



Beate Wolf
Rolf Angersbach
Hans-Joachim Flügel

PLECOPTERA AND TRICHOPTERA IN THE TAGLIAMENTO FLOOD PLAINS AND IN SOME TRIBUTARIES IN FRIULI VENEZIA GIULIA (ITALY)

PLECOTTERI E TRICOTTERI DEL FIUME TAGLIAMENTO E DI ALCUNI SUOI AFFLUENTI IN FRIULI VENEZIA GIULIA (ITALIA)

Abstract - Between 2005 and 2007 we investigated Plecoptera and Trichoptera in the Tagliamento flood plains and some tributaries using a light trap and hand nets. We found 5 Plecoptera and 32 Trichoptera species in the flood plains of the Tagliamento, and 8 Plecoptera and 31 Trichoptera species in the tributaries.

Key words: Stoneflies, Caddisflies, Faunistics, Tagliamento river, Tributaries, Friuli Venezia Giulia, Italia.

Riassunto breve - Tra il 2005 e il 2007 sono stati monitorati i Plecotteri e i Tricotteri in stazioni golenali del Fiume Tagliamento e di alcuni suoi affluenti, mediante l'utilizzo di trappole luminose e di retini immanicati. Sono state rinvenute 5 specie di Plecotteri e 32 specie di Tricotteri nella gola del Fiume Tagliamento, mentre negli affluenti sono state rinvenute 8 specie di Plecotteri e 31 di Tricotteri.

Parole chiave: Plecoptera, Trichoptera, Faunistica, Fiume Tagliamento, Affluenti, Friuli Venezia Giulia, Italia.

Introduzione

The Tagliamento river, with its broad, gravel flood plains, is considered to be the only remaining large, semi-natural alpine river in Europe (WARD et al. 1999; ARSCOTT et al. 2003). Its morphology has remained largely intact and the river corridor is characterized by dynamic floodplain areas (ARSCOTT et al. 2003). The macrozoobenthos has been studied at different sites along the Tagliamento (e.g. KRETSCHMER 1995; ARSCOTT et al. 2003; KARAUŠ et al. 2004; ARSCOTT et al. 2005), but published records of adult Plecoptera and Trichoptera at these sites are rare (e.g. FOCHETTI & NICOLAI 1985; MALICKY 2004). On the basis of sampling, undertaken during a three year period, we investigated the Plecoptera and Trichoptera species occurring in the Tagliamento flood plains and some of its tributaries.

Area and sampling methods

The Tagliamento is a 7th order river in north-eastern Italy (Friuli Venezia Giulia), with its source in the limestone-dolomite Alps (WARD et al. 1999). After 172 km it flows into the Adriatic Sea between Bibione (San Michele al Tagliamento, VE) and Lignano Sabbiadoro

(UD). Our studies focused on adult Plecoptera and Trichoptera collected during three collecting trips in the summer of 2005, 2006 and 2007, mainly in the middle reaches of the Tagliamento (Medio Tagliamento), but also in some of its tributaries, to gain further insight into the fauna of the only remaining large, semi-natural river system in Europe. Our studies were concentrated in the area around Gemona del Friuli, where the river flows in a westward direction due to the glacial moraines. This stretch of the Tagliamento belongs to the middle reach of the river, which has an average slope of 1% (WARD et al. 1999). Only the sampling site south of Caprizi belongs to the upper reach of the Tagliamento (fig. 1, tab. I). The adults of Plecoptera and Trichoptera species were sampled with a handnet and/or a light trap, working with two fluorescent lamps (12 V, 15 W; one actinic and one black light) (tab. I). All species were preserved in 70% ethanol.

Results and discussion

Plecoptera

Altogether, 11 Plecoptera species were recorded. All species were captured with a handnet. In the open flood plains of the Tagliamento, 5 species were found that

