

Trichoptera of a peat bog in the western Ligurian Apennines

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Abstract. Light trap catches of Trichoptera were made in the Lajone peat bog (15000 m² at 987 m a.s.l.), in the western Ligurian Apennines, from June to October 1994. The sampling sites were: in the peat bog, in the marginal zone, and in the beech woods at 300 m from the bog. The catches yielded a total of 698 Trichoptera specimens belonging to 27 species in 10 families. The highest number of specimens (393) was collected in the beech woods, of which 188 during the June samplings. The families having the most species, were Polycentropodidae (5) in slow moving water, and Limnephilidae (11) in stagnant water. *Limnephilus sparsus* CURTIS (41.2 % of total specimens) and *Grammotaulius submaculatus* RAMBUR (21 %) were dominant. Fourteen species are recorded for the first time in Liguria, and *G. submaculatus* is noted for the first time in Italy. The species of northern distribution are dominant (70.4%), 5 species are endemic to the Italian fauna. New drawings of the ♂ and ♀ genitalia, and the larva head of *G. submaculatus* are given.

Key words: Zoogeography, peat bog, Liguria, light traps, *Grammotaulius submaculatus*.

The Lajone peat bog in the western Ligurian Apennines near Piampaludo (Savona), below the north-eastern slopes of M. Grosso, is a marshy plain extending 15000 m² at 987 m a.s.l. (Fig. 1). It is almost elliptical in shape and is crossed by a meandering spring stream (Fig. 3). It is not far from the sea and is part of the M. Beigua massif (1287 m), which consists of ophiolitic rock from the Jurassic "Gruppo di Voltri" with frequent accumulations of large blocks of serpentinites. Two landslides from the Cresta della Taja may have blocked a water course during the post-glacial period forming a lake (ROVERETO, 1939).

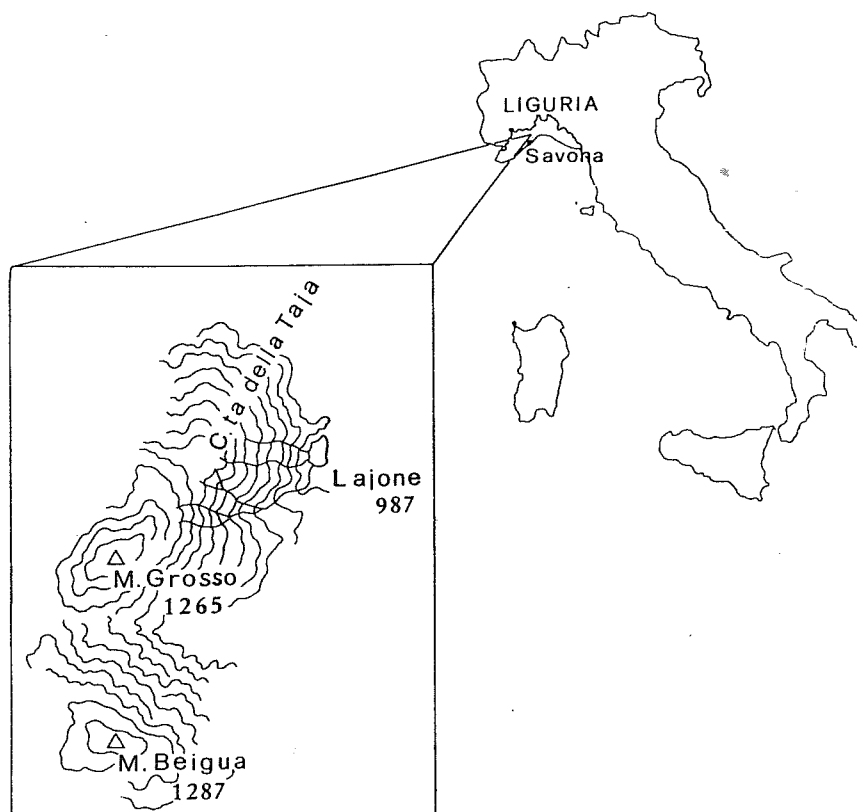


Fig. 1 - The Lajone peat bog in the western Ligurian Apennines.

