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## Acta Hydrobiologica

### Contents of Volume 15 (1973)

**Leszek BERGER**

**Mollusca of the River Raba and some of its tributaries.**

Acta Hydrobiol., 15, 401-411.

**Abstract** - The author found 17 species of Mollusca occurring in the River Raba and near-lying bogs. *Bythinella austriaca* and *Ancylus fluviatilis* are inhabitants of streams and *Valvata naticina* and *Unio crassus* of rivers. The two former were found in their typical environment, the two latter being found in old river beds in which *Gyraulus laevis* also occurred. The fairly large number of species found in the old river beds with their simultaneous absence in the river lead to the conclusion that no proper conditions exist for them in the investigated river, i.e. either there are no biotopes or because the river is polluted with sewage.

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**Piotr EPLER and Krzysztof BIENIARZ**

**Influence of heated discharge waters from the "Skawina" Electric Power Station on the ichthyofauna of the rivers Skawinka and Vistula.**

Acta Hydrobiol., 15, 331-339.

**Abstract** - Investigations on the influence of heated waste waters discharged into the rivers Skawinka and Vistula showed that except in the hottest seasons of the year fish gather in the area of heated waters. In high temperatures of the water (20 °C and 28 °C for not heated and heated waters respectively) the total amount of fish caught decreased. It was found that such species as *Leuciscus cephalus* (L.), *Alburnus alburnus* (L.), *Barbus barbus* (L.), and *Leuciscus leuciscus* (L.), are highly eurythermic.

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**Elżbieta GRABACKA**

**Protozoans in ponds filled with sugar factory wastes.**

Acta Hydrobiol., 15, 97-111.

**Abstract** - The protozoans in the bottom mud of fish ponds used for the treatment of sugar factory wastes were investigated. In the microfauna of protozoans, mainly in the Ciliata group, the qualitative and quantitative relations were examined. The course of self-purification of the water in the pond was distinctly reflected in the development of Ciliata. It was shown in their succession when three ecologically different associations followed each other. The rate of mineralization of wastes depended on the degree of water pollution and limited the occurrence and disappearance of individual associations of Ciliata in the mud of the pond. The enrichment of the environment of the pond with new mineral constituents influenced favourably the number of Ciliata.

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**Witold HUK**

**Epiphytic microphytes in a pond polluted with beet sugar factory wastes.**

Acta Hydrobiol., 15, 89-95.

**Abstract** - The present paper concerns observations (made from April to September 1967) of the development of epiphytic microphytes on a synthetic medium (bunches of cellophane strips) in a pond filled with undiluted beet sugar factory wastes. The results of investigations showed full mineralization of wastewaters within 8 months from the moment of releasing the wastewaters into the pond; individual stages of self-purification were characterized by a different composition of periphyton and different number of particular taxa. This corresponded with biochemical changes recorded parallelly in the examined pond.

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**Jan KAROLCZYK<sup>1</sup>, Jerzy KWAPULIŃSKI<sup>2</sup> and Hubert MAJCHRZYK<sup>1</sup>**

**Studies on the radioactivity of the carcass of carp (*Cyprinus carpio* L.) bred in southern districts of the Katowice Province.**

Acta Hydrobiol., 15, 413-425.

**Abstract** - In the years 1965-1971 the total beta radioactivity, potassium background, and artificial radioactivity of the carp carcass, plankton, periphyton, bottom sediment, and of the water were measured in the fishery farms in six southern districts of the Katowice Province. In the period of investigations the values of the measured parameters were maintained on the same level. The order of the measured values depended neither on the age of the fish nor on the localization of their breeding. In a fish pond the following have the greatest cumulative capacity of radioactive substances: plankton, periphyton, and fish. Phytoplankton has higher radioactivity than zooplankton. The carp shows great abilities of discriminating radioactive substances in the natural food, which appear to exist even in the early stages of the development of the carp.

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**Maria KLIMCZYK-JANIKOWSKA**

**Cyprinid (*Chondrostoma nasus* L.) from the River Raba.**

Acta Hydrobiol., 15, 197-213.

