Group A: *Hexagenia munda*, *Aphylla williamsoni*, *Dromogomphus spinosus*, *Epicordula regina*, *Enallagma* sp., *Cheumatopsyche* sp., *Dubiraphia* sp., and *Telmatoscopus albipunctatus*. Group B: *Dromogomphus spinosus*. Group C: *Epicordula regina*.

4. Group A: *Musculium* sp., *Anodonta couperiana*, *Popenais buckleyi*. Group B: *Popenais buckleyi*, *Vivaparus georgianus*. Group C: *Viviparus georgianus*.

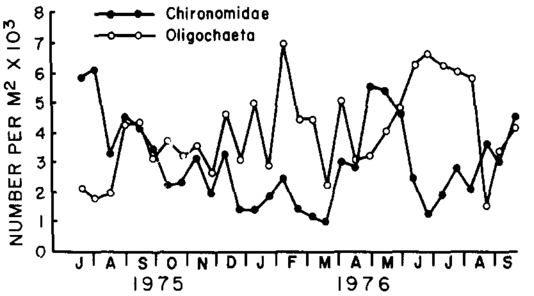

Fig. 3. Seasonal abundance of oligochaete worms and chironomids in Lake Thonotosassa, Florida, July 1975 through September 1976. Abundance for each date represents the weighted mean of 24 sampling stations.

uniform, 3,000-5,000 per m^2, at all times of the year except early February and June and July, when they exceeded 6,000/m^2. Minimum densities ($<$ 2,000/m^2) in both 1975 and 1976 were recorded in August following the occurrence of low dissolved oxygen concentrations at deep water stations. The chironomid population reached maximum abundance, 5,500-6,200/m^2, during the spring and summer (August 1975, April and May 1976) and then gradually declined through the fall, winter and early spring months. The differences between years were caused by the availability of the predominant chironomid, *Polypedilum halterale.*

Further discussion of the seasonal abundances and life histories will be limited to chironomid and other insect species which occurred with frequency ($>$ 20 organisms per m^2 on an annual basis). Densities will be given for the group(s) of stations where the species was most abundant (A, B or C).

Polypedilum halterale was the most abundant chironomid comprising 69.6% of the shoreline population (Group A). Population peaks occurred in the spring (April) and summer (July-August) months when densities exceeded 10,000/m^2 (Fig. 4). The population declined markedly during the fall and was minimal, $<$ 2,500/m^2, during the winter. At first, we thought the decline in May and the increase in July might reflect emergence and subsequent egg laying. However, twice we have conducted instar analyses of core samples (unsieved) collected at 3-day intervals during July, and have found that the larval length of life for *P. halterale* is only 14-17 days at 31°C. Thus, the two week sampling interval we used is too long to determine life history information.

Glyptotendipes paripes, the second most abundant chironomid in Lake Thonotosassa, comprised 43.9% of the population at the deep stations with sand substratum (Group B). Population densities were high throughout the summer and fall of 1975, averaging 3,465 larvae/m^2 at the Group B stations (Fig. 4). However, densities decreased to 31/m^2 in December and only three minor peaks were recorded in 1976: January (1,720/m^2), May (1,548/m^2) and September (2,666/m^2). In addition, adult populations which reached nuisance proportions along the shoreline at periodic intervals throughout the summer of 1975 were more localized and less abundant in 1976.

Glyptotendipes paripes appears to have a slower development time (egg to adult) than most of the chironomid species in Lake Thonotosassa. We have reared *G. paripes* from egg to adult in 19 days in aquaria placed in an incubator at 27°C; natural substratum supplemented with Baker's yeast was used as the food source.

Chironomus crassicaudatus was found at all sampling stations in the lake but was more abundant at the deep, sandy stations (Group B) and the deep, silty stations (Group C) where it comprised 17.3% and 42.2%, respectively of the total chironomids collected. A single, spring