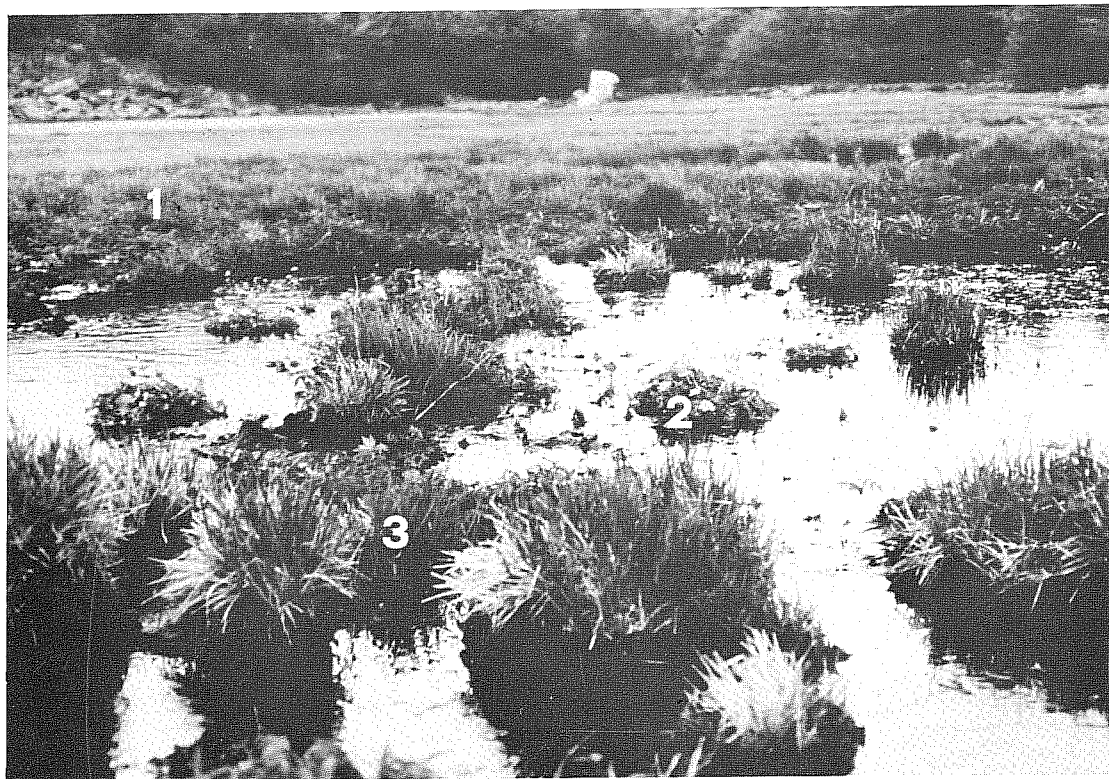


Fig. 2 - Peat bog covered by grass (*Molinietalia*) (1), *Caltha palustris* (2) and *Carex fusca* (3).