**Abstract** - The rate of growth, biometry, and food of 187 *C. nasus* from the River Raba were investigated. The investigated population grew similarly to that from the rivers of Czechoslovakia, but slower than those from the rivers of the Soviet Union. Biometric analysis indicated that *C. nasus* from the Raba was typical form. The varieties morpha *elata* and morpha *elongata* were not noted in the examined material. The population from the Raba was fairly uniform with regard to plastic features. The males differed from the females in longer fins, especially pectoral ones, and in shorter body circumference. The cyprinid fed exclusively on plants, mainly on filamentous algae of the genus *Cladophora* and on diatoms. *C. nasus* from the Raba fed less intensively in spring than in autumn. The investigated *C. nasus* produced similar amounts of spawn to those from the rivers of Transylvania.

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**Henryk KLIMOWICZ**

**Microfauna of activated sludge. 3. The effect of physico-chemical factors on the occurrence of microfauna in the annual cycle.**

Acta Hydrobiol., 15, 167-188.

**Abstract** - The effect of physico-chemical and atmospheric conditions on the development of the microfauna in the annual cycle was determined. 69 species were identified. It was difficult to determine which fluctuations in the assemblage of the microfauna depended on the technological and which on the atmospheric conditions. The majority of species in the activated sludge appear accidentally in periods which are difficult to anticipate. The remaining species may be divided into frequently and rarely found in the course of the year, and into those characteristic for warm or cold seasons of the year. The rise in temperature from March to September caused a gradual increase in the number of species and the fall in temperature in the cold season an increase in the number of individuals. The number of species and of the individuals representing them depends mainly on the course of the process of sewage purification and to a lesser degree on the season of the year.

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**Jerzy KOLASA**

**Turbellaria and Nemertini of greenhouses in Poznań.**

Acta Hydrobiol., 15, 227-245.

**Abstract** - The author presents 19 Turbellaria and 2 Nemertini found in greenhouses in Poznań, among which 13 are new for Poland .

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**Andrzej KOWNACKI and Marta KOWNACKA**

**The distribution of the bottom fauna in several streams of the Middle Balkan in the summer period.**

Acta Hydrobiol., 15, 295-310.

**Abstract** - In the streams of the Middle Balkan the main component of the bottom fauna were the larvae of insects represented mainly by Ephemeroptera, Plecoptera, Trichoptera, and Chironomidae. In these streams six communities of fauna were found, which differed in their qualitative composition and in the structure of domination. On this basis two types of streams were determined. The stream Ribarica is a typical stream of "middle mountains" which may be classified according to Illies and Botosaneanu (1963), while the short upper parts of streams on the slopes of the Botev are of montane type.

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**Łucja KRZECZKOWSKA-WOŁOSZYN**

**The plankton of new transfer-ponds at the Gołysz Farm.**

Acta Hydrobiol., 15, 427-436.

**Abstract** - The present work is a continuation of earlier investigations on the plankton of the first and second transfer-ponds in the first year after their construction. It discusses the development of plankton with the application of another type of fertilization. The observed changes in the phyto- and zooplankton indicate a structure more consistent with that occurring in water bodies utilized for a longer time. The analyses of

the fertilization did not reveal any influence on the numbers of plankton. Among other factors, some role was probably played by its composition, chiefly among the algae.

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**Edward KRZYŻANEK**

**Bottom macrofauna in the Goczałkowice dam reservoir in the years 1965-1969.**

Acta Hydrobiol., 15, 189-196.

**Abstract** - Investigations of the bottom macrofauna of the dam reservoir at Goczałkowice were carried out from 1965-1969 as a continuation of those carried out from the beginning of its existence. In the years 1965-1967 a further decrease in the amount of bottom macrofauna was observed, but from 1968 there was a gradual increase. Oligochaeta and the larvae of Chironomidae (mainly *Procladius* and *Chironomus plumosus*) dominated quantitatively. The number of large Mollusca, mainly *Unio pictorum*, also increased. The upper and central zones were most numerously populated by the bottom macrofauna. Usually the encountered forms had already been noted in previous years.

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**Jerzy KWAPULIŃSKI**

**Cumulation of radioactive substance in dam reservoirs.**

Acta Hydrobiol., 15, 215-225.

**Abstract** - Systematic investigations on the accumulation of beta radioactive substances by the benthos, periphyton, phytoplankton, zooplankton, bottom sediment, and higher plants in limnic and rheolimnic reservoirs showed that the cumulation coefficient was of the order  $10^3$ - $10^5$ . The cumulation coefficient for the bottom sediment and periphyton was influenced by hydrobiological parameters.

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**Krystyna KYSELOWA**

**The plankton of ponds enriched with wastes from beet sugar factories.**

Acta Hydrobiol., 15, 51-88.

