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## Acta Hydrobiologica

### Contents of Volume 28 (1986)

**Maria BOMBÓWNA**

**Chemical composition of the water in the River Mała Panew, and its tributaries, and of the ground water in its basin in the Upper Silesian Industrial Region (Southern Poland).**

Acta Hydrobiol., 28, 55-67.

**Abstract** - The water chemism was influenced by industrial pollution, the forestation of the drainage basin and its agricultural utilization. This last one was especially evident in the ground water. The River Mała Panew is significantly loaded with non-biodegradable pulp-mill wastes. Metallurgical industrial, domestic sewage, and mining waters of great salinity drained into the River Stoła bring about periodical formation of the sodium chloride type of water with parallel advanced destruction. Below the inflow of the River Stoła the self-purification zone of the River Mała Panew is extended, this constituting a threat to the dam reservoir at Turawa.

**Key words:** rivers, ground water, hydrochemistry, macroelements, nutrient compounds, eutrophication, pollution.

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**Halina BUCKA**

**Algae and some bacteria in the plankton of the River Mała Panew and its tributaries polluted with industrial discharged waters (Southern Poland).**

Acta Hydrobiol., 28, 121-138.

**Abstract** - In the years 1976-1979 the algae and also some bacteria occurring in the plankton of the River Mała Panew and its affluents, strongly loaded with industrial wastes (heavy metals), were investigated. Their high concentrations had a negative effect on the aquatic environment, facilitating the development of species of great tolerance and resistance to pollution (mainly Euglenales or some blue-green algae) and those easily adaptable to the altered environmental conditions (certain diatoms and green algae). At the polluted stations a reduction in the number of taxa (particularly of the genera of diatoms) and a distinct decrease in population density were noted.

**Key words:** rivers, streams, phytoplankton and some bacteria, industrial wastes (heavy metals).

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**Halina BUCKA**

**Phytoplankton of the Rożnów dam reservoir in the years 1982-1983 (Southern Poland).**

Acta Hydrobiol., 28, 345-360.

**Abstract** - The phytoplankton of the Rożnów dam reservoir and of the River Dunajec above and below this water body was investigated. Current results in comparison with those obtained in earlier studies showed a change in the composition of algal communities and species domination. The phytoplankton was successively dominated by chrysophytes-dinoflagellates or diatoms, or diatoms-green algae in the 1940's,

diatoms-dinoflagellates and diatoms-chrysophytes-dinoflagellates-blue-green algae in the fifties, diatoms-cryptomonads in the sixties, and blue-green-green algae in the eighties. This indicates that the reservoir, initially of riverine type, gradually changed into one of stagnant water type. A mutual effect of phytocoenoses of the river on the reservoir and *vice versa* was observed.

**Key words:** river, dam reservoir, algal communities, temporal changes.

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**Charalambos DAOULAS**

**Diurnal feeding pattern of *Rutilus alburnoides hellenicus* Stephanidis (Pisces, Cyprinidae) in Lake Trichonis, Greece.**

Acta Hydrobiol., 28, 227-235.

**Abstract** - A study on the diurnal feeding pattern and the feeding habits of *Rutilus alburnoides hellenicus* in the oligotrophic Lake Trichonis in different seasons was made. Feeding takes place during the day and the fullness index changes with the hourly and seasonal rhythm. The feeding spectrum is wide and the diet includes both plant and animal food. Zooplankton predominated in the diet during the morning and at night, while phytoplankton was more important in the afternoon.

**Key words:** *Rutilus alburnoides hellenicus*, feeding behaviour, Lake Trichonis, Greece.

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**Elżbieta DUMNICKA, Jerzy ZIĘBA and Roman ŻUREK**

**Characteristics of zooplankton and macrobenthos in the Rożnów dam reservoir (Southern Poland).**

Acta Hydrobiol., 28, 393-413

**Abstract** - The annual cycles of the zooplankton and benthos of the Rożnów dam reservoir were investigated. In the backwater zone a very small biomass of the benthos and the smallest zooplankton biomass were frequently noted. A change in the zooplankton structure was recorded in spring, this indicating that fish were feeding on the fauna. In the central part of the reservoir and in the zone near the dam changes in the number of animals were mainly connected with their life cycle, while the predation of fish and invertebrates played a minor role.

