

ABSTRACTS

Meeting at the K.U.L. on 14 March, 1990 Aquatic Zoology

EFFETS DE LA DENSITÉ CELLULAIRE DE *CHLORELLA VULGARIS* BEIJER SUR LA DYNAMIQUE DE PRODUCTION ET LA QUALITÉ NUTRITIONNELLE DU ROTIFÈRE *BRACHIONUS CALYCIFLORUS* PALLAS

par

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La production de proies vivantes destinées essentiellement aux premiers stades de développement des larves de poissons se limite généralement à l'utilisation d'une seule espèce, *Brachionus plicatilis* MÜLLER, un rotifère d'eaux saumâtres. GALKOVSKAYA (1963) a proposé l'utilisation du rotifère *Brachionus calyciflorus* PALLAS espèce d'eaux douces, comme source d'alimentation pour les larves en aquaculture dulcaquicole. Une maîtrise parfaite de la production de cette espèce sur certains substrats alimentaires s'impose toutefois afin de subvenir aux besoins nutritionnels des larves. Des essais de production en masse de ce rotifère sur l'algue monocellulaire *Chlorella vulgaris* ont été réalisés après détermination du niveau optimal d'alimentation des organismes durant un cycle journalier et en relation avec la densité algale dans les milieux de culture. La densité cellulaire de *Chlorelles* doit être voisine de $4 \cdot 10^6$ cell/ml afin de maintenir les rotifères à satiété. A cette densité, le rotifère atteint son taux d'ingestion maximal, soit 16.000 cell/animal.h avec un taux de filtration de $4.04 \mu\text{l}/\text{animal.h}$. La production de cet organisme est corrélée linéairement à la densité cellulaire de *C. vulgaris* et son accroissement entre 1,5 et $6 \cdot 10^6$ cell/ml est hautement significatif ($P < 0,001$). L'accroissement journalier maximal, soit 31,5 rotifères/ml.j est obtenu avec $6 \cdot 10^6$ cell/ml. Le temps de doublement de la population décroît significativement ($P < 0,05$) de 5,81 à 3,01 jours avec l'accroissement de la densité cellulaire entre 1,5 et $6 \cdot 10^6$ cell/ml. Sa valeur minimale, soit 2,88 jours est atteinte avec $6 \cdot 10^6$ cell/ml. L'augmentation du taux de croissance (de 0,12 à 0,23) entre ces deux densités est significative ($P < 0,01$). Celle de la densité de population est sensiblement régulière entre 3 et $6 \cdot 10^6$ cell/ml et atteint un facteur 3 en moyenne à $6 \cdot 10^6$ cell/ml. La densité maximale enregistrée à cette concentration cellulaire, après 13 jours de culture est de 202,5 rotifères/ml. Sur le plan nutritionnel, l'accroissement de la densité cellulaire de *C. vulgaris* entre 1,5 et $6 \cdot 10^6$ cell/ml s'est traduit par une amélioration de la valeur protéique des *Bra-*

chionus de 92,10 à 107,52 ng de Protéine/rotifère. La composition en acides aminés (AA) des rotifères au terme de la culture dépend de la densité initiale des chlorelles. Le rapport (AA)essentiels/(AA)non essentiels varie de 0,95 à 1,36 entre 1,5 et 6.10^6 cell/ml. Il n'y a pas de différence significative entre 3 et 6.10^6 cell/ml ($P < 0,05$). On note d'autre part une large représentation des acides gras (AG) de la famille oléique, environ 50 % des AG totaux dont l'acide oléique C18:1n-9. Le pourcentage des acides gras longs poly-insaturés (AGLPI) est sensiblement amélioré avec l'accroissement de la densité cellulaire et principalement pour les familles linoléique et linoléique. Les AGLPI essentiels, comme C18:2n-6 et C20:5n-3 représentent respectivement 8,42 et 1,95 % des AG totaux à 6.10^6 cell/ml. La production de *B. calyciflorus* peut être entravée par la prolifération du cilié *Vorticella nebulifera* et de certains flagellés Bodonidés dans les cultures, avec comme conséquence une diminution croissante des possibilités de nutrition du rotifère et une perturbation probable de son cycle de développement.

GALKOVSKAYA, G. A. (1963) — *Zool. Th. Mosk.*, **42**, 506-512.