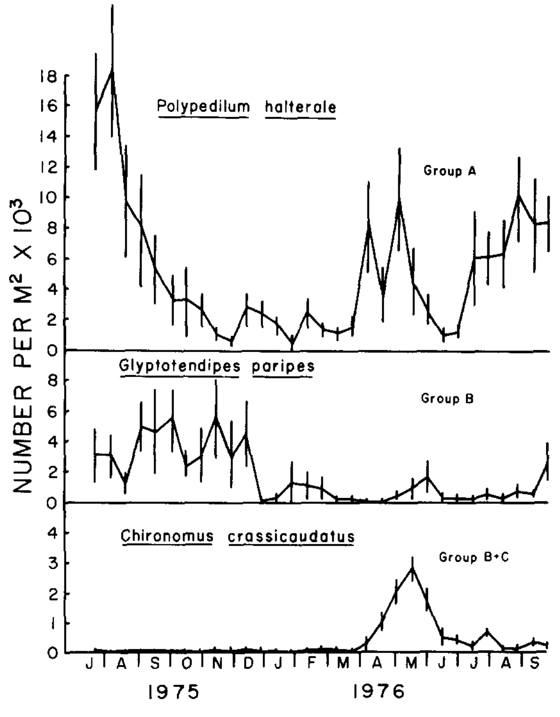

Fig. 4. Seasonal abundance of the three most abundant chironomids (*Polypedilum halterale, Glyptotendipes paripes* and *Chironomus crassicaudatus*) in Lake Thonotosassa, Florida, July 1975 through September 1976. Densities are given for the group(s) of stations where the species was most abundant and vertical lines represent ± 1 standard error.

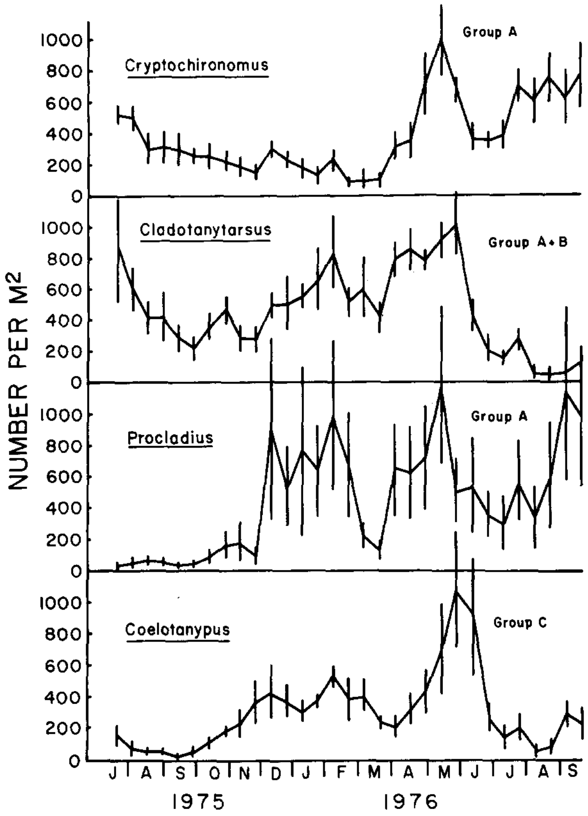

Fig. 5. Seasonal abundance of *Cryptochironomus* spp., *Cladotanytarsus* sp., *Procladius* spp. and *Coelotanypus concinnus* in Lake Thonotosassa, Florida, July 1975 through September 1976. Densities are given for the group(s) of stations where the taxon was most abundant. Vertical lines represent ± 1 standard error.

peak of larval populations was recorded with densities reaching 2,600/m^2 (Fig. 4). At other times of the year densities were quite low, often less than 100/m^2. The summer decrease in abundance apparently is related to low dissolved oxygen concentrations (0.2-2.4 mg/l) at the mid-lake deep, silty stations (Subgroup C_2). Summer populations of *C. crassicaudatus* occur at the deep, silty stations near shore (Subgroup C_1) where dissolved oxygen concentrations at the mud-water interface range from 1.8-3.6 mg/l.

C. crassicaudatus has a rapid life history in Central Florida. We have reared specimens from egg to adult in 15 days in laboratory aquaria maintained at 30°C. Moreover, preliminary field studies using instar analyses of core samples suggest that the life history may be as rapid as 10-12 days at summer temperatures of 31°C.

Cryptochironomus fulvus and *C. blarina* were most abundant along the shoreline (Group A) where they comprised 7.1% of the chironomids. Larval population peaks, similar to those of the co-occurring *Polypedilum halterale*, occurred in the spring and summer months (Fig. 5). The spring peak reached 1,005/m^2 in early May and summer densities ranged between 250 and 770/m^2. Fall and winter populations decreased to less than 200 larvae/m^2. Studies of the life histories of both species showed the larval length of life to be 14-17 days at 31°C.

Cladotanytarsus sp. was almost equally abundant at both shoreline and deep stations with sand substratum (Groups A and B). Population peaks in excess of 800/m^2 were recorded in the winter (February), spring (April and May 1976), and early summer (July 1975); minimum densities (30-220/m^2) in both years were recorded in late summer or early fall (Fig. 5). We were unable to accurately determine the larval length of life for this species because instar analyses of core samples collected at three day intervals suggest continuous reproduction rather than cohort reproduction at defined intervals (cohorts were not traceable with time).