**Key words:** dam reservoir, zooplankton, Oligochaeta, Choronomidae, seasonal changes, fish pressure.

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**Andrzej FALNIOWSKI**

**Pigmentation in *Hydrobia ulvae* (Pennant, 1777) and *H. ventrosa* (Montagu, 1803) (Hydrobiidae, Prosobranchia) from the Polish Baltic.**

Acta Hydrobiol., 28, 443-449.

**Abstract** - Head pigmentation of two common *Hydrobia* from the Polish Baltic Sea, *H. ulvae* and *H. ventrosa*, is presented. The earlier acknowledged diagnostic value of this feature, usually allowing correct determination of a species, is confirmed. However, the restrictions and difficulties of such determination, caused by the great variability of the feature, were neglected by the earlier literature. Numerous untypical pigmentation patterns are described. Pigmentation of the tentacles is considered more taxonomically useful

than of the snout.

**Key words:** Mollusca, *Hydrobia*, Baltic, head, pigmentation, determination, variability.

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**Wojciech FIAŁKOWSKI**

**Life cycles and microdistribution of *Nemoura cinerea* (Retz.) and *Nemurella picteti* Klap. (Plecoptera: Nemouridae) from two small lowland streams in Southern Poland.**

Acta Hydrobiol., 28, 199-213.

**Abstract** - *Nemoura cinerea* and *Nemurella picteti* populations were studied in two lowland streams: the Lane Błoto (season 1978/79) and a tributary of the River Biała Przemsza in Kali (season 1979/80). The investigations concentrated on microdistribution and the life cycles. A strong relationship between the character of the substratum and the population density was found. The stoneflies preferred microhabitats among plants. Both species were univoltine with prolonged periods of flight and hatching.

**Key words:** life cycles, lowland streams, microdistribution, microhabitats, *Nemoura cinerea*, *Nemurella picteti*, stoneflies.

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**Tadeusz M. FLEITUCH**

**The food of dominant fish species in the Rożnów dam reservoir (Southern Poland) and their food resources.**

Acta Hydrobiol., 28, 463-473.

**Abstract** - Quantitative and qualitative analyses of the food of the dominant fish species *Abramis brama* L., *Rutilus rutilus* L., *Lucioperca lucioperca* L., *Perca fluviatilis* L., and *Aspius aspius* L. caught in the reservoir were carried out from 1982-1984. Seasonal variation in the filling of the alimentary canal was observed in non-predatory fish and in predators. Additionally, the coefficient of food selectivity was calculated for non-predatory fish. The greatest food competition was found to be between the perch and pikeperch.

**Key words:** dam reservoirs, food of fish, food selectivity, food competition.

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**Maria HUL**

**Ciliata in bacterial and fungal communities in the River Łyna (North-Eastern Poland).**

Acta Hydrobiol., 28, 149-164.

**Abstract** - An analysis was made of the similarities and differences between the communities of Ciliata inhabiting the epiphytes of the bacteria *Sphaerotilus natans* and *Beggiatoa alba* and of the fungus *Leptomitus lacteus* in the River Łyna at two stations of slightly different water chemism. The communities showed great similarity in dominating species. The differences lay in the number of the leading forms and whole communities, frequency of species, and proportion of the systematic and ecological groups.

**Key words:** rivers, pollution, Ciliata, bacterial and fungal communities.

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**Marek JELONEK**

**Food of juvenile stages of rudd (*Scardinius erythrophthalmus* L.), roach (*Rutilus rutilus* L.), and perch (*Perca fluviatilis* L.) in the heated waters of the Rybnik dam reservoir (Southern Poland).**

Acta Hydrobiol., 28, 451-461.

**Abstract** - The food of the fry of rudd, roach, and perch from the littoral of the Rybnik reservoir was investigated. The reservoir is supplied with warm post-cooling water from the Rybnik power station. The material was collected in the spring and summer of 1979 and 1980. The content of the alimentary canal of fry from hatching until about the 120th day life was investigated. Differences were shown in the food of the individuals of species investigated in stages II, III, and IV.

