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Autumnal aspects of the caddisfly fauna (Trichoptera) of Sicily, with the description of a remarkable relict species

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1. Introduction

The spring and summer caddisfly fauna of Sicily are reasonably well known (CIANFICCONI, MORETTI & TUCCIARELLI, 1984 ; MORETTI & CIANFICCONI, 1978, 1986), therefore the authors organized a trip to Sicily in November 1985 for the purpose of collecting the very poorly known autumnal fauna of caddisflies of this island. Unexpected health problems prevented the 3rd author from effective participation. The 1st and 2nd authors were accompanied during the collecting excursions by Umberto Chiappafreddo, technician at the Istituto di Zoologia, Perugia, and by Franco & Dr. Elisabetta Carlani (Perugia) ; we express them our best thanks for their valuable help and efficient and pleasant company. We are grateful to Prof. D. Caruso (University of Catania) who arranged an excursion to the Fiume Cava Grande, and to Dipl. Biol. R. Gerecke (then at the University of Catania) for guiding us to the collecting site where *Chaetopteryx trinacriae* sp. n. was discovered. Live larval and pupal material was collected and brought to Perugia to be reared : this material, and the emerged adults, are taken into account in the following faunistical survey. The specimens collected were divided between the Zoölogisch Museum Amsterdam and the Istituto di Zoologia Perugia.

2. Faunistical survey

Sicily is an island certainly not rich in permanently running water, as is particularly evident during late autumn. Moreover, some of its water courses are modified by millenary human activities to such an extent as to become uninteresting, if not biological deserts. For these reasons, it was not very easy to find a number of representative sampling localities. These are briefly described below (for some physical and chemical parameters : see Table I) and the collected species are enumerated.

a. Fiume Cava Grande, in south-east Sicily (Prov. Siracusa, Monti Iblei, basin of Fiume Anapo, between Ferla and Sortino). This beautiful, small, clear mountain river (450 m above sea level), draining a typical afforested karst area and distinctly influenced physiographically and chemically by the karst, yielded (22.XI.1985) the following species, caught by net : *Wormaldia mediana nielseni* MORETTI, *Polycentropus mortoni* MOSELY, *Tinodes maclachlani* KIMMINS, *Lype reducta* (HAGEN) ; larvae and pupae of *Philopotamus montanus siculus* HAGEN, as well as larvae of *Plectrocnemia geniculata* McLACHLAN, *Hydropsyche* sp., *Odontocerum albicorne* (SCOPOLI), and *Sericostoma* sp. (certainly *siculum* McLACHLAN) were collected, too. From other larvae and pupae collected, the following species emerged : *Hydroptila vectis* CURTIS, *Wormaldia mediana nielseni*, *Polycentropus mortoni*, *Tinodes maclachlani*.

b. Vallone del Caffaro, in central-east Sicily (Prov. Catania), at 220 m above sea level. This is a tributary of the Fiume Simeto, the collecting site being a few km from Paternò. At light, on the borders of this rapidly flowing, probably polluted, small river, the following species were caught (21.XI.1985) : *Rhyacophila rougemonti* McLACHLAN, *Hydroptila vectis*, *Tinodes maclachlani*. From pupae sampled the same day, 1 ♂ and 1 ♀ of a species of *Hydropsyche* emerged, which, however, could not be identified since the ♂ genitalia were lost.

c. Fiume Simeto, 700 m above sea level. The most important water course of Sicily was sampled near Bronte, at the foot of the western slopes of Mt. Etna (Prov. Catania). Light catches on this stony, fast-flowing, certainly slightly polluted river yielded (19.XI.1985) : *Rhyacophila hartigi* MALICKY, *Hydroptila angulata* MOSELY, *H. vectis*, *Wormaldia mediana nielseni*, *Mesophylax aspersus* (RAMBUR). Four days later, *Rhyacophila hartigi* and the two species of *Hydroptila* were collected again, together with *Agapetus nimbulus* McLACHLAN. From pupae collected on 19.XI.1985, adults of the following emerged : *Rhyacophila rougemonti*, the two Larvae of already mentioned *Hydroptila* species, and *Hydropsyche pellucidula* CURTIS. Were also collected : *Agraylea* sp., *Orthotrichia* sp. — possibly *O. angustella* (McLACHLAN), already known from the F. Simeto —, *Ithytrichia* sp., *Polycentropus* sp., *Micrasema* sp.