**POPULATION GENETIC AND SYSTEMATIC STUDY
OF THE *VENUS GALLINA* COMPLEX IN THE RIA FORMOSA,
SOUTHERN PORTUGAL (MOLLUSCA, BIVALVIA)**

by

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Venus gallina s.l. is a common bivalve species which occurs along the European coasts from northern Norway to the Black Sea. Yet, despite its abundance and commercial importance, the species still presents systematic problems. Indeed, three contrasting opinions on the taxonomy of *Venus gallina s.l.* persist in the literature. The species has been considered as (1) a single, but polymorphic species with a vast and continuous distribution, (2) a complex of two distinct species whose distributions partly overlap and, finally, (3) a single species consisting of two subspecies, viz. the Mediterranean *V. gallina gallina* and the Atlantic *V. gallina striatula*. These (sub)species would differ in some minor conchological details too.

In order to investigate this controversy, we performed an electrophoretic analysis of *V. gallina s.l.* in the Ria Formosa, southern Portugal, where the two presumed (sub)species live microsymbatrically. A total of seven enzyme systems, viz. MDH, ME, XDH, PGD, GPI, SOD and GPD, were surveyed by means of polyacrylamide gel electrophoresis in four populations (149 individuals), of which three comprised both (sub)species.

The results of this analysis show that *V. gallina s.l.* is genetically highly variable. As a matter of fact, if the three mixed populations are considered, all loci studied turn out to be polymorphic (0.95 criterion). Yet, for most loci there are very significant deviations between

the observed genotype frequencies and those expected under Hardy-Weinberg conditions. On the other hand, if in each of the mixed populations the two presumed (sub)species are treated separately, the degree of polymorphism decreases substantially, while for most loci the deviation from Hardy-Weinberg equilibria disappears and is replaced by a significant concordance. This observation suggests that the mixed populations have a heterogeneous genetic structure and hence may consist of two (or more) gene pools between which genetic exchange is reduced, if not absent. Therefore, we conclude that *V. gallina s.l.* in the Ria Formosa consists of two reproductively isolated species (*V. gallina* and *V. striatula*). This is further confirmed by an analysis of the genetic identities between the two species, as well as by both conchological and anatomical data. A much more profound account of this study will be published in a forthcoming paper.

**THE EUROPEAN EEL (*ANGUILLA ANGUILLA* L.) :
AN ENDANGERED SPECIES IN FLANDERS ?**

by

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Major concern has arisen about the actual situation and further evolution of our European eel (*Anguilla anguilla* L.) stocks over the continent. The Working Party on Eel states (1) that the recruitment of eel to European waters has declined, (2) that evidence has been presented of the restriction of habitat available to wild eel, and (3) that there is thus a possibility that the European eel could become an endangered species requiring international cooperation to maintain or restore the stocks (1).

Estimating eel stocks is feasible on four different levels :

1. Estimating population density of migrating leptocephali in the Atlantic ocean. Figures show that since 1979 leptocephali catches have been very low (< 5 individuals per 1h trail with an Isaacs Kidd Midwater Trawl with a 6 m² opening). However, to ensure a standardised methodology in the different working areas, international cooperation is still needed.

2. In most rivers of western Europe glasseel catches have diminished significantly from 1980 onwards. On the river Yser (Flanders) the situation is similar : after an abrupt decline in the amounts of ascending elvers in the years 1980-81 catches remain on a very low level.

3. Total catches of yellow eel in the EC countries have been decreasing already since 1970. Evidence has been provided on the decrease of yellow eel stocks on the river Yser as a result of the extreme eutrophication of the river. Several studies have been carried out resulting in data on natural eel stocks, indicating that quite different environmental conditions may influence eel populations profoundly.

4. No reliable data are available on the migration of silver eel in Flanders.

(1) EIFAC (1989) — Report of the Sixth Session of the Working Party on Eel, Porto, Portugal, 29 May - 3 June 1989.

It is concluded that there are reasons to believe that declining eel stocks in Flanders may be linked with the general decrease in water quality and the import of several foreign eel pathogens.

Long-term monitoring and international cooperation is needed to provide reliable information on future evolution of the eel populations in order to set up adequate stock management.

**PRELIMINARY EVALUATION OF THE ABC METHOD
FOR THE ASSESSMENT OF DISTURBANCE IN RIVER ECOSYSTEMS,
USING FISH POPULATIONS**

by

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WARWICK (1986) suggested that the distribution of numbers of individuals among species should behave differently from the distribution of biomass among species when an ecosystem is influenced by disturbance. Using combined k-dominance plots for species biomass and numbers, three situations could be distinguished; unpolluted, moderately polluted and grossly polluted. An abbreviated name for this technique is the ABC method (Abundance Biomass Comparison).