**Key words:** reservoir, heated waters, fry, food, rudd, roach, perch.

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**Henryk KASZA**

**Hydrochemical characteristics of the Wisła-Czarne reservoir (Southern Poland) in the period 1975-1984.**

Acta Hydrobiol., 28, 293-306.

**Abstract** - The work describes the hydrochemical characteristics of the Wisła-Czarne reservoir and its affluents. The intake of the biogenic compounds of the reservoir and the loading of the bottom nutrients were calculated. On the basis of the annual mean of some of the physico-chemical features of the reservoir water their changes during 10 years investigation period are given.

**Key words:** dam reservoir, hydrochemistry, nutrients, chlorophyll.

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**Henryk KASZA**

**The effect of the Goczałkowice dam reservoir on the hydrochemical conditions of the River Vistula below the dam (Southern Poland).**

Acta Hydrobiol., 28, 83-97.

**Abstract** - In the period 1982-1983 the physico-chemical properties of the River Vistula waters were investigated at 4 stations: above the inflow to the reservoir, directly below the dam, and 1 km and 20 km below the reservoir. When compared with the entering waters, those flowing out from the reservoir are poorer in mineral compounds of nitrogen and phosphorus but richer in organic matter. In summer, the waters below the reservoir contain far less oxygen than flowing in. The reservoir has a negative effect on the purity of the River Vistula.

**Key words:** river, dam reservoir, nutrients, organic matter, water purity.

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**Barbara KAWECKA<sup>1</sup> and Pertti ELORANTA<sup>2</sup>**

**Biology and ecology of snow algae. 4. SEM studies on the cell wall structure of "resting cells" of *Chloromonas rostafiński* (Starmach et Kawecka) Gerloff et Ettl (Chlorophyta, Volvocales).**

Acta Hydrobiol., 28, 387-391.

**Abstract** - Scanning electron micrographs showed that the studied cells, as yet unidentified but called "resting cells", of *Chloromonas rostafiński* (Starmach et Kawecka) Gerloff et Ettl had a characteristic sculpture of the cell wall. They could not be identified with any other snow alga described so far. Most probably they were akinetes or zygotes of *Chloromonas rostafiński* (Starmach et Kawecka) Gerloff et Ettl.

**Key words:** snow algae, cell wall structure, SEM.

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**Barbara KAWECKA**

**Sessile algae of the River Nida (Southern Poland) in the area of experimentally fertilized bankside soils.**

Acta Hydrobiol., 28, 371-378.

**Abstract** - No great differences were found in the structure of algal communities developing at control stations, and those affected by the run-off from experimentally fertilized fields. Cells of *Fragilaria pinnata*, *Nitzschia palea*, *Achnanthes lanceolata* with varieties, and *Cocconeis placentula* var. *euglypta* were most frequently observed: the biomass index of diatoms reached maximum values in the summer-autumn period and minimum ones in winter. At the station below a fertilized field the number of *Navicula pupula*, *Nitzschia kützingiana*, and green algae increased in the summer-autumn period.

**Key words:** rivers, sessile algae, ecology of algae, seasonality, agricultural wastes.

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**Barbara KAWECKA**

**The effect of light deficiency on communities of sessile algae in the Olczyński stream (Tatra Mts, Poland).**

Acta Hydrobiol., 28, 379-386.

**Abstract** - The development of sessile algae in a montane stream in conditions of reduced light intensity was investigated using the shade thrown by bridges. *Homoeothrix janthina*, *Hydrurus foetidus*, *Prasiola fluviatilis*, *Achnanthes minutissima*, *A. pyrenaica*, *Ceratoneis arcus*, *Cymbella affinis*, *C. ventricosa*, *Diatoma hiemale* with the variety *mesodon*, *Gomphonema angustatum*, *G. intricatum* var. *pumilum*, *G. olivaceum* showed a negative tendency in their development while a positive one was observed in *Achnanthes lanceolata*, *Amphora ovalis* var. *pediculus*, *Cocconeis placentula* var. *euglypta*, and *Cymbella sinuata*.

**Key words:** stream, sessile algae, ecology of algae, effect of light.

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**Małgorzata KŁONOWSKA**

**The food of some mayfly (Ephemeroptera) nymphs from the streams of the Kraków-Częstochowa Jura (Southern Poland).**

Acta Hydrobiol., 28, 181-197.