**Abstract** - The feeding of ponds with wastes from sugar factories generally stimulated the growth of phyto- and zooplankton. A high concentration prolonged the period of self-purification. The development of the algae considerably outpaced that of zooplankton. The succession of individual groups of plankton followed in four stages whose length was affected by the concentration of wastes. Stage I - of heterotrophy, showed the beginning of development of Volvocales (mainly genus *Chlamydomonas*) and Euglenophyceae (genera *Euglena*, *Phacus*) and an almost total lack of zooplankton. It was a period of high BOD<sub>5</sub> and COD, and of oxygen deficit. Stage II - of hyperautotrophy, was characterized by the appearance of Chlorococcales and Cryptophyceae with growing numbers of zooplankton (mainly rotifers). It was correlated with a further decrease in BOD<sub>5</sub> and COD and with a high content of oxygen. In this stage the mineralization processes of organic substances from the wastes were almost at an end and the content of oxygen was often very high. In the III, transition, stage a decrease in the number of algae and an increase in Cladocera were observed. Stage IV was characterized by stabilization of the chemical conditions and by the formation of phyto- and zooplankton communities characteristic for normally utilized ponds.

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**Stanisław LEWKOWICZ**

**Chemical changes in the water and accumulation stratum of soils in ponds fertilized with beet-sugar factory wastes.**

Acta Hydrobiol., 15, 1-49.

**Abstract** - The processes of self-purification of sugar factory wastes in fish ponds (1967-1968) as well as the primary production of phytoplankton were investigated. The time of mineralization of the wastes lasted from 3-6 months and depended on the concentration or dilution of organic matter in them. During the time the waste waters were in the ponds 4 stages were distinguished: 1) heterotrophy, 2) hyperautotrophy, 3) transition, 4) stabilization. In the examined ponds a complete disintegration of organic matter introduced with the sewage was established, as no accumulation of organic matter was found in the pond soils towards the end of the vegetative season. Fish yield was several times higher in ponds fertilized with sugar factory wastes than in control ponds.

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**Stefan MIELEWCZYK**

**Heteroptera of the River Raba, some of its tributaries and riverine reservoirs.**

Acta Hydrobiol., 15, 387-400.

**Abstract** - The paper presents the results of investigations on the fauna of Heteroptera which proved to be much richer in riverine reservoirs than in the Raba itself and some of its tributaries. Scarcity of the fauna of these insects in flowing waters is, however, not a secondary but a primary phenomenon resulting from the mountane character of these waters. Their division into characteristic section was made on the grounds of the distribution of two species of the genus *Micronecta* Kirk. and participation in their population of the specimens of the brachypterous (short-winged) and macropterous (long-winged) forms. The presence of these species demonstrates a high purity and low trophism of the populated waters. The two species of the *Micronecta* Kirk. develop only one generation in the course of a year, and their larvae can hibernate not only in the IVth but also in the IIIrd stage. It was found that for some species the riverine reservoirs play role of refugia during flood periods.

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**Stefan MIELEWCZYK**

**The dragonflies (Odonata) of the River Raba, of some of its tributaries, and of riverine water bodies.**

Acta Hydrobiol., 15, 379-385.

**Abstract** - The author indicates considerable scarcity of the fauna of dragonflies in the investigated water courses: they only developed in the middle and lower section of the River Raba. He attempts to explain this phenomenon by the great variability of the water levels and by the character of the substratum. Generally, *Calopteryx virgo* (L.), *Gomphus vulgatissimus* (L.), and *Onychogomphus forcipatus* (L.) occurred as single specimens. Only the larvae of *Calopteryx splendens* (Harr.) which lived in the lower section of the Raba appeared in greater numbers. The species of the genus *Calopteryx* Leach, which usually replace each other, are fairly important in the description of water courses. The fauna of dragonflies in the riverine water bodies was considerably richer. It was composed of the species characteristic for small water bodies or of those usually dominant in weakly eutrophicated reservoirs. For some rheophilous forms the riverine water bodies proved some sort of refugium.

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**Przemysław OLSZEWSKI**

**Effect of cutting down shore trees on the intensity of water movements in a lake.**

Acta Hydrobiol., 15, 131-143.

**Abstract** - An attempt was made to check the conviction that trees surrounding a lake, and thus protecting it from the wind, cause a decrease in the mobility of the waters in the lake. A lake was investigated for 5 years before and after 5 years cutting down shore trees. No noticeable differences in the intensity of the spring circulation, temperatures of the hypolimnion, deeper shifting of the thermocline or other properties supporting the above conviction were observed. Variations of these properties were before and after cutting down shore trees considerable and connected with differences in the course of meteorological phenomena in different years.