In this study, the applicability of the ABC method was evaluated for the assessment of disturbance in water courses, using fish populations. The biomass and density of the fish populations was determined by electrofishing in fifteen different watercourses. The sample points represent both undisturbed, slightly disturbed and grossly disturbed water courses. By the selection of the sample sites, a distinction was made between disturbance by pollution and physical disturbance (*e.g.*, canalization).

Field data from undisturbed sample sites (good water quality and absence of physical disturbance) support the model of WARWICK. For the disturbed water courses the model was supported as well, but it was difficult to make a distinction between physical disturbance and disturbance by pollution.

There are indications that the ABC method is applicable for the assessment of disturbance in natural fish populations in rivers. However, this method gives indications of the physical disturbance together with the disturbance caused by pollution.

It seems that the ABC method could be useful to evaluate the disturbance of fish populations in unpolluted rivers caused by physical modifications of the rivers. Further field data are required to evaluate the method.

**PRELIMINARY RESULTS CONCERNING THE CULTURE
OF FRESHWATER ANOSTRACANS AND CONCHOSTRACANS
(CRUSTACEA, BRANCHIOPODA)
FOR APPLICATIONS IN AQUACULTURE AND AQUATIC TOXICOLOGY**

by

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Freshwater anostracans and conchostracans have for a long time been considered as biological curiosities. Only in recent years, there is a growing interest to use these phyllopods as a new type of live food in aquaculture and as additional test organisms in aquatic toxicology. Especially, their common feature of producing resting eggs (cysts) with a high storage capacity, makes these animals attractive for various kinds of applications.

This study presents some quantitative reproductive characteristics of two freshwater phyllopod species cultured at 25° C and fed with micro-algae. For both species, high fecundity rates were observed. Results are here presented as averages with standard deviations. Females of the conchostracan *Caenestheriella australis* produced a clutch of 338 ± 79 cysts every 1.5 ± 0.25 days, for a total number of 39 ± 21 broods. In the fairy shrimp *Streptocephalus proboscideus*, cysts were deposited with a frequency of 1 clutch of 167 ± 16 cysts every 2.1 ± 0.9 days, for a total number of 31 ± 27 broods. Fecundity, however, was found to be affected by daily manipulations and water quality.

To assure a good water quality and a constant food concentration in the tanks, a culture system for the controlled production of fairy shrimp cysts was constructed. This system is equipped with separate recirculation units and an automatic feeding apparatus and is furthermore readily modified for the culture of the more benthic conchostracans. Deposited cysts are easily removed for further processing. The use of these cysts as starting material in ecotoxicological testing minimizes technical and financial problems inherent to continuous culturing of live stock. Cysts could also be used to inoculate large scale culture systems in aquaculture.

Because of their non-selective and continuous filter feeding habits, mainly on phytoplankton, freshwater phyllopods could help to control the accumulation of agricultural wastes and tertiary effluents from purification processes by converting organic particulate material into phyllopod biomass. This energetically acceptable culture method offers promising perspectives in the artificial propagation of several kinds of freshwater fishes.

A CULTURE SYSTEM FOR FAIRY SHRIMPS
(CRUSTACEA, ANOSTRACA)

by

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In contrast with *Artemia* cysts which can be harvested in a monospecific way, fairy shrimps generally co-occur with several other species in their respective biotopes and a mixture of resting stages is found in the sediments. To obtain specific fairy shrimp resting eggs, a culture system is required and suitable culture techniques must be developed for a successful production of cysts.

A semi-automatic and small-scale culture system is developed which aims at optimizing water quality, maintaining a constant food concentration and at facilitating a regular monitoring of the organisms and the harvesting of their cysts. The design is directed towards an automation of both the algal food culture and the feeding of the organisms themselves. The fairy shrimps are reared in conical tanks, equipped with a recirculation system consisting of a sand filter. Deposited cysts are collected in a separate compartment, which is easily removed for further processing of the harvest.

Streptocephalus proboscideus, a subtropical species, was reared at an initial density of 56 animals per litre. Several physico-chemical (pH, O₂, NH₃-N, NO₂-N, NO₃-N, and PO₄) and biological (survival, growth, diseases, brood size, hatching quality) variables were monitored at regular intervals and compared to the results derived from a static/renewal system with an initial density of 30 indiv./l. and with discontinuous food supply.

In the static/renewal system, the carrying capacity is clearly exceeded. The accumulation of ammonia (max : 0.92 mg l⁻¹) and nitrite (max : 1.48 mg l⁻¹) resulted in a crash of almost the entire experimental population during the first week.