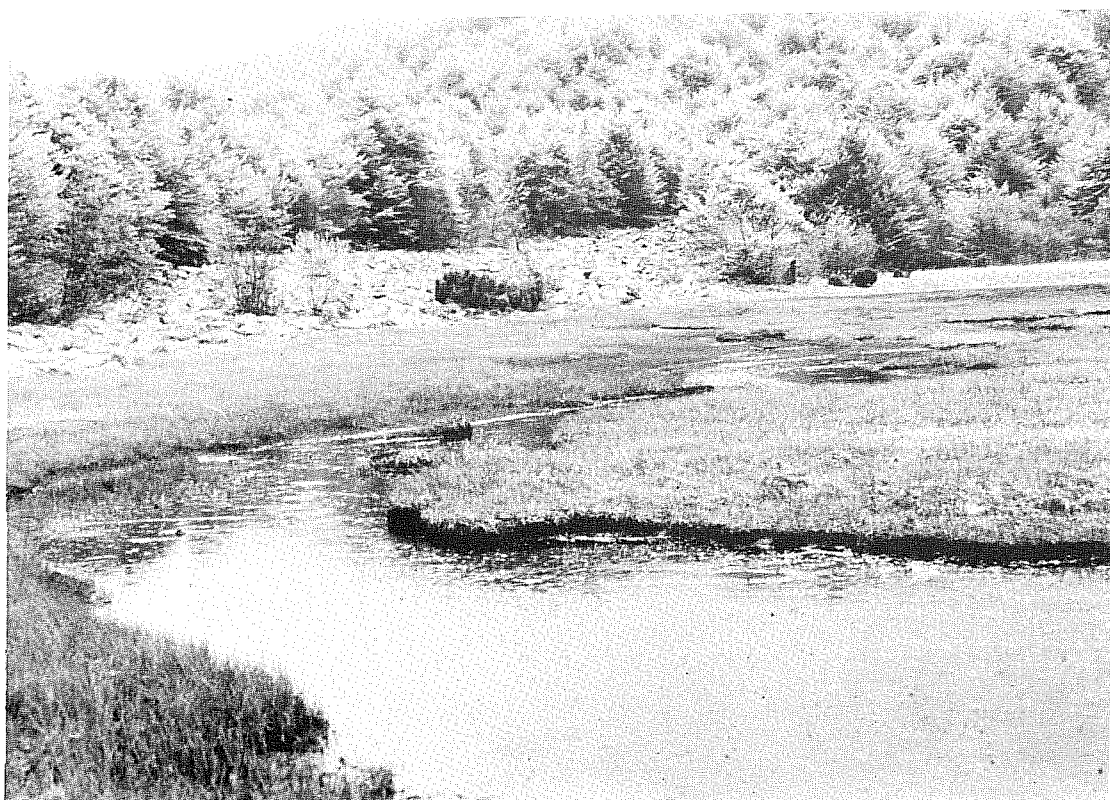


Fig. 3 - Peat bog crossed by meandering spring stream. Marginal zone and beech woods.

The climate is characterized by two periods of maximum rainfall, in spring and winter. The snow is abundant in winter and remains on the ground until spring. There is persistent mist especially in spring and summer.

The Lajone peat bog is a protected area of particular geobotanic interest owing to the presence of hygrophilic vegetation which is considered a glacial relict since it occurs at higher altitudes (MONTANARI, 1990). In addition several microthermic relicts are to be found, such as *Drosera rotundifolia*, *Rhynchospora alba* and *Parnassia palustris*, etc.

The aquatic fauna of the peat bog has not yet been studied. This paper is the first contribution to the trichopteran coenosis of this peculiar habitat and adds new information to the knowledge of Ligurian Trichoptera (CIANFICCONI & MORETTI, 1982). This study was carried out by Moretti using specimens collected with light traps by Raineri and Fava in 1994.

The classified specimens are housed in the Museo Civico di Storia Naturale "G. Doria" in Genova.

Study area

The peat bog is low-lying and changes its appearance in the course of the year. In winter it is flooded and resembles a shallow pond; in summer it is a water-logged meadow crossed by small channels of slow moving water, invaded by *Potamogeton oblongus*. The surface is partly covered by sphagnum (*Sphagnum contortum*) with areas of hydrophytes (*Potamogeton*, *Phragmites*). The substrate, which consists partly of peat, is covered by grass (*Molinietalia*) and acid alpine and subalpine peat bog communities (*Caricetalia fuscae*, *Scheuchzerio-Caricetalia fuscae*) (Fig. 2). The marginal zone on the dry ground is covered by *Nardo-Callunetea* and *Molinio-Arrhenatheretea* communities and by shrubs (*Juniperus communis*, *Sorbus aria*, *Corylus avellana*, etc.). About 300 m from the marginal zone the bog is surrounded by beech woods (*Trochyschantho-Fagetum*) (BRAGGIO MORUCCHIO et al., 1978) (Fig. 3).