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**Kazimierz PASTERNAK**

**The occurrence and variability of microelements in the water in the longitudinal section of the River Nida.**

Acta Hydrobiol., 15, 357-378.

**Abstract** - In the water of the River Nida and its clean and polluted tributaries the occurrence of the 10 most important microelements and the general chemical composition were investigated in the characteristic periods of the year. It was found that the inflow of pollution with the waters of the River Bobrza brings about an increase in the content of heavy metals, especially of zinc, chromium, and lead in the water of the Czarna Nida and the Nida. However, the concentration of none of these metals in the water of these two rivers exceeds the limits considered as distinctly noxious for aquatic organisms. The self-purification of these rivers from heavy metals, with the exception of chromium, occurs on a sector of about 40 kilometres. Among other factors it is favourably influenced by the admixture of the clean waters of their tributaries. A certain set-back in the self-purification of the discussed polluted rivers is observed in the winter period. Also a tendency to an increased content of heavy metals in the water is observed with low water levels in the rivers. The content of microelements in the clean tributaries of the Nida, with the exception of strontium, generally corresponds with their content in other clean rivers and chiefly depends on the character of the substratum. In connection with the characteristic geological structure of the catchment basin, the amount of strontium in the water of the whole river network of the Nida is several times higher than in other clean rivers.

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**Kazimierz PASTERNAK**

**The spreading of heavy metals in flowing waters in the region of occurrence of natural deposits and of the zinc and lead industry.**

Acta Hydrobiol., 15, 145-166.

**Abstract** - The basic chemical composition and the concentration of Cu, Zn, Pb, Cd, Cr, Co, Mo, Sr, and Ba were investigated in flowing waters (channels, streams, and rivers) in the region of occurrence of natural deposits of zinc and lead, and of the mining and metallurgic industry exploiting these deposits. Among other things it was found that from the region of such an industrial centre the migration of zinc, lead, and

cadmium by the water courses may be fairly considerable. In the water of the successive receivers of wastes the most rapid decrease in lead and the lowest in zinc content was found with the increase in the distance from the source of pollution. The natural occurrence of lead and zinc ores in the deeper rock layers does not to any extent influence the surface waters with pH about 8.1 and with high total hardness - which occur in the investigated region. The increase in the content of zinc, lead, and cadmium in the water of the investigated water courses is mainly connected with the industrial pollution. The quantitative level of these three heavy metals shows a distinct tendency to increase in the autumn-winter season. The occurrence of calcium-dolomite rocks in the catchment basin of the investigated water courses is revealed in the chemism of the water by an exceptionally high content of magnesium and a low content of manganese and copper.

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**Tadeusz PENCZAK and Maciej ZALEWSKI**

**The efficiency of electrofishing with rectified pulsating current in the zones of a river of medium size, evaluated by the method of successive catches.**

Acta Hydrobiol., 15, 343-355.

**Abstract** - The efficiency of fishing in the zones of the transverse sections of a medium sized river (Pilica) was evaluated using an alternating current generator with a full-wave rectifier together with fishing nets (lead-in-net and guiding-barrier-net). In the qualitative catches the net was of no importance and in the quantitative ones of little importance.

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**Jan PILARSKI**

**The application of infra-red gas analyser for measurements of gas exchange of aquatic plants.**

Acta Hydrobiol., 15, 275-293.

**Abstract** - It was found that a gas analyser can be used for measurements of gas exchange of aquatic plants, using boiled water and appropriate flow. Preliminary investigations were carried out on three species: *Potamogeton lucens*, with submersed leaves, and *Nuphar luteum* and *Sagittaria sagittifolia* with floating leaves. As an example, continuous measurements of gas exchange in aquatic plants were carried out during 24 hours in order to establish the dependence of photosynthesis on light intensity and to calculate the estimated photosynthetic productivity.

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**Janusz STARMACH**

**Oxygen consumption and number of erythrocytes in the peripheral blood in three stone loach (*Nemachilus barbatulus* L.) populations.**

Acta Hydrobiol., 15, 437-442.