Adult collections of *Procladius* indicated that *P. culiciformis* was the more abundant of the two species. However, larvae of both species were most abundant at sandy, shoreline stations (Group A) where they comprised 9.6% of the chironomids. Larval population densities were high, > 1,000/m^2, in the winter (December-February), late spring (May) and fall (September of 1976), and were low in the early spring (March) and summer months (June-August) of both years (Fig. 5). However, summer densities were approximately an order of magnitude higher in 1976 than in 1975 and the fall peak was not observed in 1975. We have reared larvae of both of these carnivorous species, from hatching of the egg to adult in 22 days at 27°C using natural substratum and unlimiting supplies of natural prey items.

Coelotanypus concinnus comprised 50% of the chironomid populations at the deep, silty stations (Group C). This species showed a major spring (May-June) peak with densities greater than 1,000/m^2 and minor winter (December-February) peaks in excess of 400/m^2 (Fig. 5). Minimum densities of less than 40/m^2 occurred in both years in late summer, coincidental with low dissolved oxygen concentrations. In fact, the late fall increase leading to the winter peak may only reflect the breakdown of thermal stratification and subsequent increase in dissolved oxygen concentration at the mud-water interface at the Group C stations. We have no life history data on this species.

The only insects other than Chironomidae to occur with frequency in Lake Thonotosassa were larvae of the phan-

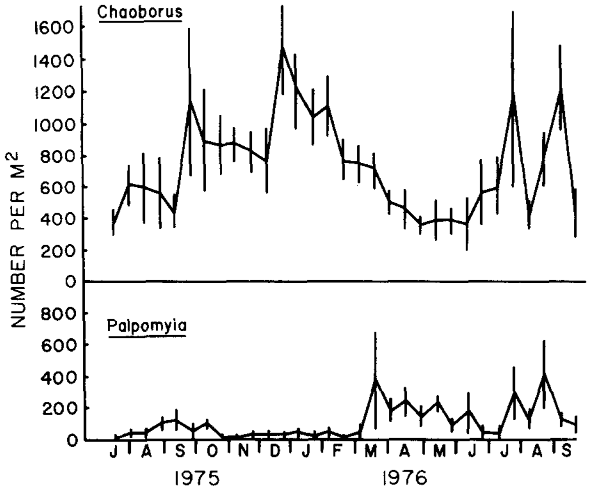

Fig. 6. Seasonal abundance of *Chaoborus punctipennis* and *Palpomyia* sp. in Lake Thonotosassa, Florida, July 1975 through September 1976. Densities are given for the group of stations where the species was most abundant, *Chaoborus* = Group C and *Palpomyia* = Group A. Vertical lines represent ± 1 standard error.

tom midge, *Chaoborus punctipennis* (Say), and the ceratopogonid, *Palpomyia* sp. *C. punctipennis* was most abundant at the deep, silty stations (Group C) where it comprised 33.3% of the benthic invertebrates. Larval population densities increased during the summer and fall months and reached a peak of 1,505/m^2 in late December (Fig. 6). Densities decreased throughout the winter and spring with minimal values, < 400/m^2, occurring in April and May. *Palpomyia* sp. was most abundant at the shallow shoreline stations (Group A). Larval population densities were high, 30-220/m^2, from March to October; late fall and winter densities were < 30/m^2 (Fig. 6).

Discussion

The literature indicates that the main factors determining the large-scale distribution patterns of benthic macroinvertebrates are related to the trophic state of the lake. Both chironomid and oligochaete communities, particularly those of the profundal zone, have been used as indicators of trophic state and/or pollution (e.g., Humphries, 1936; Brundin, 1949, 1951, 1956; Brinkhurst, 1966, 1970a, b; Saether, 1975; Jónasson & Thorhauge, 1976; Cannings & Scudder, 1978; and Moore, 1978). This relationship between indicator organisms and lake type stems from differential tolerance of oxygen deficits by various species (Cannings & Scudder, 1978). Thus, the number of species and diversity of benthic invertebrate communities tend to decrease with depth in eutrophic lakes which stratify, even for short periods, during the summer.