The physico-chemical conditions of the water are fairly stable in time. The depth varies from a minimum of 0.20 m in summer to a maximum of 1.50 m in spring. The water temperature ranges from 7 °C in spring to 25 °C in summer, from May to July it is similar to the air temperature. The pH, normally acid (6.2 - 6.9), increases in April and October to 7.2. The oxygen level (O₂%) is slightly below saturation value, except in June (115 %) owing to chlorophyll activity. The sulphur, nitrate, nitrite and chloride contents increase in June, whereas the calcium content increases in July. Conductivity varies from 57 to 64 µS/cm.

Methods and dates of samplings

The adult Trichoptera were collected in summer and autumn 1994 with light traps (300 W Mercury vapor lamps powered by a 600 W petrol generator), left for about 4 hours (from 22:00 to 2:00) in three different sites: in the peat bog, in the marginal zone and in the beech woods at 300 m from the bog. A total of 14 samplings were carried out from June to October 1994 on 10 different days: 5 in the peat bog (from July to October), 4 in the marginal zone (from July to September) and 5 in the beech woods (from June to September).

Results

698 adult Trichoptera (441 ♂, 257 ♀), belonging to 27 species from 10 families and 17 genera, were classified (Table I).

In the peat bog 150 specimens belonging to 19 species from 8 families were caught. The most abundant species *Grammotaulius submaculatus* (33 specimens) belongs to the family Limnephilidae which is represented by 7 species and 57 specimens (58 %). *Hydropsyche pellucidula* follows with 28 specimens. This species belongs to the family Hydropsychidae represented by 2 species and 38 specimens. Polycentropodidae, with 4 species and 24 specimens, was third. Philopotamidae was present with two species, Glossosomatidae and Lepidostomatidae with 1 species each. Hydropsychidae, Glossosomatidae and Lepidostomatidae were present only in this site.

Table 1 - Lajone peat bog. Trichoptera species in the light traps catches, subdivided into sampling sites and dates. The species are listed according to BOTOSANEANU & MALICKY (1978).

TABULIERA
torba

TAXA	DATE			PEAT BOG										MARGINAL ZONE					BEECH WOODS					Tot							
	16/VII	22/VII	27/VII	4/IX	10/IX	16/IX	22/IX	28/IX	4/X	10/X	16/X	22/X	28/X	4/XI	10/XI	16/XI	22/XI	28/XI	4/III	10/III	16/III	22/III	28/III		4/IV	10/IV	16/IV	22/IV	28/IV		
Rhyacophilidae																															
1 Rhyacophila rectispina McL.																										1				1	
Glossosomatidae																															
2 Glossosoma conformis Neboiss																															
Philopotamidae																															
3 Philopotamus lucificatus McL.																															
4 Wormaldia copiosa botosaneanui M.																										1				1	
5 W. mediana McL.																															
Hydropsychidae																															
6 Hydropsyche pellucidula Curtis																															
7 H. tenuis Navas																															
Polycentropodidae																															
8 Plectrocnemia appennina McL.																															
9 P. conspersa Curtis																															
10 P. geniculata corsicana Moseley																															
11 P. praestans McL.																															
12 Polycentropus moretti Malicky																															
Limnephilidae																															
13 Limnephilus italicus McL.																															
14 L. lunatus Curtis																															
15 L. rhombicus reserf Malicky																															
16 L. sparsus Curtis																															
17 Grammotaulius submaculatus Rambur																															
18 Potamophylax gambanicus spinulifer M.																															
19 Stenophylax crossotus McL.																															
20 S. mitis McL.																															
21 Micropterna sequax McL.																															
22 M. wagneri Malicky																															
23 Alogamus hilaris McL.																															
Lepidostomatidae																															
24 Lepidostoma hirtum Fabr.																															
Leptoceridae																															
25 Oecetis testacea Curtis																															
Sericostomatidae																															
26 Sericostoma pedemontanum McL.																															
Odontoceridae																															
27 Odontocerum albicorne Scop.																															
TOTAL	62	63	3	2	12	2	4	2	150	28	35	26	11	27	15	10	3	153	126	62	16	3	19	1	86	54	22	4	393		