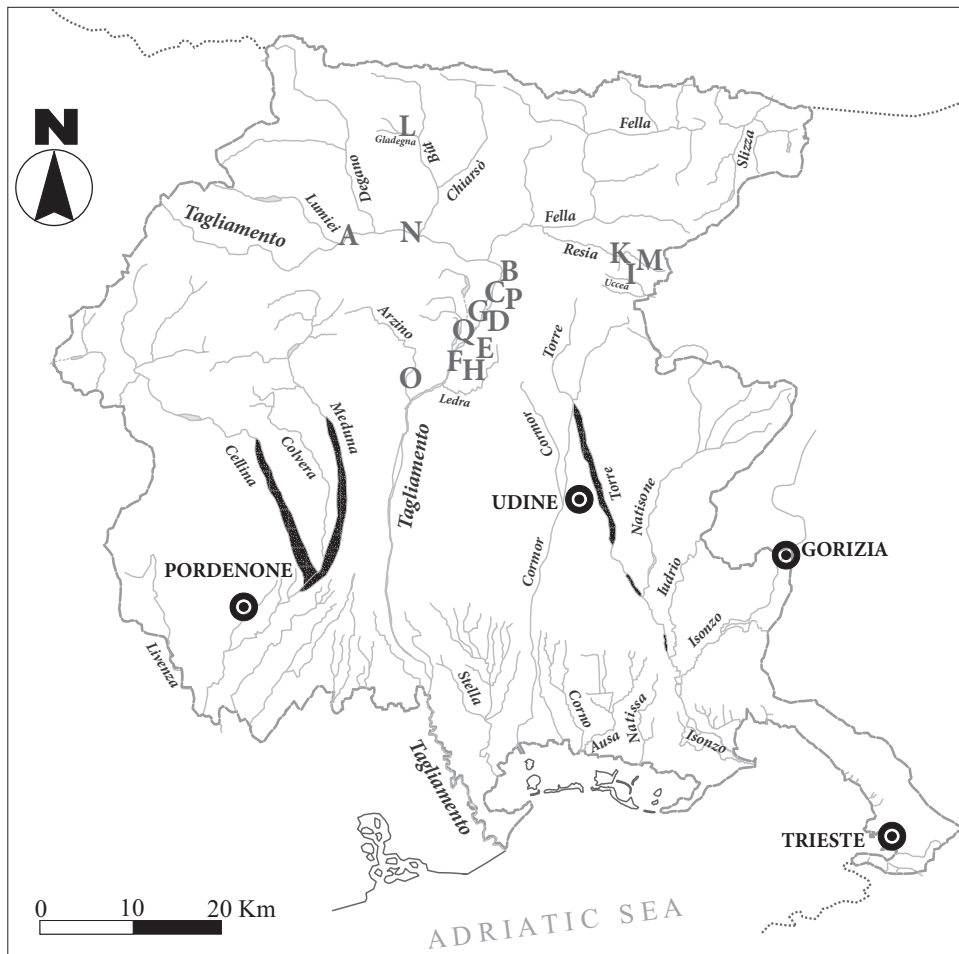


Fig. 1 - Location of sampling sites in the Tagliamento area and some tributaries. Further information is available in table I.
 - Collocazione delle stazioni di monitoraggio nell'area del Tagliamento e di alcuni suoi affluenti. Per ulteriori informazioni si veda la tab. I.

Sampling sites	Altitude [m]	Coordinates	Sampling method	Sampling date
Tagliamento river				
A Tagliamento, SW Caprizi (Socchieve)	512	12°46'30" E, 46°26'20" N	handnet	21.09.2007
B Tagliamento, Portis Vecchio	240	13°08'17" E, 46°21'19" N	light trap	21.08.2005
C Tagliamento, Venzone	225	13°07'54" E, 46°20'07" N	light trap	21.06.2006
D Tagliamento, Bordano	216	13°06'42" E, 46°18'09" N	light trap	16.08.2005
E Tagliamento, Gemona del Friuli	213	13°07'48" E, 46°17'30" N	light trap	23.06.2006
F Tagliamento, Osoppo	191	13°04'22" E, 46°14'42" N	handnet	23.06.2006
Tributaries				
G Creek, St.li Vieris, Bordano	480	13°06'30" E, 46°19'20" N	light trap	18.08.2005
H Ledra, Lessi (Gemona del Friuli)	166	13°07'34" E, 46°14'15" N	light trap	22.06.2006
I Ucea, Sella Carnizza (Resia)	1090	13°19'18" E, 46°20'13" N	handnet	21.06.2006
K Barman, Lischiazze (Resia)	700	13°20'00" E, 46°20'50" N	handnet	20.06.2006
L Gladegna, Cercivento	686	12°58'20" E, 46°31'36" N	handnet	22.09.2007
M Resia, Coritis (Resia)	625	13°22'43" E, 46°21'15" N	handnet	20.06.2005
N Vinadia, canyon (Villa Santina)	342	12°54'20" E, 46°26'42" N	handnet	20.09.2007
O Arzino, Anduins	289	12°57'16" E, 46°15'48" N	handnet	24.06.2006
P Venzonassa, Venzone	230	13°08'39" E, 46°20'09" N	light trap	18.08.2005
Q Canale, Avasinis	200	13°03'25" E, 46°17'08" N	light trap	17.08.2005

Tab. I - Sampling sites and sampling methods.
 - Stazioni di rilevamento e relativi metodi di monitoraggio.