The conditioned recirculation system proved to be a reliable technique. A steady state was established and a biological overcapacity was observed, effectively handling the initial peak load, assuring low mortality rates ($\pm 5\%$ per week) and a high cyst production (± 200 cysts per brood cycle) in the experimental fairy shrimp population (sex ratio 1/1), opening possibilities for several types of applications in aquaculture and aquatic toxicology. Total production yielded an average of 18,000 cysts per day and per culture unit (volume : 6 l.). Increased production yields can be expected from higher population densities, manipulation of sex ratio and diet, and from optimization of the filter unit.

THE GENUS *LIMNOCYTHERE* s.s. IN AFRICA
(CRUSTACEA, OSTRACODA)

by

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Lake Galla is a fossil lake in southern Ethiopia and consists at present of four clearly separated and typologically very different basins : the most northerly situated lake Zwai, the central lakes Langanu and Abijata and the southern lake Shala. Both Zwai and Langanu are freshwater lakes (salinity < 1‰), Abijata and Shala are saline lakes (salinity = c. 17‰). Geological data suggest high lake levels in the early Holocene (9220 ± 190 BP) and in the mid Holocene (5610 ± 100 BP) and a smaller transgression of late Holocene age (GROVE *et al.*, 1975). Lake Awassa, also a freshwater lake, is situated south of the Galla basins and is supposedly completely isolated from the former.

The five lakes hold an interesting ostracod fauna, the most important component being a (sub)specific cluster of *Limnocythere*-taxa : *L. thomasi thomasi* in Lake Zwai, *L. borisi borisi* in Lake Abiyata, *L. borisi awassaensis* in Lake Awassa, *L. borisi shalaensis* in Lake Shala and the same *L. borisi shalaensis* and *L. thomasi langanoensis* in Lake Langanu. All taxa are endemic to their basin, *L. borisi shalaensis* being the only one occurring in two lakes.

It thus appears that *Limnocythere* has experienced a very active and rapid speciation in East African lakes and it would at first glance seem acceptable to situate at least the sub-speciation in the period since the last pluvial, i.e. between 5000 BP and present. There are, however, several arguments against this hypothesis, for example the presence of a subspecies of *L. borisi* in the completely isolated Lake Awassa. There are thus two possibilities :

(1) Subspeciation indeed occurred in the past 5000 years and in that case, *L. borisi* was passively introduced in Lake Awassa.

(2) The said (sub-)speciation is of a much older date and the various taxa persisted sympatrically in the filled Galla-basin at various times.

In vitro cross-breeding experiments, combined with the fossil record of the Galla-basins, could possibly provide a solution to this dilemma.

FOOD ITEMS OF PERCH (*PERCA FLUVIATILIS* L.)
IN THE MONTH OF JULY IN W.P.C. DE BLANKAART IN 1982 AND 1988

by

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Food items of different length classes of perches were studied in 1982 and 1988 in the eutrophicated storage reservoir (60 ha, max depth 5 m) of W.P.C. De Blankaart (W. Flanders, Belgium).

The main food items of perches, smaller than 205 mm, were zooplankton followed by Chironomidae. Perches with a length between 205 and 250 mm and those with a length greater than 250 mm eat a lot of Chironomidae and no fish.

The fish biomass measured in 1988 consisted of perch *Perca fluviatilis* (number (n) : 353,124 ; total weight (tw) 1,709 kg), bream *Abramis brama* (n : 5 ; tw : 22.9 kg), pike *Esox lucius* (n : 1 ; tw : 0.7 kg), pikeperch *Stizostedion lucioperca* (n : 43 ; tw : 0.5 kg), eel *Anguilla anguilla* (n : 566 ; tw : 128 kg). The total fish biomass obtained a value of 31 kg/ha, which is very low for a eutrophicated reservoir. The total fish biomass in July 1988 was calculated to be 0.21 fish/m³ or 1.1 g/m³.

Each year a great number of cormorants (*Phalacrocorax carbo*) were observed during several months on the reservoir. Their influence on the fish biomass could be great but has not been directly measured.

Abundance and biomass of zooplankton to feed on was great enough and not considerably influenced by the turbidity due to the presence of phytoplankton. In 1982 and 1988 the chlorophyll concentrations were respectively 19.9 mg/m³ and < 10 mg/m³ and the total number of Cladocera were respectively 385 and 150 organisms/l.