In the marginal zone a total of 153 specimens belonging to 14 species from 4 families were collected. The most abundant species, *Limnephilus sparsus* with 68 specimens (54 %) and *Grammotaulius submaculatus* with 36 specimens (29 %) belong to the family Limnephilidae, whose 9 species and 125 specimens (81 %) are present here in greater numbers than in the bog. Polycentropodidae were fewer than in the bog (3 species and 19 specimens). In the beech woods 393 specimens belonging to 16 species from 6 families were caught. The Limnephilidae were represented by 7 species and 373 specimens (95 %). The most abundant species belong to this family: *Limnephilus sparsus* with 206 specimens (55 %), *Grammotaulius submaculatus* with 76 (20 %) and *Limnephilus lunatus* with 46 (12 %). Three species of Polycentropodidae and 2 species of Philopotamidae were caught, while Rhyacophilidae and Leptoceridae were present with one species each. Sericostomatidae and Odontoceridae were represented by one species each and were collected in all three sites.

Conclusions

Analysis of the specimens captured by light traps provides interesting information about Trichopteran fauna of the acid low-lying peat bog.

There are Trichoptera of running water as well as stagnant or slow moving water. Among the former the family Polycentropodidae is represented by *Polycentropus morettii* and by 4 species of *Plectrocnemia*. The Polycentropodidae were often found to be abundant in acidified water in Norway (FIELLHEIM & RADDUM, 1988; ANDERSEN & KLAUSEN, 1994). Among the specimens from stagnant or slow moving water Limnephilidae are dominant with *Limnephilus sparsus* and *Grammotaulius submaculatus*. They were most abundant in the beech woods confirming that they are strong fliers (CRICHTON, 1971). *Limnephilus sparsus* had 2 periods of maximum presence, one in June (19 % of the population) and the other in September (28 %), while *G. submaculatus* had a maximum emergence in June (17 %).

The adults of *Grammotaulius submaculatus* differ in the pigmentation of the forewings, some of which are pale yellow and others markedly spotted (Figs. 4, 5). From emergence in captivity it seems that the pigmentation characterizes young adults. The high number of specimens examined allows us to propose new drawings of ♂ and ♀ genitalia of this species (Figs. 6, 7).

