Transactions of the Illinois State Academy of Science
(1983), Volume 76, 3 and 4, pp. 293-296

Occurrence of *Oecetis inconspicua* (Walker) in an Acid Strip-Mine Lake of Southern Illinois

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ABSTRACT

Zullo, Steve and Norman Bates. (Dep. Zoology, Southern Illinois University, Carbondale, Il 62901, USA). Occurrence of *Oecetis inconspicua* (Walker) in an acid strip-mine lake of southern Illinois.

This study reports for the first time the finding of *Oecetis inconspicua* (Walker) in an acid strip-mine lake of southern Illinois. The caddisfly larvae and pupae were found among *Typha latfolia* detritus in less than one meter of water. Chemical composition of the surrounding water is typically rich in dissolved ions. The pH is around 3.2. Total dissolved solids concentration approaches 2450 mg l^{-1}. The necessity for species identifications in ecological studies is discussed.

INTRODUCTION

Acid strip-mine lakes present conditions that are extreme with respect to several environmental conditions. Many of these lakes have a pH as low as 2.3 (Smith and Frey 1974). Dissolved ion concentration is usually quite high with some lakes in Missouri having concentrations up to 28,500 mg l^{-1} (Campbell and Lind 1969). Metals such as iron, manganese, and aluminum are often found in high concentrations due to increased solubility at low pH (Lewis and Peters 1955, Lind and Campbell 1970, Parsons 1964).

The faunal diversity of acid strip-mine lakes is depressed and typically dominated by few taxa (Smith and Frey 1971). The literature has listed several species of Diptera, Odonata, and Trichoptera as most tolerant of low pH conditions (Bell 1979, Bell and Nebeker 1969, Dills and Rogers 1974, Roback and Richardson 1969).

Species identification is important in all studies, but perhaps it is even more important in studies in acid strip-mine lakes because habitat conditions are vital to the species able to survive there (Resh and Usinger 1975). Many authors however,

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do not or cannot identify organisms they find in acid lake studies to the species level. For example, *Chironomus maturus* Johannsen was found in acid conditions (Humphrey 1970), but Yamamoto (1977) later described it as *Chironomus* nomen species based on salivary gland chromosome configuration. Harp and Campbell (1967) identified *C. plumosus* (Linné) from Missouri acid mine lakes; Harp and Campbell (1967) identified *C. plumosus* (Linné) from Missouri acid mine lakes; Harp and Hubbard (1974) subsequently redescribed it as a new species. Roback and Richardson (1969) reported Trichoptera found in acid conditions. They found *Hydropsyche betteni* Ross and *Polycentropus* (probably *Crassicornis*) in Pennsylvania streams polluted with acid mine drainage. Harrison (1948) found *Leptocerus harrisoni* (Barnard) in similar streams. We report here occurrence of *Ocectis inconspicua* (Walker) (Trichoptera: Leptoceridae) in an acid strip-mine lake.

RESULTS AND DISCUSSION

This species was found in Bradley's Acid pit, a 2.3 hectare final-cut acid strip-mine lake located near DeSoto in Jackson County, Illinois. The pH is almost constantly 3.2 and the total dissolved solids concentration is near 2450 mg l^{-1} (unpublished data). The lake has a maximum depth of 8.0 and a mean depth of 3.0 m (Zullo 1981).

Cattails (*Typha latifolia* (Linné)) and Sphagnum moss (*Sphagnum* sp.) comprise the dominant aquatic vegetation. The lake bottom is a mosaic of terrestrial leaves, cattail stalks, Sphagnum moss, and a fine, soft sediment (Zullo 1981).

The water is very clear and has a slight green tint. A Secchi disc (15cm) reading was recorded at the maximum depth (8m) (Bates, personal observation). A thermocline usually starts to develop in April as the water warms. By August, the lake is often homoiothermic and quite warm (27°C). The water cools throughout the fall, developing an inverse thermocline by December. The dissolved oxygen content exhibited a characteristic inverse gradient to temperature in 1977-78 (Zullo 1981). In general, the dissolved oxygen content was high during 1977-78. Concentrations of selected chemical parameters determined by colorimetric methods (Hach 1973), are shown in Table 1.

The fauna of this lake is dominated by a few species. The only zooplankter found is *Brachionus urceolaris* O.F. Muller (Rotifera) (Schramm 1973). The benthos is dominated by *Chironomus* and *Tanytarsus dendyi* Sublette (Diptera: Chironomidae). Another chironomid, *Tanypus nubifer* Coquillett has been collected sporadically (Stahl 1975, Zullo 1981). *Palpomyia* sp. (Diptera: Ceratopogonidae) is common in the littoral zone. The invertebrate predators include naiads of the odonates *Anax junis* (Drury) and *Enallagma*, larvae or the trichopteran *Oecetis inconspicua* (Walker), and *Palpomyia* sp. larvae. There are no fish present.

TRICHOPTERA COLLECTIONS

The dates of collection, number, and head capsule width (mm) of specimens of *O. inconspicua* (Walker) collected are presented in Table 2. All specimens were collected with an Ekman grab (225cm^2) or a coarse mesh dipnet. The larvae were collected exclusively around the cattail and leaf detritus at the northeast corner of the strip pit in a meter or less of water. Live larvae were brought back to the labo-

ratory, but none pupated. One pupa brought back eventually emerged to an adult male. Identification was based on the description in Ross (1944).

Ross (1944) reported that *O. inconspicua* is one of the most common caddisflies in Illinois, taken throughout the state from a diversity of habitats. However, to our knowledge these are the first collections from an acid strip-mine lake in Illinois.

ACKNOWLEDGEMENTS

We wish to thank L. Knutson (USDA Insect Identification and Beneficial Insect Introduction Institute) for directing the specimens to O.S. Flint (Smithsonian Institution) who verfied our identifications. Specimens were obtained during research projects undertaken by each author. Specimens are available from N.B. Special thanks to Yvonne Nolan for typing this manuscript.

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Table 1. Surface in Water Chemistry in Bradley's Acid Pit in 1977-78. In mg l^{-1}.

Date	Al^{3+}	Total Fe	Mn^{2+}	PO_4^{3-}	SO_4^{2-}
23 Aug 77	26.5	5.0	—	62.5	1850
23 Sep	26.5	4.6	28.0	53.5	1950
27 Oct	22.5	4.4	40.0	55.0	1525
21 Nov	22.5	5.3	20.0	60.0	1450
19 Dec	23.5	5.5	20.0	56.0	1475
21 Jan 78	26.0	6.9	21.0	44.5	1400
24 Feb	19.0	4.2	12.0	27.5	1300
22 Mar	12.0	3.0	11.8	29.0	800
26 Apr	21.5	13.0	120.0	87.5	1350
24 May	24.0	4.9	—	42.0	1350

(Modified from Zullo 1981).

Table 2. Head Capsule Widths of *Oecetis inconspicua* larvae collected in Bradley's Acid Pit in 1978 and 1981.

Head Capsule Width (mm)	Collection Date 19 Apr 78	3 May 78	19 May 78	26 Jul 81
0.20	1			
0.35	1			
0.42				1
0.44				1
0.47	1			
0.48				1
0.52			1	
0.70				1
0.72				3
0.74				1
0.75			1	1*
0.76			1	
0.78		1		
0.82		1		

*Was in pupal case.