The density of Chironomidae reached a value of 70,000 animals/m² in the summer of 1986 (GODDEERIS, pers. comm.). There were no data available on the density of Chironomidae in 1982 and 1988.

The relation between length and weight in 1982 and 1988 was calculated to be respectively $\log G = - 5.086 + 3.163 \log L$ ($R^2 = 0.997$) and $\log G = - 5.008 + 3.118 \log L$ ($R^2 = 0.972$). As these relations are comparable with data cited in literature for other perch populations, we may conclude that the lack of fish in the diet does not reduce the growth of perches in the reservoir of W.P.C. De Blankaart.

**USE OF AERIAL ADULT INSECTS
(EPHEMEROPTERA, PLECOPTERA AND TRICHOPTERA)
FOR THE ECOLOGICAL SURVEY OF THE MEUSE RIVER IN BELGIUM :
PRELIMINARY RESULTS AND PROSPECTS**

by

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In order to palliate the difficulties of adequately sampling benthic macroinvertebrates in as large a river as the Meuse in Belgium, the possibility of using aerial adult insects as a reflecting image of the aquatic communities was considered, with a view to manage a practical method for a long-term survey of the river. The purpose of the preliminary study presented here was to check this possibility by comparing the Ephemeroptera, Plecoptera and Trichoptera caught in three differentiated sampling sites, assuming that a method that would allow a characterization of spatial differences would also be likely to reveal temporal changes.

The three sampling sites, Dinant, Tailfer and Andenne, show a decreasing environmental quality, with a strongly marked impairment in Andenne, below Namur, and confluence with

the polluted Sambre river (4) (2). In each site, a modified light-trap (1) was placed on the steady substructure of the weir. Sampling was carried out from April to October 1987; the light-traps operated two hours a day, from one hour before to one hour after sunset.

Thirty-four species were caught: 9 Ephemeroptera, 2 Plecoptera and 23 Trichoptera. Larvae of 26 of them had already been found in banks or other accessible places of the Meuse, some having only been identified at the genus level (2) (3). Besides 2 clearly exogenous Trichoptera species, the other newly recorded species are typical of large rivers and are thus supposed to come from poorly accessible media of the Meuse.

Comparison of the species caught in each site revealed a clear decrease of species richness from Dinant (25 species) and Tailfer (22 species) to Andenne (12 species), also expressed by diversity indices (Shannon-Weaver's index respectively 2.18, 1.34 and 0.38). Most species progressively decrease or disappear, whereas the few reputedly tolerant species as *Hydropsyche contubernalis* MCLACHLAN and *Ecnomus tenellus* (RAMBUR) survive or even develop in Andenne.

These preliminary results tend to indicate a relative efficiency of the method for space and probably also time-spread comparisons. A condition for its practical use as survey method would be a strong reduction of the sampling period. Current researches aim at defining optimal periods and weather conditions for an effective sampling.

MICRORÉPARTITION DE SAUMONS JUVÉNILES INTRODITS ET DE TRUITES *FARIO* AUTOCHTONES DANS LE SAMSON (BASSIN DE LA MEUSE)

par

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Le saumon atlantique (*Salmo salar* L.), poisson migrateur anadrome, a disparu de Belgique vers les années 1930 suite à la construction d'une série de grands barrages sur la Meuse et à l'accroissement généralisé de la pollution des milieux fluviaux vers cette période.

Dans le cadre du projet de réintroduction du saumon atlantique dans le bassin mosan, des déversements d'œufs, d'alevins et de tacons 0⁺ (= saumons dans leur première année de vie) ont eu lieu en 1988 dans plusieurs affluents de la Meuse dont le Samson, rivière calcaire salmonicole de la région namuroise.

Au printemps 1989, la microrépartition des truites (*Salmo trutta trutta* m. *fario* L.) autochtones et des saumons juvéniles introduits a été relevée dans le Samson.

(1) FONTAINE, J. (1982) — *Bull. Soc. linn. Lyon*, **51**, 81-89.

(2) MEURISSE-GENIN, M., A. REYDAMS-DETOLLENAERE, Ph. STROOT and J. C. MICHA (1987) — *Arch. Hydrobiol.*, **109**, 67-88.

(3) MOL, A. W. M. (1987) — *Ent. Ber.*, **47**, 60-64.

(4) VAN CRAENENBROECK, W. and M. VAN DEN BOS (1983) — RIWA, Amsterdam, 146 pp.