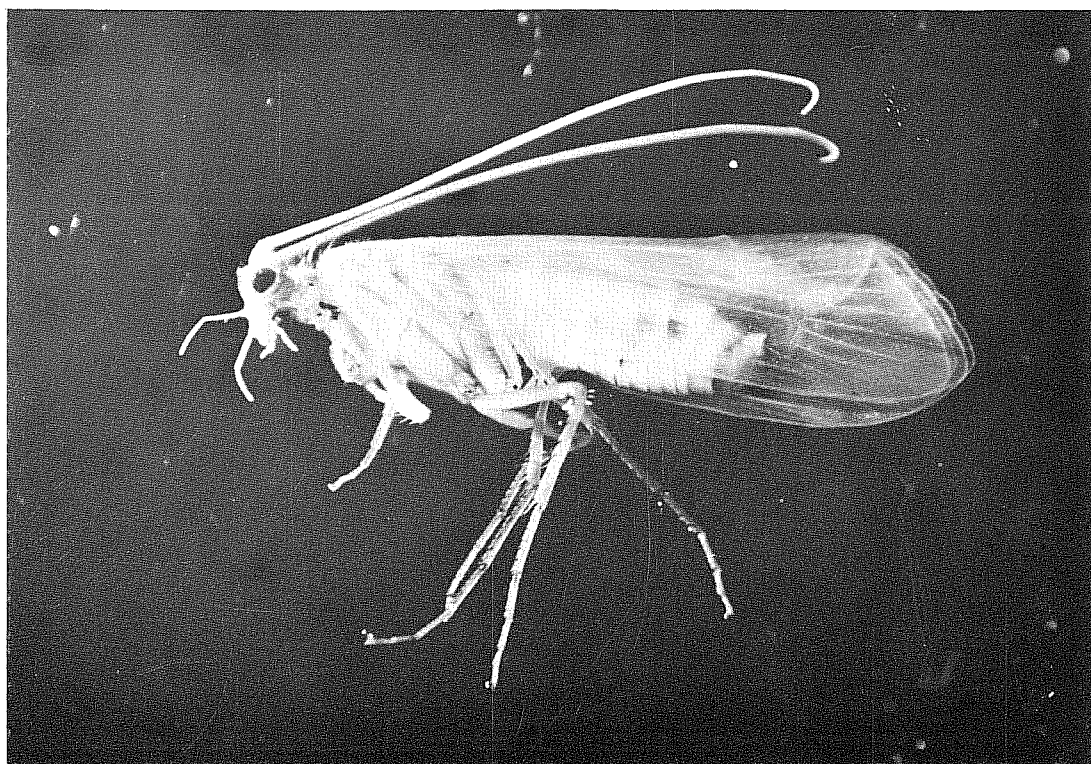


Fig. 4 - *Grammotaulius submaculatus* Rambur - Adult with yellow forewings.

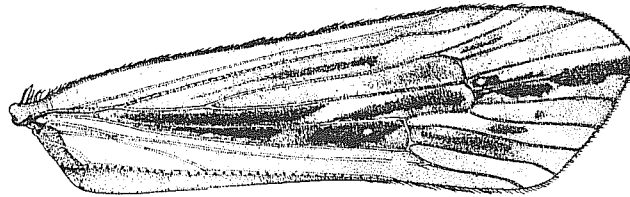
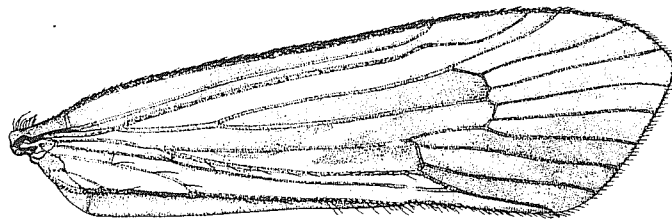


Fig. 5 - *Grammotaulius submaculatus* - Different pigmentation of the forewings.

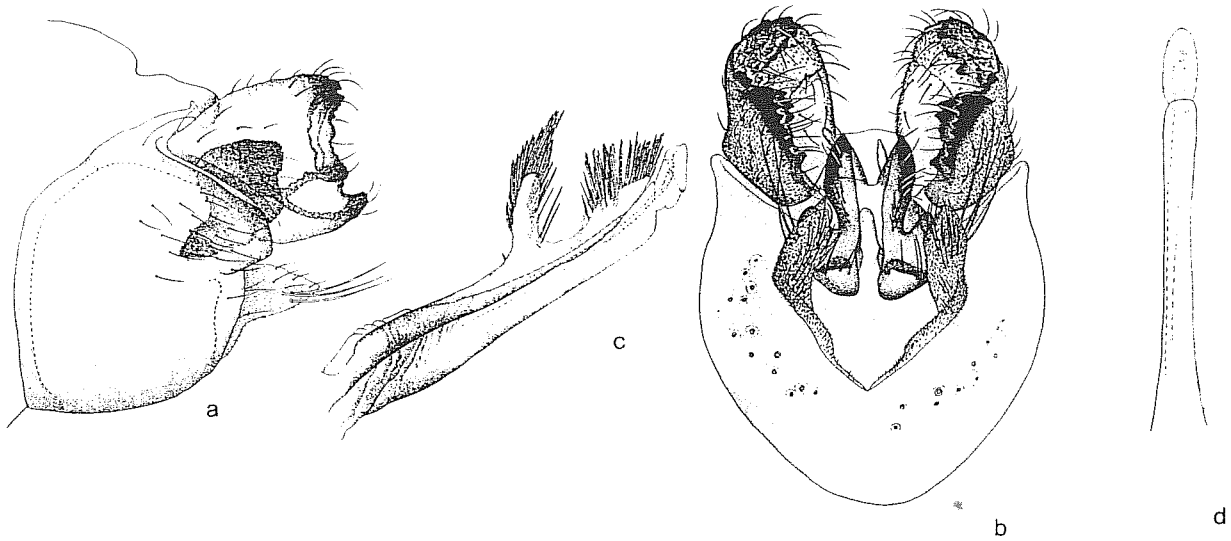


Fig. 6 - *Grammotaulius submaculatus* - ♂ genitalia. a=lateral view, b=ventral view, c=aedeagus and paramere, d=the end of aedeagus