Tab. II - On the right: species list from the different sampling sites. Trichoptera species recorded for the first time at the Tagliamento are indicated. Numbers of males/females are listed.
 - A destra: elenco delle specie rinvenute nelle differenti stazioni di monitoraggio, con indicato il numero di maschi/femmine. Sono indicati i Tricotteri segnalati per la prima volta per il Fiume Tagliamento.

Species	Tagliamento river							Tributaries							Species new at the Tagliamento		
	Tagliamento, SW Caprizi (Socchieve)	Tagliamento, Portis Vecchio	Tagliamento, Venzone	Tagliamento, Bordano	Tagliamento, Gemona d. Friuli	Tagliamento, Osoppo	Creek, St. Vieriis, Bordano	Ledra, Lessi (Gemona d. Friuli)	Uccea, Sella Carnizza (Resia)	Barman, Lischiazze (Resia)	Gladegna, Cercivento	Resia, Coritis (Resia)	Vinadia, canyon (Villa Santina)	Arzino, Anduins		Venzonassa, Venzone	Canale, Avasinis
Plecoptera																	
<i>Amphinemura sulcicollis</i> (STEPHENS, 1836)	0/1	.	.	
<i>Amphinemura triangularis</i> (RIS, 1902)	1/0	.	.	.	.
<i>Chloroperla tripunctata</i> (SCOPOLI, 1763)	.	.	6/0	.	.	.	.	.	.	.	.	.	.	1/2	.	.
<i>Isoperla rivulorum</i> (PICTET, 1842)	1/0	.	.	.	.	.	.	.	.
<i>Leuctra albida</i> KEMPNY, 1899	2/0	1/0	.	.	.	.	.	.	.	0/3	.	.	.	.	.	.
<i>Leuctra major</i> BRINCK, 1949	7/8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Leuctra mortoni</i> KEMPNY, 1899	3/1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Nemoura flexuosa</i> AUBERT, 1949	1/0	.	.	.	.	.	.	.	.
<i>Nemoura illiesi</i> MENDEL, 1968	1/1	.	.	.	.	.	.	.
<i>Nemoura marginata</i> PICTET, 1836	0/1	.	.	.	.	.	.	.
<i>Protonemura auberti</i> ILLIES, 1954	.	.	2/0	.	.	.	.	.	.	.	.	.	.	.	.	.
Number of Plecoptera taxa: 11	3	1	2	0	0	0	0	0	2	2	1	1	0	2	0	0	
Trichoptera																	
<i>Agapetus fuscipes</i> CURTIS, 1834	.	3/0	4/2	.	0/1	.	.	84/67	1/2	new
<i>Agapetus ochripes</i> CURTIS, 1834	1/0	new
<i>Allotrichia pallicornis</i> (EATON, 1873)	.	.	10/1	.	1/0	new
<i>Beraeamyia schmidi</i> BOTOSANEANU, 1960	10/17	.	.	.	
<i>Cyrnus trimaculatus</i> (CURTIS, 1834)	1/0	.	.	.	.	.	.	.	.	.	.	.
<i>Glossosoma bifidum</i> MCLACHLAN, 1879	.	6/1	.	.	.	.	.	.	.	.	.	.	.	.	.	6/1
<i>Hydatophylax infumatus</i> (MCLACHLAN, 1865)	0/2	.	.	.	.	.	.	.	.
<i>Hydropsyche angustipennis</i> (CURTIS, 1834)	.	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Hydropsyche bulbifera</i> MCLACHLAN, 1878	.	.	1/0	new
<i>Hydropsyche fulvipes</i> (CURTIS, 1834)	0/1	.	.	.	.	.
<i>Hydropsyche incognita</i> PITSCH, 1993	2/0	
<i>Hydropsyche instabilis</i> (CURTIS, 1834)	.	.	7/11	.	7/4	.	0/2	3/0	.	.	.	.	.	.	.	7/8
<i>Hydropsyche siltalai</i> DÖHLER, 1963	0/5	.	.	
<i>Hydropsyche tenuis</i> NAVAS, 1932	.	.	2/1	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Hydroptila forcipata</i> (EATON, 1873)	.	.	0/1	new
<i>Hydroptila occulta</i> (EATON, 1873)	.	.	3/12	new
<i>Hydroptila tachei</i> COPPA & MALICKY, 2005	.	.	.	1/6	.	.	.	.	.	.	.	.	.	.	.	1/13
<i>Hydroptila vectis</i> CURTIS, 1834	.	.	8/3	.	.	.	.	3/1	.	.	.	.	.	1/13	1/1	new
<i>Lepidostoma hirtum</i> (FABRICIUS, 1775)	.	.	0/1	.	.	.	.	0/2	.	.	.	.	.	.	.	3/9
