

Brief report

***Potamanthus luteus* L. (Ephemeroptera, Ephemeridae) found for the first time in Finland: notes on the morphology and habitats of the nymphs**

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Five nymphs of *Potamanthus luteus* L. were found in kicknet samples collected at two riffle sites of the Kymijoki river, Southern Finland. This is the first record of the species in Finland. The Kymijoki river is currently recovering from gross pollution by industrial and municipal effluents. The sediments of the river at some localities are heavily polluted by dioxins and furans originating from the past manufacture of Ky-5 wood preservative in Kuusankoski, located in the upper reach of the river. The nymphs collected from the badly contaminated site had generally darkened gills, possibly indicating impacts of pollution. The habitats were characterized by abundant vegetation, relatively slow current speed and gravel and sand bottoms.

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1. Introduction

The Ephemeropteran fauna of Finland includes 53 species (Saaristo & Savolainen 1980, Savolainen 1984, Savolainen & Pulkkinen 1987, Saaristo et. al. 1993, Savolainen & Saura 1996, Nurmi & Savolainen 1997). One of the most recent records is *Ephemera lineata* collected from the Kymijoki river, Southern Finland (Nurmi & Savolainen 1997). This species was earlier known to occur in Russian Karelia (Tiensuu 1939, Saaristo 1980). Another ephemerid species occurring in western Russia, but not recorded earlier in Finland, is *Potamanthus luteus* (Illies 1978, Kljuge 1997). The wide distribution of this species covers 21 of the 27 European palaeartic regions listed by Illies (1978) and it lives in large as well as small streams (Schoenemund 1939, Illies 1978). The species was recently discovered in the Kymijoki river. This paper

reports the finding locations and gives notes on the morphology and habitat characteristics of the nymphs.

2. Study area and finding locations

The study was conducted in the Kymijoki river, Southern Finland (province of Karelia australis). With a length of 204 km, an average discharge of 307 m³ s⁻¹ (MQ) and a drainage basin of 37 170 km², the Kymijoki river is the fourth largest river basin in Finland. The river is currently recovering from gross pollution by industrial and municipal effluents. Industrialization began at the downstream reaches of the Kymijoki river in the 17th century. By the beginning of the 18th century industrial and municipal effluents and the struc-

turing of the river had already deteriorated the water quality and impoverished fish stocks. The water quality was at its worst during the 1960s and early 1970s. Thereafter, the introduction of more efficient waste water purification and processing in the forest industries has improved the water quality (Vuori & Parkko 1996). The current water quality of the Kymijoki river is considered to be satisfactory according to the criteria of the National Board of Waters and Environment (Heinonen et al. 1985). However, there are also signs of continual stress in aquatic organisms in the Kymijoki river, attributable to the elevated levels of heavy metals and chlorinated organic compounds in the water, sediments and biota (Koistinen et al. 1995, Vuori & Parkko 1996). A serious prevailing pollution problem is the contamination of bottom habitats by dioxins and furans originating from the past manufacture of Ky 5-wood preservative in Kuusankoski, upstream (Koistinen et al. 1995, Vuori 1996, Verta et al. 1997).

Material. *Potamanthus luteus* nymphs were collected from the kicknet samples taken in the upper and middle reaches of the river on 10 September 1997. Four individuals were found from the Keltti riffle (6751175:3478800, Grid 27° E) on the northern side of Äijänsaari Island and one nymph from the eastern side of the Ahvionkoski riffle (6726400:3485600).

3. Notes on the morphology and habitats of the nymphs

The nymphs collected from the Keltti riffle had darkened gills when compared to the normal, transparent gills of the nymph from the Ahvionkoski riffle (Fig. 1). Similar kinds of darkened and even malformed gills have been reported earlier in the hypsychid caddisfly larvae collected from the Kymijoki river by Vuori & Parkko (1996). These gill abnormalities have been suggested to imply that despite the improved water quality of the Kymijoki river, the pollution, most likely from chlorinated compounds, still adversely affects the well-being of the benthic invertebrates.

In the Kymijoki river, toxic loads of dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF) calculated as TEQs (TCDD-equivalents) are so high in some sediments that they should be treated as hazardous waste (Koistinen et al. 1995). The highest measured dioxin and furan concentrations include results from the sediment samples collected in the close vicinity of the Keltti riffle (Koistinen et al. 1995, Verta et al. 1997).

The habitat characteristics of the two sites were somewhat different. In the Keltti riffle the current speed was approximately 20–50 cm s⁻¹ and the bottom was predominantly gravel, sand and pebbles covered by abundant vegetation consisting mainly of *Myriophyllum* spp., although large stones with dense tufts of *Fontinalis antipyretica* were also common. Sampling occurred mainly at the *Myriophyllum* covered gravel beds. In the Ahvionkoski riffle the habitat structure is more diverse and the sampling occurred both at sand and gravel beds covered with *Myriophyllum* and at more rapidly flowing (current speed ranged approximately from 30 to 150 cm s⁻¹) stony bottoms with dense *Fontinalis antipyretica* vegetation. Since more *Potamanthus* nymphs were found from the Keltti riffle, it is probable that the species prefers rela-

tively slow current speed and finer bottom materials. This is in agreement with Harrison (1958), who found the species from a side-pool floored with stones and sand in the River Usk. According to Schoenemund (1930) the nymphs dwell underneath the stones and feed on organic mud.

Overall, the autecology of *Potamanthus luteus* is not well known. The occurrence of species at a site heavily polluted by organochlorines indicates that it is not particularly sensitive to pollution. This is also manifested by the findings made in other moderately or heavily polluted rivers in Europe. In Great Britain, old observations were made in large polluted rivers, e.g. the River Thames, the River Wye and the River Usk (Macan 1979). In France several observations have been made in the upper Rhône impacted by sewage effluents and impoundments (Plenet & Gibert 1994, Dolédec et al. 1996). However, the German saprobic system characterizing the degree of pollution by biodegradable organic matter classifies *Potamanthus luteus* as an indicator of only mild, *b*-mesosaprobic pollution (Friedrich 1990).

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Fig. 1. The habitus (a) and close up of the gills (b) of *Potamanthus luteus* L. nymphs collected from the Kymijoki river. The specimen collected from the Keltti Riffle has darkened gills (the lower one in the photographs) when compared to the normal, transparent gills of the specimen collected from the Ahvionkoski Riffle (upper in the photograph).

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