**Abstract** - The composition of the diet (in the annual cycle) was studied for four species: *Ecdyonurus venosus* (Fabr.), *Ephemera danica* Müll., *Baetis rhodani* Pict., and *Centroptilum luteolum* (Müll.) from streams of the Kraków-Częstochowa Jura. *E. venosus* and *B. rhodani* feed mainly on diatoms (herbivores - scrapers of algae). Detritus and unidentified organic particles dominated in the food of *E. danica* and *C. luteolum* (detritivores). The species composition of the diatoms ingested is given and also the diet preferences of the larvae with regard to diatoms. Usually those species which occurred most frequently in the environment in a given season were ingested in greater amounts.

**Key words:** streams, mayflies, food, diatoms, herbivores, detritivores.

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**Edward KRZYŻANEK**

**The effect of the Goczałkowice dam reservoir on zoobenthos of the River Vistula (Southern Poland).**

Acta Hydrobiol., 28, 215-225.

**Abstract** - The effects of the Goczałkowice dam reservoir on the qualitative and quantitative composition of zoobenthos in the River Vistula is presented. The investigation was carried out at three stations: 1) 3 km above the reservoir, 2) 100 m below the dam, 3) 1000 m below the dam. It was observed that even the small water discharges which occurred in 1982-1983 affected the number and biomass of the zoobenthos as well as its taxonomic composition.

**Key words:** .

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**Edward KRZYŻANEK**

**Zoobenthos of the small rheolimnic Wisła-Czarne dam reservoir (Southern Poland) in the period 1975-1984.**

Acta Hydrobiol., 28, 415-427.

**Abstract** - The characteristics of the zoobenthos and the process of its formation in a rheolimnic dam reservoir, with a special consideration of Chironomidae, are described. In the central zone of the reservoir (Station I) the most numerous zoobenthos appeared in the second year after filling, followed by a constant decrease in its number and biomass. In the bay zone of the reservoir (Stations II and III) the largest numbers of zoobenthos were noted in the eighth year. Oligochaeta predominated quantitatively at all stations (70-80%).

**Key words:** dam reservoir, zoobenthos, abundance, succession.

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**Janina KWANDRANS**

**The structure of a diatom community in the spring sector of a stream with low pH (Biała Wiselka, Silesian Beskid, Poland).**

Acta Hydrobiol., 28, 139-148.

**Abstract** - The work presents the structure of the diatom community developing in the spring sector of a mountain stream with low pH. A small species variety was observed in the community. The following species occurring in acid waters were of essential importance: *Eunotia exigua*, *E. tenella*, and *E. trinacria*. The effect of water acidity on the cell morphology of diatoms was noted. The changes concerned linear dimensions, the number of striae in 10  $\mu$ m, and the shape of the valve. During the period of investigation no important seasonal changes were observed in the structure of the diatom community.

**Key words:** pH, mountain stream, diatom community.

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**Aniceto LÓPEZ FERNÁNDEZ and Tomás MUÑOZ ALBELDA**

**Vertical distribution of certain organochlorine compounds in the monomictic Lake Zoñar (Córdoba, Spain).**

Acta Hydrobiol., 28, 307-316.

**Abstract** - The depth variations of organochlorine insecticide residue levels in the waters of Lake Zoñar were studied. During the stratification period, an exponential increase in contaminant rates was recorded in relation to depth, this correlation disappearing in the mixing period. The recorded pollution was due mainly to hexachlorocyclohexanes with a mean level of 0.48 ppb in the mixing period, 0.43 ppb in the epilimnion, 0.80 ppb in the thermocline, and 3.62 ppb in the hypolimnion during the stratification period. The highest levels were found in sediments (20.15 ppm DW).

**Key words:** water, lake, sediments, hexachlorocyclohexanes.

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**Andrzej MAMCARZ**

**Conversion formulae and nomograms for various measurements of length in the peled (*Coregonus peled* Gmel.).**

Acta Hydrobiol., 28, 475-481.

**Abstract** - In the present paper, the relationships between three measurements of length (standard length, total length, Smitt's length) were described for the age classes 0+ to 3+ in *Coregonus peled* (Gmel.). Nomograms were constructed for particular age groups, facilitating rapid interconversion of these measurements. The statistical verification of regression equations revealed that the conversion formulae for particular classes differ, hence common equations may be used for only some of them.