d. Fiume Cutò, a tributary of the Simeto in its upper course (800 m above sea level), near Mazzaporro (Prov. Messina). On the banks of this clean, fast flowing small mountain river, 1 ♂ of *Limnephilus cianficconiae* MALICKY was caught in a spider's web (19.XI.1985). One ♀ of *Rhyacophila rougemonti* emerged from a pupa collected here.

e. Sorgenti del Fiume Morello. A description of these spring-brooks will accompany the description of *Chaetopteryx trinacriae* sp. n., the single

caddisfly species whose adults were caught here, by hand, on 20.XI.1985. From pupae collected the same day, other specimens of *C. trinacriae* emerged. Larvae and pupae of *Philopotamus montanus siculus* (1 ♂ emerged subsequently), *Plectrocnemia geniculata*, and *Odontocerum albicorne*, as well as young larvae or empty cases of Limnephilidae, were also collected.

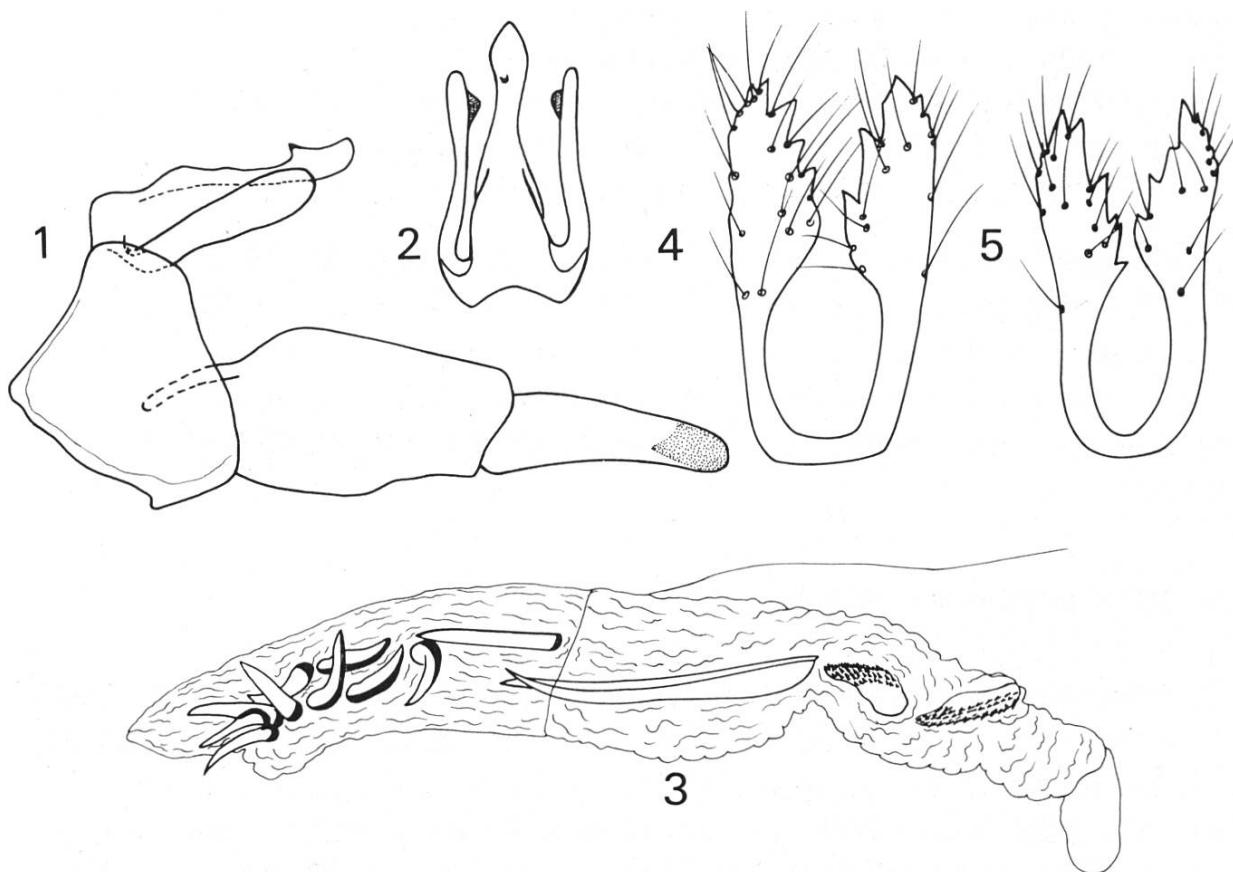
f. Mountain brook in the Monti Nebrodi, near Laghetto Quattroci, a few km from Mistretta (central-north Sicily, Prov. Messina). Along this small brook flowing through grazed pasture and on a steep slope at ca. 1100 m above sea level, no adults were caught (27.XI.1985), only larvae and prepupae of *Rhyacophila* sp., *Plectrocnemia* sp. and Limnephilidae being found.