Lake Thonotosassa is hypereutrophic and stratifies periodically during the summer. The marked differences in similarity we observed between the deep, silty stations (Group C) and the deep or shallow, sandy stations (Groups B and A, respectively) undoubtedly reflect differential tolerance of oxygen deficits. In a previous study we used the polyethylene bag technique (Fremling & Evans, 1963) to measure dissolved oxygen concentrations at the mud-water interface, and found concentrations to be consistently low (0.2 to 1.6 mg/l) at the Group C stations during the summer (Cowell, Dye & Adams, 1975). Measurements during the summers of 1975 and 1976 also showed low concentrations at the deep, silty stations (0.2-2.4 mg/l at the midlake deep stations and 1.8-3.6 mg/l at the deep stations near shore). Both the number of species present and the densities of benthic invertebrates were reduced drastically during these periods and only species capable of surviving low oxygen concentrations were found with regularity (e.g., *Limnodrilus* sp., *Chaoborus punctipennis* and *Chironomus crassicaudatus*).

Depth was the only factor which correlated with the differences in species similarity between the two groups of sandy stations (Groups A and B); dissolved oxygen and sediment composition (particle size and percent organic matter) did not differ significantly. This suggests that the predominant species of these groups either have different dispersal abilities or that microdistributional factors (environmental or biological) which we did not measure are important.

The differences in seasonal abundances of individual taxa, both within and between-years, found in this study emphasize the need for studies to determine what factors regulate seasonal abundances in subtropical lakes. In temperate and polar lakes the seasonal abundances and growth patterns often have been shown to be dependent on temperature and/or food abundance (e.g., see papers by Jónasson & Kristiansen, 1967; Oliver, 1971; Danks, 1971; Danks & Oliver, 1972; Welch, 1976 and Moore, 1978). However, our data from this warm (mean temperature = 25°C), hypereutrophic lake show that the benthic community is not limited by food quantity and that the insect species are multivoltine and capable of continuous growth and development. Apparently temperature and food abundance do not have as much influence on seasonal abundance in eutrophic, subtropical lakes.

Other factors which might regulate seasonal abundances in Lake Thonotosassa include: 1) tolerance of variations in physical and chemical parameters, 2) food quality (e.g., phytoplankton species composition), and 3) the biotic interactions of competition and predation. Ward & Cummins (1978) stated that a more complete understanding of life cycles and growth patterns of the major taxa of benthic systems must be obtained if the function of benthic communities is to be understood. Thus, we have undertaken detailed field and laboratory experiments to determine the life cycle and ecology of each of the predominant chironomid species in Lake Thonotosassa (Vodopich, 1980).

It has long been known that it is necessary to sample at frequent intervals, throughout the year, to adequately determine the life cycles of benthic organisms. Heuschele (1969) recommended biweekly intervals for temperate lakes during periods of emergence or rapid growth. Our studies in this subtropical lake indicate that the interval should be no longer than 3 days during the summer (Cowell, unpublished data).

Summary

The distribution and seasonal abundance of benthic macroinvertebrates was studied in a hypereutrophic lake in subtropical Florida. Classification and ordination of biweekly collections from 24 stations yielded three discrete groups of stations (A, B and C), with similar patterns of species co-occurrence, which reflected depth, sediment characteristics and dissolved oxygen concentrations at the mud-water interface. Mumbers of taxa collected from Groups A, B and C (shallow, mid-depth, and deep, respectively) were 42, 24, and 22 while annual mean densities were 12,255, 9,809 and 2,255/m^2. The weighted annual mean density for the entire lake was 7,424/m^2.

The benthic community was comprised principally of oligochaetes (56.1%), chironomids (37.1%) and chaoborids (5.7%). Seasonal abundances of oligochaetes were relatively uniform throughout the year; peaks (6,000/m^2) occurred in February and June-July and the minimum density occurred in August (1,500/m^2) following oxygen deficits at the deep stations. The chironomid population reached maximum abundance in the late spring and summer and then gradually declined throughout the fall, winter and early spring. Chaoborid densities increased during the summer and fall reaching a peak of 1,505/m^2 in December. Subsequent decreases occurred throughout the winter and spring with minimal values occurring in April and May.

The predominant species of Chironomidae in Lake Thonotosassa and groups of stations at which they are most abundant are: Group A (shoreline stations)-*Polypedilum halterale, Cryptochironomus fulvus, C. blarina, Cladotanytarsus* sp., and *Procladius culiciformis;* Group B (mid-depth, large-grained sand substrata)-*Glyptotendipes paripes* and *Cladotanytarsus* sp.; Group C (deep, fine-grained sand, silt and organic matter substrata stations)-*Chironomus crassicaudatus* and *Coelotanypus concinnus.* All of these species are multivoltine with rapid generation times which indicates that sampling in subtropical lakes should be at short intervals (3 days) to determine life cycles. The large differences in seasonal abundances of individual species found in this study emphasize the need for detailed field and laboratory studies of the life cycles and ecology of the predominant species if the function of the benthic community is to be understood.

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