**Key words:** conversion relationship, fish, *Coregonus peled*, body length measurements.

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**Grażyna MAZURKIEWICZ**

**Microbiological characteristics of the River Dunajec waters in the sector between Nowy Targ and Nowy Sącz (Southern Poland).**

Acta Hydrobiol., 28, 111-119.

**Abstract** - The microbiological description of the waters of the River Dunajec in a sector of nearly a hundred kilometers, was based on an investigation which was carried out during one year and included analysis of the number of selected groups of bacteria and their biomass. The obtained results showed that the fertility of the water increased along the river course in spite of the self-purification processes occurring there. A continuous inflow of wastes closely connected with towns lying on the river is evident.

**Key words:** river, microbiological characteristics, self-purification.

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**Andrzej S. OLEKSOWICZ**

**Spatial distribution, biomass, chlorophyll-*a* content, and primary production of Charophyceae in Lake Zmarłe (Northern Poland).**

Acta Hydrobiol., 28, 165-180.

**Abstract** - The paper presents the spatial distribution of 5 Charophyceae species in Lake Zmarłe, as well as the biomass, chlorophyll *a* content, and the production of 3 species from optimum development at different depths. The mean biomass of the Charophyceae diminishing with depth, was as follows: *Chara tomentosa* - 3.42 (3 m), *Ch. globularis* - 2.56 (6 m), and *Nitella flexilis* - 1.17 (9 m) g DW dm<sup>-2</sup>, whereas the chlorophyll *a* content increased and amounted to: 1.357, 2.527, and 5.427  $\mu\text{g mg}^{-1}$  DW, respectively. The production of *Ch. globularis* and *Ch. tomentosa* was the greatest and that of *N. flexilis* the lowest.

**Key words:** lakes, littoral zone, macrophytes, Charophyceae, biomass, chlorophyll *a* content, primary production.

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**Andrzej PILARCZYK**

**Changes in selected blood parameters in carp with signs of spring viremia, gill necrosis, and tapeworm invasion.**

Acta Hydrobiol., 28, 253-263.

**Abstract** - The level of fourteen haematological and biochemical parameters and the activity of serum enzymes in the blood of healthy carp and of specimens with signs of spring viremia of carp, gill necrosis, and tapeworm invasion were compared. In most indices distinct deviations from the norm were associated with spring viremia.

**Key words:** carp, pond production, diseases, physiological indices.

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**Andrzej PILARCZYK**

**Selected haematological and biochemical indices of the carp organism in ponds with a high**



### **production level.**

Acta Hydrobiol., 28, 245-251.

**Abstract** - During three different periods of the farming season the content of haemoglobin, haematocrit, proteins and total lipids of serum, the level of glucose, cholesterol, urea, creatinine, calcium, and inorganic phosphorus, and the activity of acid and alkaline phosphatase, and asparagine and alanine transaminase were investigated in the serum of one-year- and two-year-old carp under conditions of ponds with a high production level.

**Key words:** carp, ponds, intensive production, physiological indices.

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### **Marta RECZYŃSKA-DUTKA**

#### **Transport of heavy metals in three differently polluted surface waters in Silesia (Southern Poland).**

Acta Hydrobiol., 28, 279-291.

**Abstract** - The transport of Pb, Cu, Ni, Cd, Co, Zn, Mn, and Fe was investigated in waters polluted by metallurgical, chemical, municipal, and pulp-mill wastes. The effect of Fe-Mn oxides, Ca and Mg carbonates, chlorides, sulphates, nitrates, phosphates, and organic matter on the transport of metals was analysed on the basis of linear correlations of the bulk concentrations of metals and chemical parameters of the water. The different share of the chemical mechanisms was discussed in relation to the quality and the level of water pollution, physico-chemical conditions, and chemical interactions of various types.

**Key words:** water pollution, heavy metals, chemical parameters interrelations.

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### **Jacek SANECKI**

#### **Communities of sessile algae in the River Dunajec, above and below the dam reservoirs of Rożnów and Czchów (Southern Poland).**

Acta Hydrobiol., 28, 361-370.