3. Brief comments on a few species

— *Wormaldia mediana nielseni* MORETTI, 1981. Described from Basilicata, Calabria, and Sicily (MORETTI, 1981) this subspecies is distinguished from *W. m. mediana* McLACHLAN, 1878, by the following characters of the ♂ genitalia (figs. 1-3) : IXth segment in lateral view slightly stouter ; superior appendages in dorsal view with median "tooth" placed not apically but distinctly subapically ; Xth segment, in lateral view with more complex (irregular) dorsal relief ; coxopodite and harpago slightly more slender. The number of spines of the phallic endotheca is about 10 (long, paired spur and two basal spiny plates excluded), thus possibly slightly higher than in *W. m. mediana*, but the formerly mentioned features are more important in characterizing this subspecies of a species which, generally speaking, does not display any important geographical variability (KIMMINS, 1953 ; VIGANÒ, 1974 ; BOTOSANEANU & MARLIER, 1981).

— *Polycentropus mortoni* MOSELY, 1930, already known from Corsica and Sardinia, was only quite recently recorded from Sicily, Basilicata and Calabria, too (MORETTI & CIANFICCONI, 1986). There is a very slight difference in the size of the insects and in the shape of the Xth segment of the Sicilian specimens when compared with those from Corsica.

— *Tinodes maclachlani* KIMMINS, 1966. The Sicilian specimens show an interesting feature : the lowermost projections of the coxopodite of the gonopod are always strongly and irregularly denticulated (serrate) on their internal margin (figs. 4-5). VAILLANT (1954) and MALICKY (1983) illustrated them completely devoid of teeth ; MOSELY (1938) represents them with one strong median projection only. Slight peculiarities of a Maltese specimen were mentioned by BOTOSANEANU (1981). The distribution of this species being imperfectly known and partly sporadic (STOLTZE, 1985), and the



Figs. 1-3. *Wormaldia mediana nielseni* MORETTI, ♂ genitalia : 1, lateral view ; 2, dorsal view ; 3, phallic endotheca, more enlarged.