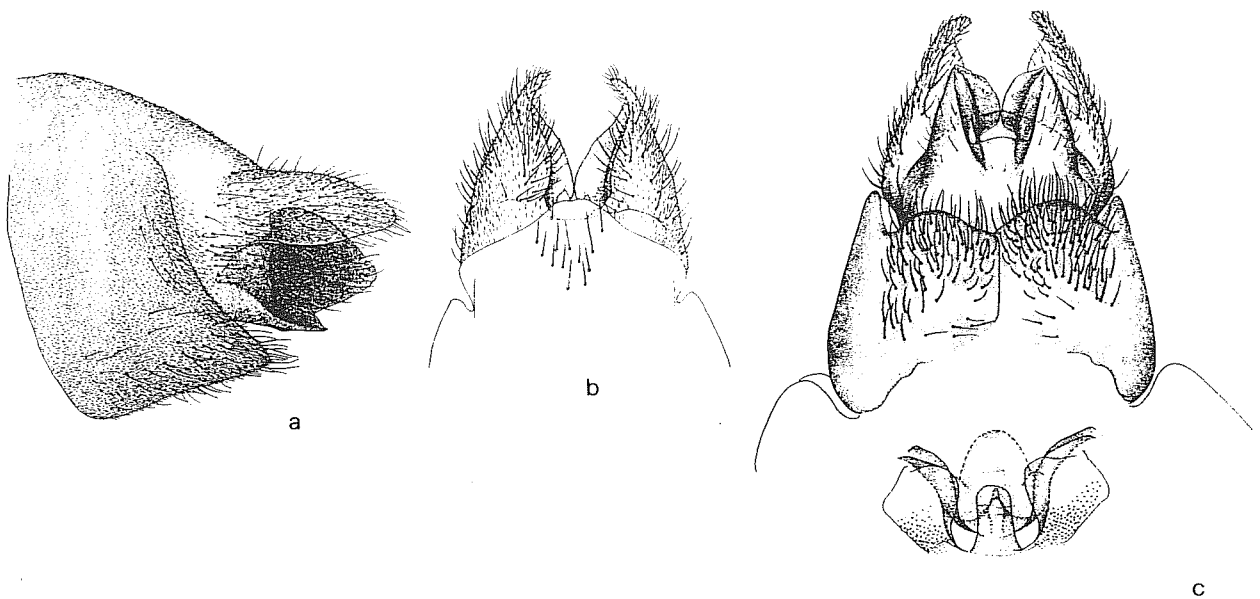


Fig. 7 - *Grammotaulius submaculatus*- ♀ genitalia. a=lateral view, b=from above, c=from below.

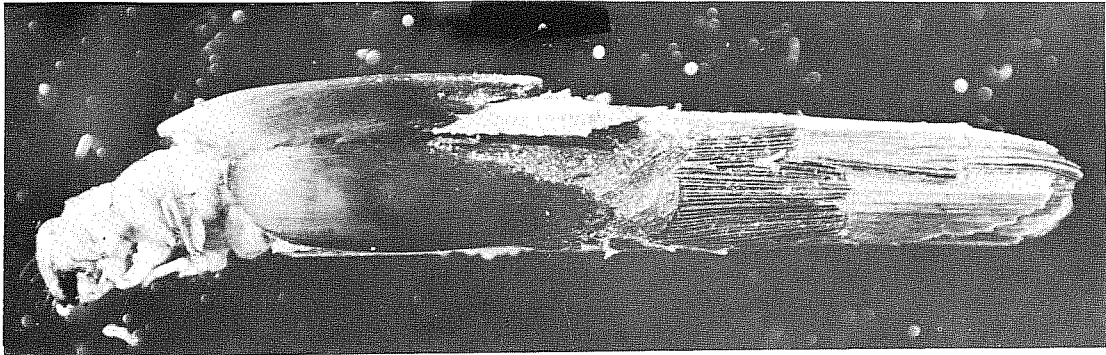


Fig. 8 - *Grammotaulius submaculatus* - Larval case built with pieces of *Carex fusca* leaves.