<i>Limnephilus lunatus</i> CURTIS, 1834	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1
<i>Limnephilus sparsus</i> CURTIS, 1834	0/1	.	.	.	.	.	.	.	.
<i>Lype reducta</i> (HAGEN, 1868)	.	1/0	1/1	new
<i>Micrasema minimum</i> MCLACHLAN, 1876	11/0	.	.	.	
<i>Mystacides azureus</i> (LINNAEUS, 1761)	.	1/0	0/1	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Notidobia ciliaris</i> (LINNAEUS, 1761)	.	0/1	new
<i>Odontocerum albicorne</i> (SCOPOLI, 1763)	.	.	0/4	.	0/1	.	.	25/70	.	.	.	.	.	2/4	23/6	.
<i>Oecetis testacea</i> (CURTIS, 1834)	.	.	0/1	new
<i>Philopotamus ludificatus</i> MCLACHLAN, 1878	2/1	.	.	.	.	.
<i>Philopotamus variegatus</i> (SCOPOLI, 1763)	4/2	.	.	.	.	.
<i>Phryganea grandis</i> LINNAEUS, 1758	0/1	.	.	.	.	.	.	.	.
<i>Plectrocnemia conspersa</i> (CURTIS, 1834)	0/1	.	.	.	.	.	.	.	5/0	.	
<i>Plectrocnemia geniculata</i> MCLACHLAN, 1871	.	.	2/0	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Polycentropus excisus</i> KLAPALÉK, 1894	.	.	4/2	.	.	.	.	.	.	.	.	.	.	5/1	.	.
<i>Polycentropus flavomaculatus</i> (PICTET, 1834)	1/1	.	.	.	.	.	.	1/0	.	.	1/0	.	
<i>Potamophylax cingulatus alpinus</i> TOBIAS, 1994	.	1/0	.	.	.	.	.	4/0	.	.	.	.	.	.	2/0	new
<i>Psychomyia klapaleki</i> MALICKY, 1995	0/1	1/24	.	
<i>Psychomyia pusilla</i> (FABRICIUS, 1781)	.	.	23/8	.	2/0	1/0	.	1/0	.	.	.	.	.	.	1/0	.
<i>Rhyacophila aurata</i> BRAUER, 1857	1/0	.	.	.	.	1/0	1/0	.	.	
<i>Rhyacophila dorsalis persimilis</i> MCLACHLAN, 1879	.	14/0	26/1	1/0	.	.	.	.	.	.	.	.	1/0	.	0/3	new
<i>Rhyacophila fasciata</i> HAGEN, 1859	.	2/0	.	.	.	.	.	9/4	.	.	.	.	.	.	.	new
<i>Rhyacophila simulatrix simulatrix</i> MCLACHLAN, 1879	.	1/0	.	.	1/0	.	.	.	.	.	.	.	.	.	.	new
<i>Sericostoma personatum</i> (SPENCE in KIRBY & SPENCE, 1826)	.	.	4/3	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sericostoma schneideri</i> KOLENATI, 1848	1/0	.	.	.	.	.	.	.	.	.	.	.
<i>Silo nigricornis</i> (PICTET, 1834)	.	10/3	.	.	.	.	.	4/4	.	.	.	.	.	.	0/2	.
<i>Tinodes dives</i> (PICTET, 1834)	18/6	.	.	.	.	5/1	.	.	
<i>Trichostegia minor</i> (CURTIS, 1834)	.	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	new
<i>Wormaldia copiosa</i> (MCLACHLAN, 1868)	.	.	1/1	.	.	.	.	.	3/1	.	9/0	.	1/0	.	.	.
Number of Trichoptera taxa: 47	0	11	20	2	9	2	2	14	0	2	0	4	1	6	5	15	
Total number of taxa: 58	3	12	22	2	9	2	2	14	2	4	1	5	1	8	7	15	15

are characteristic for meta- and hyporhithral zones of rivers (tab. II) (GRAF et al. 2009). The highest number of species were caught at the Tagliamento near Caprizi where *Leuctra albida*, *L. major* and *L. mortoni* were just emerging. *L. major* and *L. mortoni* are typical for open floodplains of alpine rivers, both species need a coarse interstitial environment. In the Tagliamento's tributaries 8 Plecoptera species were found, most of which are characteristic for crenal and epirhithral stream zones. *Nemoura illiesi* is known in Italy only from the Venezia Giulia area (FOCHETTI & TIerno DE FIGUEROA 2008), where this species is common. The record of *Leuctra mortoni* is the second for Friuli Venezia Giulia (F. Desio per mail).