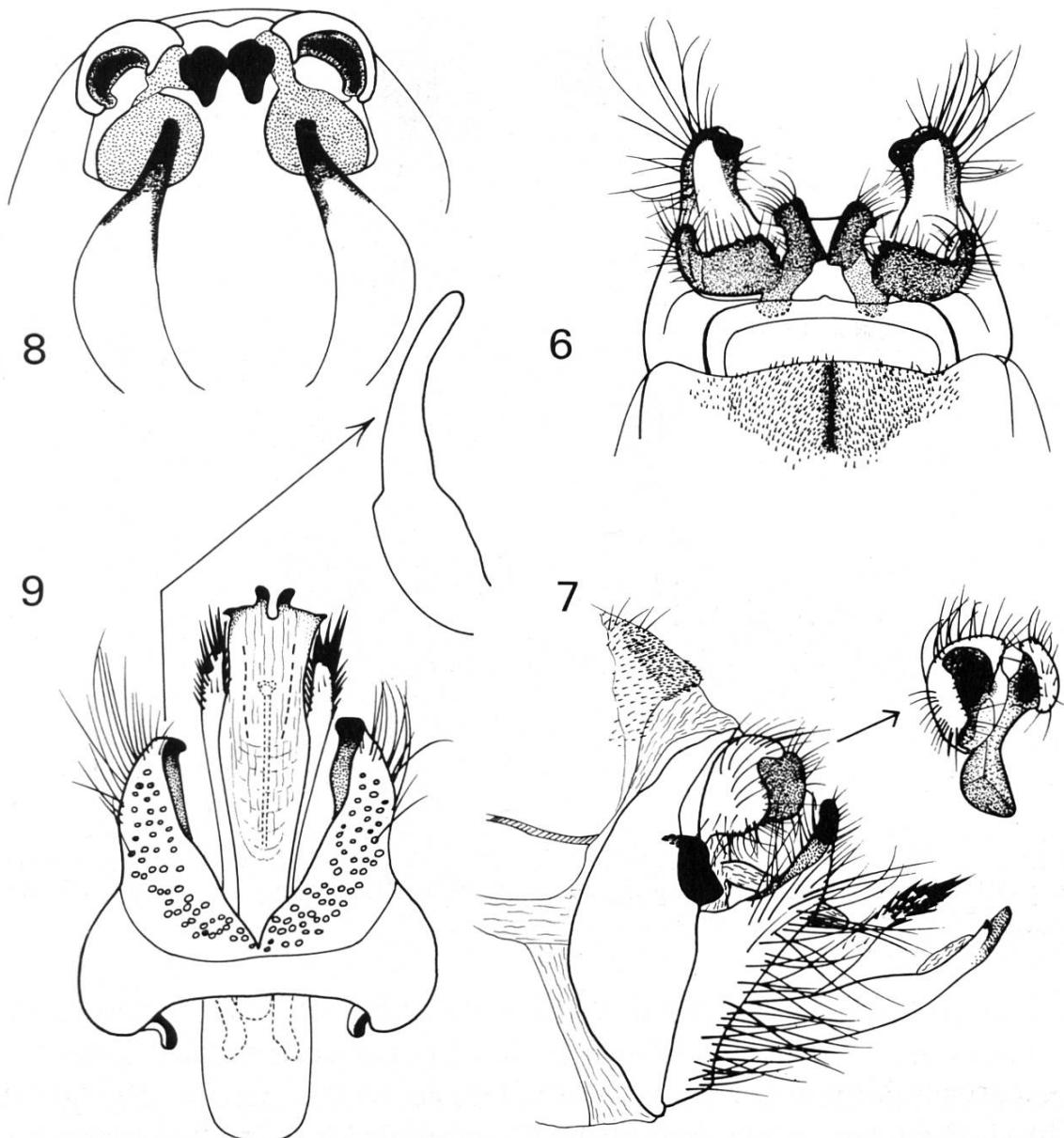
Figs. 4-5. *Tinodes macclachlani* KIMMINS, lower branch of inferior appendages in ventral view (two different specimens).

occurrence of the above mentioned character not being really well understood, it would be risky to describe here a new subspecies.

— *Limnephilus cianficconiae* MALICKY, 1980. This species was described (MALICKY, 1980) from 1 ♂ caught in June at Randazzo, Sicily ; it was caught also in Calabria (Aspromonte) and in Emilia (Lago Scuro) (CIANFICCONI, MORETTI & TUCCIARELLI, 1984). The ♂ specimen found by us (probably on the wing during the first days of November) is the second record for Sicily. The ♀ is still unknown.

