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# Threatened Species of Ephemeroptera (Insecta) from Bulgaria

**[Gefährdete Ephemeroptera-Arten (Insecta) aus Bulgarien]**

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**Schlagwörter**: Ephemeroptera, Insecta, Bulgarien, Gefährdung, Naturschutz

**Traced are the Red Data Lists of threatened mayflies from various regions of Western Germany. Extinct and threatened mayfly species in Bulgaria are reported. Discussed is anthropogenic interference which is the cause of the decline or threat of extinction of mayflies. Concrete data on mayflies in the river Danube are given.**

The Red Data Book of Threatened Plants and animals of Nordrhein-Westfalen (BLAB & al. 1979) provides a definition for the categories of degrees of threat, given as categories A 1.1 Died out or missing; A 1.2 Threatened by extinction; A 2 Seriously threatened; A 3 Threatened; A 4 Potentially threatened. According to MÜLLER-LIEBENAU (1979) 14 (31-35%) out of the 40-45 species of mayflies established in Nordrhein-Westfalen should be included in Red Lists of this region in Germany. According to MALZACHER (1981) 5 (7,5%) out of the 67 species established in Baden-Württemberg could be considered extinct, not having been recorded for the past 50 years and comprising chiefly potamobiotic species. Seriously threatened are 22 species (33%) particulary inhabiting summer-warm streams and oligotrophic lakes. In the later edition of the RED Data Book (BLAB & al. 1984) PUHTZ has summarized the data for the Ephemeroptera of Germany. Five out of 81 species are extinct, 30 (54%) out of the remaining 76 species are considered threatened and 8 (10%) potentially threatened.

In Bulgaria more than 100 species of mayflies have been established, 20 of them falling in the categories mentioned above.

1. Died out or missing
*Palingenia longicauda* (OLIVIER)
*Ephoron virgo* (OLIVIER)
*Cercobrachys minutus* TSHERN
*Brachycercus harisella* CURTIS

*Neophemera maxima* JOLY
*Ephemerella maculocaudata* IKONOMOV (a balkan endemite)
*Ametropus fragilis* ALBARDA

2. Threatened by extinction
*Thraulus thraker* JACOB (Bulgarian endemite)
*Metreletus balcanicus* ULMER
*Epemerella mesoleuca* BRAUER

3. Threatened
*Heptagenia fuscogrisea* (RETZIUS)
*Heptagenia longicauda* STEPHENS
*Electrogena affinis* (EATON)
*Siphlonurus armatus* (EATON)

4. Potentially threatened
*Ephemera lineata* EATON
*Ephemera vulgata* LINNE
*Choroterpes picteti* EATON
*Heptagenia coerulans* ROSTOCK
*Habrophlebia fusca* (CURTIS)
*Isonychia ignota* (WALK)

In Bulgaria mayflies threatened by extinction are chiefly those of middle and lower stretches of rivers, which generally have been subjected to greater anthropogenic interference, expressed not only by increased effluent but also by industrial pollution, poorly designed drainage, changes in river bed, hydro construction projects, hydro electric power stations, pumping stations, dikes, costal anti-erosion melioration projects, quarry operations etc. Thus smooth or wave-like concrete substrate (asphalt, concrete, reinforced concrete and pavement) imposed by the changes make the river bed inaccessible to mayflies and most riverine organisms. On the other hand the concrete walls or concrete cover of streams and rivers resulted in acceleration of current speed to over 2-3 m/s, leading to the erosion of the banks and frequently of the river bed itself. Naturally, in the absence of suitable biotopes vegetation and animal species particulary the larvae of mayflies cannot attach themselves, feed and maintain their normal life cycle.

The building of dikes along river banks for the drainageof marshland, the completion of dams etc. leads to a break in the normal link between river marshland, the low lying plains and the respective river. This makes it harder for the mayflies to find a suitable breeding substrate for settlement. But the disruption of the link between river, marshes and flooded lowlands has even worse consequences: it does not allow the flow of warmer waters. They are considerably richer in organic

matter and phyto- and zooplankton, which represent the principal food base of the larvae of mayflies. The construction of barriers across rivers has led to a slow down of the current from the end of the reservoire to its wall. Silting, beginning at a current speed below 0,4 m/s, produces considerable changes in the ecological situation. Thus, gravel and stones with their lithorheophilic biocenosis and in particular most of the mayflies, are coverd by silt. A pelorheophilic biocenosis gradually appears in their place. The pelorheophilic biocenosis, however, contains far less mayflies (i. e. *Caenis horaria* (L.), frequently *Caenis robusta* ETN., *Ephemera vulgata* L. and rarely some eurybiontic mayfly species).