Plecoptera prefers low temperatures and high oxygen concentrations, and their density along the Tagliamento is therefore high in the headwaters and declines downstream (ARSCOTT et al. 2005). This pattern was also observed by KRETSCHMER (1995), who recorded 14 Plecoptera species in the Tagliamento upstream from Cornino and only one species downstream Cornino. FOCHETTI & NICOLAI (1985) found 26 Plecoptera species during the spring in the Friuli Venezia Giulia region, and FOCHETTI & TIerno DE FIGUEROA (2008) list a total of 60 species for this region. The number of Plecoptera species we found was small. This was probably a result of sampling during the summer, when only a few species emerge.

Trichoptera

Altogether, 47 Trichoptera species were recorded in the Tagliamento area, with 32 of these occurring in the open gravel floodplains between Gemona and Portis Vecchio (tab. II). At Venzone, where the Venzonassa river flows into the Tagliamento, 20 species were caught (tab. II). This was the highest species number found at a sampling site. A variety of habitats characterizes this place, and these in turn probably influenced the species composition. For example, *Agapetus fuscipes* and *Plectrocnemia geniculata* are typical for crenal zones, respectively. *Hydropsyche tenuis*, *Odontocerum albicorne*, *Polycentropus excisus* or *Rhyacophila dorsalis persimilis* are species with a preference for epirhithral conditions. At the sampling site at Portis Vecchio we found more rhithral species than at Venzone. More than half of the species (62%) recorded in the open gravel flood plains of the Tagliamento preferred rhithral stream zones (GRAF et al. 2009).

In this study most species were caught with a light trap, which was more effective for catching Trichoptera species at the Tagliamento and its tributaries than a handnet. A light trap attracts Trichoptera species from across a greater distance in open floodplains. The banks with its shrubby riverine vegetation provides a variety of habitats between small pools and backwaters. As a

result, the species caught showed a range of preferences for different habitats. We recorded species that prefer slow-flowing or standing waters, such as *Oecetis testacea* and *Trichostegia minor* as well as species that prefer crenal conditions, such as *A. fuscipes* or *P. geniculata*.

Most common species for the Tagliamento and its open flood planes were *A. fuscipes*, *H. instabilis*, *O. albicorne*, *P. pusilla* and *R. dorsalis persimilis*. With the handnet at most 4 Trichoptera species were caught at a sampling site (tab. I, tab. II).

The Trichoptera fauna of the Tagliamento tributaries consisted mainly of crenal and rhithral species such as *Hydropsyche fulvipes* or *Tinodes dives* (tab. II). 14 species were caught in Fiume Ledra, near Lessi, a place with crenal influence, and 15 species were caught at river Canale, a small tributary to the Tagliamento, rich with vegetation (tab. II). In both places rhithral species like *Hydropsyche instabilis*, *Hydroptila vectis*, *Potamophylax cingulatus alpinus* or *Silo nigricornis* were dominant. Because handnets were used for sampling imagines in some of the small streams, the species richness there was smaller than that at the sampling sites along the Tagliamento, where a light trap was used. Some of the species found had previously been recorded for the first time in the Friuli Venezia Giulia region by MALICKY (2004), for example *Agapetus ochripes*, *Hydropsyche bulbifera*, *H. incognita*, *H. siltalai*, *Limnephilus sparsus*, *Lype reducta*, *Notidobia ciliaris*, *Oecetis testacea* and *Trichostegia minor*. *Allotrichia pallicornis* is known only from one other place in this region (VALLE 2001). *Hydroptila tacheti* was described as a new species by COPPA & MALICKY (2005) from this area. We found this species in the Tagliamento at Bordano as well as in R. Canale, Avasinis.