**Abstract** - Oxygen conditions and the number of erythrocytes in the peripheral blood were investigated in "good" (8.37 mg O<sub>2</sub> L<sup>-1</sup>) and "bad" (1.14 mg O<sub>2</sub> L<sup>-1</sup>) oxygen conditions in stone loach living in a montane, submontane, and lowland river. It was established that the examined fish populations from waters characterized by different oxygenation of the water, in spite of acclimatization in aquaria to equivalent oxygen conditions, show differences in the normal oxygen consumption and in the increasing number of

erythrocytes in the peripheral blood after being transferred into "bad" conditions. It may thus be assumed, in the case of the three examined stone loach populations, that the oxygen consumption and the percentage of increase in the erythrocyte count are genetically conditioned.

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**Jan A. SZCZERBOWSKI**

**The course of spawning of the trout (*Salmo trutta m. lacustris* L.) from Lake Wdzydze in 1968 and 1971.**

Acta Hydrobiol., 15, 321-330.

**Abstract** - Investigations on the biology of the lake trout and especially its reproduction have been carried out since 1954. The main aim of the investigations was to establish the degree of changes which have taken place in the composition and number of the population under the influence of economic proceedings. Materials from the last 4 years indicate that their numbers in the lake have decreased considerably. Both the size of commercial catches and the number of specimens taking part in spawning fell to the level from before the time when the lake trout came under strict protection, this being caused by an increasing intensity of angling and poaching. The lake trout should be under special protection as there exists some danger of its perishing completely.

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**Maria SZUMIEC**

**Determination of water temperature in shallow water bodies.**

Acta Hydrobiol., 15, 247-257.

**Abstract** - Methods of measurements and of intermediate determination of water temperature by using the relation between the ground and air temperature were discussed. For water bodies of pond type the existence of a linear regression between the two values was established and presented in the form of equations. A nomogram was calculated separately for each decade of the warm part of the year (May-September). The possibility of applying the calculation results for water bodies situated in various regions of Poland was discussed.

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**Lesław TUROBOYSKI**

**The indicator organisms and their ecological variability.**

Acta Hydrobiol., 15, 259-274.

**Abstract** - A number of indicator species of plant and animal organisms of the micro- and macrobenthos from various rivers were selected, their zonal association and resistance to different kinds of factory wastes and municipal sewage being determined. The zones of pollution were determined according to the communities of indicator organisms and on the basis of chemical investigations. A number of species of organisms were classified as individual ecological groups: 1) of saprophobous organisms, 2) of saproxenous organisms, 3) of saprophilous organisms, and 4) of saprobiontic organisms. The work was carried out for the purpose of biological analysis of polluted waters.



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**Ivan TUŠA**

**Mayfly larvae in current habitats of Bělá Creek (the Northwestern part of Moravia, Czechoslovakia).**

Acta Hydrobiol., 15, 311-320.

**Abstract** - Vertical and seasonal distribution of the specific composition, number and biomass of mayfly larvae in Bělá Creek was studied in the period between May 1969, and March 1970. The specific composition gives the degree of pollution in individual habitats. From the results it follows that the greater pollution under Jeseník has a negative influence upon the specific composition and individual abundance of mayfly larvae. The slight pollution (within xeno-oligosaprobity) from individual houses scattered along the banks increases the number of larvae. Seasonal distribution of these larvae produced above all by the fluctuating occurrence of the most frequent species (*Baetis alpinus* and *B. rhodani*) shows two peaks: in December-March and in July.

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**Jerzy ZIEBA**

**Macrobenthos of ponds with sugar factory wastes.**

Acta Hydrobiol., 15, 113-129.

**Abstract** - In four investigated ponds the intensification of the development of macrobenthos, similarly as the period of numerous occurrence of this fauna, depended on the initial concentration of sugar factory wastes. After an "oxygenless" period, when the bottom animals disappeared (winter, spring, and, with concentrated wastes, up to summer) numerous or even mass quantities of the new generation of Chironomidae larvae usually appeared. Usually the *Chironomus* f.l. *plumosus* and *Glyptotendipes polytomus* larvae (more rarely those of *G. ex gr. gripekoveni*) decidedly dominated, being the best adapted species to these respiration and trophic conditions. The dilution and progressing mineralization of wastes brought about an increase in the qualitative differentiation of the macrobenthos, which accompanied a decrease in the numbers of dominants. In the second year of the investigations, besides a strong reduction of organic matter (decrease in BOD), the feeding of more dense stocks of carp probably led to a considerable decrease in the numbers and biomass of the benthos. No distinct correlation between the numbers of the occurring larvae and the quantities of food (Ciliata, plankton algae) was found in the majority of cases.

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