Gravel is often dredged from rivers. This disrupts a natural habitat by the formation of pits, which are deeper than the river bottom itself, drain adjacent terrain around the river and make the level of subterranean waters fall by several meters. Vegetation in the vicinity is condemned to gradual dying owing to lasting drought while the fauna and in paticular mayflies cannot breed because the environmental conditions have rapidly changed.

Neither should the negative effect of intensive agriculture be ignored. More use of fertilizer and plant protection means (in particular pesticides) have resulted in pollution of some upper stretches of streams and rivers with toxic substances, with their negative effect on species from the genus *Electrogena, Heptagenia, Choroterpes, Ephemera*, etc.

The preservation of the brief life of the aerial stage of the species (the subimago and the imago) is of great significance for the gene fund of mayflies. Beyond the negative impact of air pollution from local sources and transboundary emissions, uncontrolled use of insecticides, the reduction of shrubbery and trees along river banks and streams (where the subimago stage of mayflies metamorphize) - they all play a part in the abnormal fertilization period and several compensatory flights of the swarms of mayflies, carried by the air-flows and the incessant emissions from cars. As the females of the flying swarms of mayflies are frequently misled by the optic illusion given by asphalt covered roads resembling running water, they frequently lay their eggs on surfaces thus denying survival for the swarms (MALZACHER 1987).

Most Bulgarian or Balkan endemites among mayflies (chiefly from the genera *Rhithrogena* and *Ecdyonurus*) occur in mountain streams where the negative influence of industry is rare. The negative impact of increased acidity from acid rain and other pollutants, however, may also lead to a threat to the low populations of the respective species, in particular to *Rhithrogena* (MALZACHER 1989).

Even the presented list of extinct and threatened mayflies in Bulgaria may be rather optimistic if we traced the locations of mayflies along the Bulgarian and Romanian sector of the Danube for the past ten years. According to RUSSEV (1968) 20 species of mayflies have been established here. However, after 1967

their spread along the Danube has considerably fallen, while studies on *Palingenia longicauda* have proven their complete extinction (RUSSEV 1987). We will examine the results of expeditions conducted after 1981.

In October 1982 four profiles of 22 sites along the width of the Danube were studied between km 834 and km 493. In October 1986 seven profiles of a total of 56 sites across the width of the river were studied between km 834 and km 380. No single larva of mayfly was found.

Only in June 1987 the species *Heptagenia flava* ROST. was found along the Bulgarian side at km 651 near the village of Dolni Vadim, and in October 1987, at km 498 (out of Rousse) the species *Cloeon simile* ETN. on the Bulgarian bank.

During the IAD complex expedition along the Danube from its estuary to Gabcikovo (Czechoslovakia) zoobenthos from 23 sites of the river were examined. Only off the Bulgarian bank at Nikopol (km 597) *Baetis fuscatus* L. was found.

No larvae of mayflies were found during the complex Bulgarian Soviet expedition along the left bank of the Soviet sector and the fairway of the Kilikia estuary of the Danube (km 157 to km 20) including 14 sites as well as along the right Bulgarian bank and the fairway of the Danube (km 834 to km 375) with a total of 34 sites in August/September 1989, and a total of 18 other sites along the right Bulgarian bank, between the right bank and the fairway (km 516 to km 375) in August 1990 (UZUNOV in litt.).

A total of 172 sites across the river, including a psammorheophilic biocenosis were studied in the course of these four expeditions. The absence of psammorheophilic representatives of the mayflies *Ametropus fragilis* ALBARDA, *Cercobrachis minutus* TSHERN and *Brachycercus harrisella* CURTIS not only for the past decade, bute since 1964, give reasons for the conclusion that they have died out or are extinct.

Nevertheless in the course of these expeditions the bank of Danube was not studied carefully, which gives hope that some lithorheophilic mayflies may still be found there.

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