Earlier studies of the fauna in the open gravel floodplains of the Tagliamento reported the occurrence of 47 species or genus, mostly as larvae (KRETSCHMER 1995; ARSCOTT et al. 2003; KARAU et al. 2004; ARSCOTT et al. 2005). Compared with the studies of KRETSCHMER (1995), ARSCOTT et al. (2003), KARAU et al. (2004) and ARSCOTT et al. (2005) 15 of the species we found were new for the open gravel floodplains (tab. II). The abundance of Trichoptera species seems to be lower in open floodplains than in forested floodplains, and seems to be correlated with the amount of benthic organic matter (ARSCOTT et al. 2003).

Manoscritto pervenuto il 7.I.2013 e approvato il 3.IV.2013.

Acknowledgement

T. Gregor, Schlitz, assisted with the light traps and provided valuable comments on an earlier version of the text. P. Zwick, Schlitz, identified *Nemoura illiesi* and assisted with literature. Thanks are also due to H. Malicky, Lunz,

who identified *H. tacheti* and *R. dorsalis persimilis* and provided helpful comments. D. Fiebig, Schlitz, corrected the language.

References

- ARSCOTT, D.B., B. KELLER, K. TOCKNER & J.V. WARD. 2003. Habitat structure and Trichoptera Diversity in Two Headwater Flood Plains, N.E. Italy. *Internat. Rev. Hydrobiol.* 88: 255-73.
- ARSCOTT, D.B., K. TOCKNER & J.V. WARD. 2005. Lateral organization of aquatic invertebrates along the corridor of a braided floodplain river. *J. N. Am. Benthol. Soc.* 24: 934-54.
- COPPA, G., & H. MALICKY. 2005. Description d'une nouvelle espèce européenne du genre *Hydroptila* (Trichoptera, Hydroptilidae). *Braueria* 32: 19.
- FOCHETTI, R., & P. NICOLAI. 1985. Plecotteri primaverili del Friuli Venezia Giulia (Plecoptera). *Atti Mus. Civ. St. Nat. Trieste* 37: 247-53.
- FOCHETTI, R., & J.M. TIerno DE FIGUEROA. 2009. Plecoptera. *Fauna d'Italia* 43. Bologna: Ed. Calderini.
- GRAF, W., J. MURPHY, J. DAHL, C. ZAMORA-MUNOZ & M.J. LÓPEZ-RODRÍGUEZ. 2008. Trichoptera. In *Distribution and Ecological Preferences of European Freshwater Organisms*, cur. A. SCHMIDT-KLOIBER & D. HERING. Sofia, Moskau: Pensoft Publisher.
- GRAF, W., A. LORENZ, J.M. TIerno DE FIGUEROA, S. LÜCKE, M.J. LÓPEZ-RODRÍGUEZ & C. DAVIES. 2009. Plecoptera. In *Distribution and Ecological Preferences of European Freshwater Organisms*, cur. A. SCHMIDT-KLOIBER & D. HERING. Sofia, Moskau: Pensoft Publisher.
- KARAUS, U., H. GUILLONG & K. TOCKNER. 2004. The contribution of lateral habitats to macroinvertebrate diversity along river corridors. In *The ecology of lateral aquatic habitats along river corridors*, cur. U. KARAUS, 123-63. Zürich: ETH.
- KRETSCHMER, W. 1995. Hydrobiologische Untersuchungen am Tagliamento (Friaul, Italien). *Verein zum Schutz der Bergwelt e.V. München*, Jahrbuch 1995: 87-108.
- MALICKY, H. 2004. Regionale Neufunde und sonstige faunistisch bemerkenswerte Funde von Köcherfliegen aus Italien (Insecta, Trichoptera). *Gortania. Atti Mus. Friul. St. Nat.* 26: 243-59.
- VALLE, M. 2001. Contributo alla conoscenza dei Tricotteri italiani (Insecta, Trichoptera). *Riv. Mus. Civ. Sc. Nat. "E. Caffi" Bergamo* 20: 59-86.
- WARD, J.V., K. TOCKNER, P.J. EDWARDS, J. KOLLMANN, G. BRETSCHKO, A.M. GURNELL, G.E. PETTS & B. ROSSARO. 1999. A Reference river system for the Alps: the fiume Tagliamento. *Regulated rivers: research & management* 15: 63-75.

Authors' addresses - Indirizzi degli Autori:

- Dr. Beate WOLF
Siebertshof 22, D-36110 SCHLITZ
email: beate.wolf@online.de
- Rolf Angersbach
Küstriner Str. 6, D-34212 MELSUNGEN
email: Rolf.Angersbach@t-online.de
- Hans-Joachim FLÜGEL
Beiseförther Str.12, D-34593 NIEDERBEISHEIM
email: h_fluegel@web.de