**Abstract** - Sessile algae of the River Dunajec were studied in the region of two dam reservoirs. *Cladophora glomerata* was dominant, along with diatoms. Above the reservoirs, where the river was polluted, *Nitzschia palea* and *Navicula cryptocephala* were the most common species. *Sphaerotilus natans* was also present. Below the reservoirs the quality of the water improved; an increase in the number of diatom species was recorded, with a preponderance of *Navicula viridula* var. *avenacea*, *N. gracilis*, *Nitzschia dissipata* and *Achnanthes minutissima*. The decreasing number of clean water species demonstrates the increasing pollution of the river.

**Key words:** rivers, regulated streams, sessile algae, pollution.

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### **Małgorzata SCHMAGER**

#### **Laboratory studies in the effect of different conditions of oxygenation on the bioeston of the upper Vistula (Southern Poland).**

Acta Hydrobiol., 28, 329-343.

**Abstract** - The effect of an exponentially increasing degree of oxygen saturation of the water on the course of self-purification processes and on the bioeston of the polluted water of the Vistula, above the water stage at Łęczany, was studied. It was demonstrated that aeration brought about a decline in the numbers of small filamentous bacteria, with a simultaneous increase in the area and number of *Zooglea* associations. It was also found that for some algal species the level of dissolved oxygen may be an important factor in limiting or stimulating population size.

**Key words:** rivers, water aeration, bioeston, algal autecology.

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**Halina SMAL**

**Ground inflow of nutrients from catchment areas into two lakes of the Łęczyńsko-Włodawskie Lake District over a period of three years.**

Acta Hydrobiol., 28, 69-81.

**Abstract** - The chemical composition of shallow ground waters in sectors of catchment areas of various land use was examined. On the basis of the amount of ground water inflow from the particular sectors and on the concentration of elements during periods of water run-off, the ground run-off to the lakes was calculated. The participation of the sectors in the ground charging of the lakes with nutrients, the transport of elements from 1 ha of the sectors, and the loading of the lake surface were assessed.

**Key words:** land use, ground run-off, concentration of elements, load of nutrients.

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**Adam SOLSKI**

**Accumulation and evolution of organic nitrogen and mineral compounds in some aquatic vascular plants.**

Acta Hydrobiol., 28, 3-19.

**Abstract** - The growth (in cm) and increase in biomass (in g DW) of some species of aquatic vascular plants were investigated during their vegetative development. The variability in content of organic nitrogen, phosphorus, potassium, iron, and calcium, and the accumulation of these components in the above-ground parts of plants were studied during the vegetative development. The pattern of leaching out of organic nitrogen and mineral compounds from mown plants in ponds was investigated in the periods of late spring and late summer. It was found that the leaching process was most intensive during the first five days and depended upon the component leached out and the species and age of the mown plants.

**Key words:** helophytes, chemical composition, development, mineralization.

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**Adam SOLSKI**

**Forms of mineral phosphorus in the bottom sediments of the Lubachów reservoir and Lake Sława (South-Western Poland).**

Acta Hydrobiol., 28, 267-278.

**Abstract** - In the sediments of the Lubachów reservoir and Lake Sława three forms of mineral phosphorus were distinguished: phosphorus combined with iron, with calcium, and with aluminium. A regularity in their horizontal distribution according to the direction of the water flow was found, which consisted mainly in a gradual decrease in the content of phosphorus combined with calcium with a simultaneous increase in that combined with iron.

**Key words:** reservoir, lake, sediments, chemical composition, phosphorus.

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**Krystyna STACHOWICZ**

**Surface run-off pollution during thaws and heavy rainfall in agricultural catchment basins (the Carpathian Plateau, Poland).**

Acta Hydrobiol., 28, 43-54.

**Abstract** - In two submontane catchment basins differing in land use and configuration of the terrain, the effect of surface run-off pollution in periods of spring and winter thaw and after heavy rainfall was investigated. During the spring thaw and heavy rainfall when the soil took part in the origination of surface run-off pollution, the configuration of the area was decisive for the concentration of nutritive compounds. In all periods land use was factor which decided the values of pollution loads.