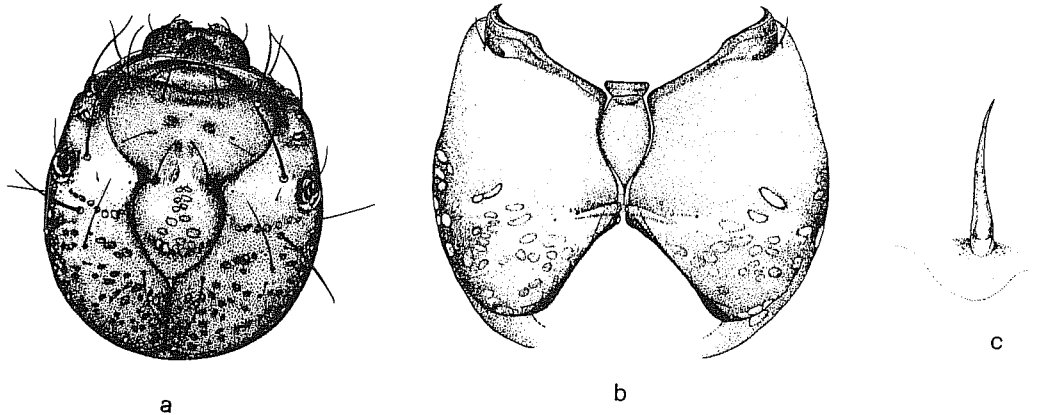


Fig. 9- *Grammotaulius submaculatus* larva: a=head dorsal view, b=head ventral view, c=prothoracic horn

The larva of this species uses pieces of *Carex fusca* leaf to build the case (Fig. 8), as seen in the aquatic instars collected on 10 April 1997. The head and prothoracic horn of the full-grown larva were studied and drawn (Fig. 9).

While the sex ratio for Limnephilidae was in favour of the males (*Limnephilus sparsus* 183♂, 104♀, *Grammotaulius submaculatus* 102 ♂, 43 ♀, *Limnephilus lunatus* 36 ♂, 13 ♀),*for *Hydropsyche pellucidula* it was in favour of the females, as already observed in the central Apennines (CIANFICCONI *et al.*, 1994) in catches with light traps.

The caddisfly fauna of the Lajone peat bog is similar to the fauna of the peat bogs at Colfiorito (Umbria) and La Zittola (Abruzzo) in central Italy, where *G. submaculatus* is vicariated by *G. nigropunctatus* RETZIUS (MORETTI & CIANFICCONI, 1995).

Zoogeographical analysis shows that species gravitating toward the north are predominant (70.4 %) followed by those gravitating toward the south (22.2 %). *Micropterna wagneri* has a transadriatic distribution. Two species (*Plectrocnemia appennina*, *Sericostoma pedemontanum*) and 2 subspecies (*Wormaldia copiosa botosaneanui*, *Potamophylax gambaricus spinulifer*) are endemic to the central northern Apennines and *Plectrocnemia praestans* is endemic to the Piedmont and Ligurian Alps.

Fourteen species (*Glossosoma conformis* NEBOISS, *Wormaldia copiosa botosaneanui* MORETTI, *Plectrocnemia appennina* MCLACHLAN, *P. conspersa* CURTIS, *P. geniculata corsicana* MOSELY, *Polycentropus morettii* MALICKY, *Limnephilus italicus* MCLACHLAN, *L. lunatus* CURTIS, *L. rhombicus reseri* MALICKY, *L. sparsus* CURTIS, *Potamophylax gambaricus spinulifer* MORETTI, *Micropterna wagneri* MALICKY, *Lepidostoma hirtum* FABR., *Oecetis testacea* CURTIS) are noted for the first time in Liguria and *Grammotaulius submaculatus* RAMBUR for the first time in Italy (CIANFICCONI & MORETTI, 1991).

In the light of these findings, the Lajone peat bog is an area of great interest for the Trichoptera biocenosis, because of the abundance of populations recorded, the coexistence of species with different ecological needs and of different geonomic components with northern, southern and eastern distribution. The importance of humid environments is confirmed and it is necessary to protect them before they are modified by human intervention.

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