Le secteur de pêche, d'une longueur de \pm 800 m et d'une largeur moyenne de 3 à 5 m, formé d'une succession de radiers à écoulement rapide et de zones plus profondes à écoulement plus faible, est situé dans le bois de Gesves, sous couvert forestier.

La technique d'échantillonnage consistait à relever les caractéristiques du microhabitat (hauteur de la colonne d'eau, vitesse de courant à 0,6 fois la hauteur d'eau, la granulométrie du substrat et la plus petite distance par rapport à la berge) chaque fois qu'un Salmonidae appartenant à une des deux espèces avait été capturé par pêche à l'électricité. Le relevé des mesures du microhabitat se faisait généralement à l'endroit où le poisson avait été observé pour la première fois.

Les résultats obtenus plaident en faveur d'une ségrégation spatiale des deux espèces : bien que le nombre de saumons 1⁺ capturés était faible (n = 17), la différence de microrépartition avec les truitelles de même âge (n = 156) a été significative pour le facteur vitesse de courant (p < 0,001, test de chi-carré) et pour la distance des poissons à la berge (p < 0,01, test de chi-carré) : les truites occupaient en majorité des microhabitats à proximité des berges et à faible vitesse de courant tandis que les tacons de saumon abondaient dans les zones à courants plus rapides, à substrat grossier (galets ou blocs) et plus éloignées des berges. En ce qui concerne la hauteur de la colonne d'eau, aucune différence interspécifique n'a été observée, mais nous avons constaté une tendance très nette des truites 2⁺⁺ (n = 115) à occuper des habitats plus profonds que les truites 1⁺ (n = 160) et les saumons 1⁺ (n = 17).

Cependant, la preuve d'un effet de la compétition sur le choix du microhabitat des saumons juvéniles n'a pas été établie jusqu'à présent. Nous ne savons pas si la répartition des tacons de saumons, notamment en ce qui concerne la préférence pour les stations à courant rapide, est la conséquence d'une ségrégation sélective (c.à.d. que les juvéniles des deux espèces occupent d'office des niches écologiques séparées) ou d'une ségrégation interactive (où la microrépartition des tacons serait le produit d'une interaction compétitive avec les truitelles). Cette question fera l'objet de recherches expérimentales dans un avenir prochain.

GRAZING PATTERNS OF *ACARTIA TONSA* ON *CHLAMYDOMONAS* SP.

by

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Both the Coulter Counter and C¹⁴ method were used to measure the grazing activity of the marine calanoid copepod *Acartia tonsa* on different concentrations of a *Chlamydomonas* sp. culture.

Both methods show that the ingestion rate increases with food concentration until some critical value, at which it seems to begin to decline.

The ingestion rate measured by the C¹⁴ method increases at a slower rate than that measured by the Coulter Counter method.

In most cases, the ingestion and clearance rates measured by the Coulter Counter method are higher than those measured by the C¹⁴ method.

Ingestion rate measurements by the C^{14} method only include grazing on labelled living particles whereas ingestion rate measured by the Coulter Counter method includes all particles grazed on.

Compared with the Coulter Counter method, the C^{14} method provides a short term measurement of the grazing rate. This makes it very useful in measuring the precise rhythms of copepods grazing activity, but the C^{14} method does not give any information about size class selectivity. By using C^{14} and Coulter Counter methods together, one can obtain more complete information about the total grazing activity of copepods.

PCBs UPTAKE AND ELIMINATION KINETICS IN FRESHWATER FISH

by

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^{14}C -PCB (Aroclor 1242) was directly (in water) or/and indirectly (in food) administered to freshwater fish (*Lebistes reticulatus*). Low chronic doses were used : $0.27-2.5 \text{ ng.ml}^{-1}$ water and $8.5-35.6 \text{ ng.g}^{-1}$ food. The uptake and elimination parameters obtained for direct exposure of PCBs are similar to the parameters obtained for direct plus indirect exposure routes ; they differ significantly from the kinetics observed during indirect contamination and elimination experiments. The accumulation equilibrium with direct PCB exposure is rapidly reached ($t_{1/2} < 0.5$ day). A dose-independent bioconcentration factor of ± 4700 was calculated, corresponding to the value predicted for physicochemical partitioning. The accumulation of PCBs during chronic exposure through the food is slower ($t_{1/2} = 3$ days); no bioaccumulation was measured. The results indicate that physicochemical partitioning of PCBs between fish lipids and water is the most important mechanism for uptake of PCBs through the water. The elimination of PCBs after exposure through water, food or water plus food includes biologically regulated mechanisms. Part of the PCB load can even remain in the body for a very long period.