**Key words:** streams, agricultural basin, surface run-off pollution, thaw, heavy rainfall, land use.

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**Krystyna STACHOWICZ**

**Surface run-off pollution of agricultural basins in the protective zone of the Dobczyce dam reservoir (the Carpathian Plateau - Poland).**

Acta Hydrobiol., 28, 21-42.

**Abstract** - A 3-year study carried out in two agricultural basins differing in land use showed that in submontane catchment areas (300-470 m absolute altitude) the processes of surface water erosion of soils have a decisive effect on the surface run-off pollution. Higher concentrations and loads of suspension, N-NH<sub>4</sub>, N organic, P total, P-PO<sub>4</sub>, and BOD<sub>5</sub> were found in the Wolnica stream which drained a typical agricultural basin. The export of phosphorus was reduced to 1/3 in the forest-agricultural basin of the Brzezówka stream. Small size fields had no decisive effect on the control of losses of nutrients.

**Key words:** streams, agricultural basin, forest-agricultural basin, surface run-off pollution, erosion, water quality, nutrients.

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**Aleksandra STARZECKA**

**Indices of bacteriological and chemical quality of waters in the Upper Silesian Industrial Region (Southern Poland) affected by atmospheric pollution and industrial wastes.**

Acta Hydrobiol., 28, 99-110.

**Abstract** - In bacteriological investigation carried out in 1976-1979 in the Upper Silesian Industrial Region various pollution of surface waters in the Rivers Brynica and Mała Panew basins was demonstrated. It was ascertained that in the River Brynica, which was polluted by atmospheric ducts, the water was relatively pure, while in the River Mała Panew basin it was strongly polluted by the inflow of wastes from plants in the Upper Silesian Industrial Region.

**Key words:** rivers, dam reservoirs, lakes, ponds, Upper Silesia, bacteria, water quality.

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**Aleksandra STARZECKA and Grażyna MAZURKIEWICZ**

**The activity of bacterial flora in the River Nida, in stretches differing in geological substratum and soils near the banks (Southern Poland).**

Acta Hydrobiol., 28, 317-328.

**Abstract** - The production of bacterial biomass and the magnitude of its bioaccumulation and biodegradation were determined for stretches of the river differing in the kind of soil near the banks. It was found that the amount of energy used for bioaccumulation and biodegradation increased in the lower part of the catchment area of the Nida. It was demonstrated that the trophic level of the water increased with the course of the river, this being indicated by a fall in the value of Schrödinger's coefficient and a rise in the coefficient of heterotrophic activity, determined in relation to asparagine.

**Key words:** river, bacteria, activity, biomass production, bioaccumulation, respiration.

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**Edochiem B.C. UFODIKE and Paterson A. EKOKOTU**

**Protein digestibility and growth of African catfish (*Clarias lazera*) fed blood meal and algal diets.**

Acta Hydrobiol., 28, 237-243.

**Abstract** - The effects of different levels of algal and blood meal diets on growth, protein digestibility, and food utilization in African catfish (*Clarias lazera*) were investigated. The results show that the best growth and food conversion ratio was obtained with the 32% algae/52% blood meal diet (50.2% crude protein), while the poorest growth was recorded in the fish on the diet of pure algae. Protein digestibility was directly proportional with the dietary protein level until an optimum was achieved at 50.2% protein. Thereafter further increase in the dietary protein level led to a decline in protein digestibility. In general, the protein in the diets was well digested.

**Key words:** *Clarias lazera*, nutrition, blood meal, algae.

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**Jerzy ZIEBA**

**Bottom insects, chiefly Chironomidae, in the River Mała Panew and its tributaries polluted with industrial wastes (Southern Poland).**

Acta Hydrobiol., 28, 429-441.

**Abstract** - The fauna of benthic insects in a sector of the River Mała Panew, strongly polluted with paper-

mill wastes was rather poor. Below the mouth of the tributary River Stoła, which brought in similar wastes and heavy metals, the noxious action of pollution was reduced by previous self-purification and dilution with the waters of other affluents. This locality was characterized by a considerable taxonomic differentiation of insects, approximating that found at the control station. The effect of greater concentrations of metals on the benthos in the Graniczna Woda stream was not always distinct.

**Key words:** river, industrial pollution, heavy metals, benthos insects, Chironomidae.

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