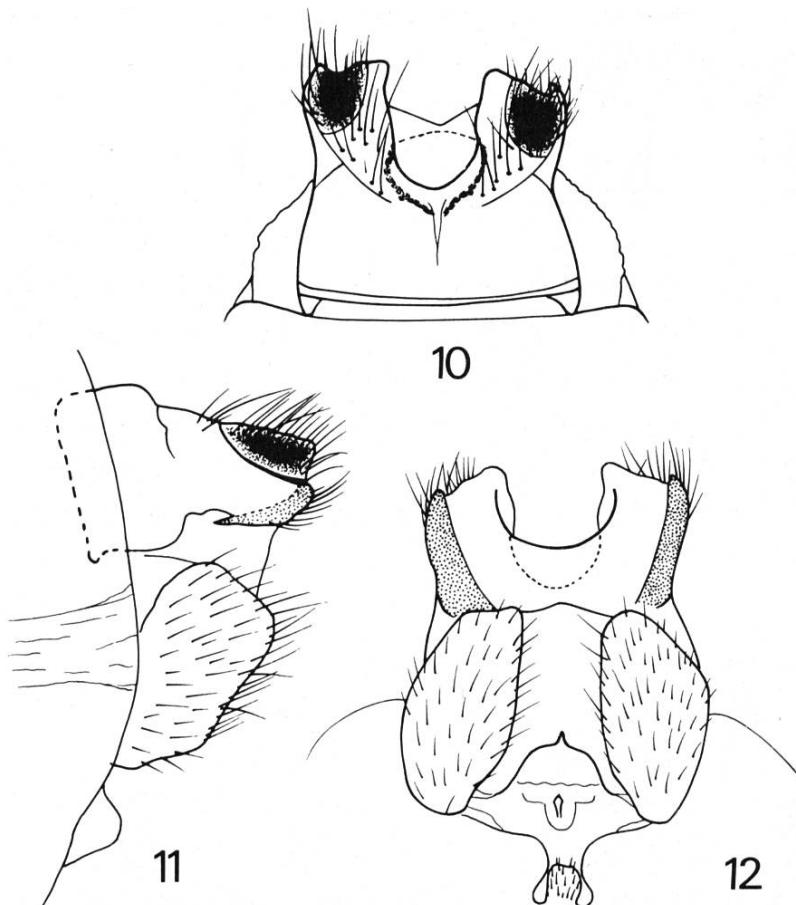
4. *Chaetopteryx trinacriae* sp. nov. (figs. 6-12)

Locality, material. — Sorgenti del Fiume Morello, in the Serra del Re, part of the Monti Nebrodi, in north-east Sicily (Prov. Messina). These spring-brooks feed the Fiume Morello, a tributary of the F. Simeto ; they are at about 15 km from the small town of Floresta, at some 1500-1600 m above sea level (the highest peak of Serra del Re being some 1750 m). We have



Figs. 6-9. *Chaetopteryx trinacriae* sp. n., ♂ genitalia : 6, dorsal view ; 7, lateral view (the arrow points to another view — slightly more from behind — of the superior and intermediate appendages) ; 8, view from behind ; 9, ventral view (the arrow points to another view — slightly more from behind — of the inferior appendage).

sampled only two of the many springs and spring-brooks that are present in the area, flowing through a dense, humid beech forest — probably one of the very last surviving on the island. The spring-brooks are narrow, with water fast flowing on a rather steep slope. The brooks are well shadowed, and certainly stenothermous, since they are very near to the springs feeding them. Small to large stones (igneous rock) in the bed, some moss-covered, large amounts of vegetable material, mainly dead beech leaves. On 20.XI.1985, 15 ♂ and 1 ♀ (one pair caught in copula) were picked by hand, (leg. L. BOTOSANEANU & F. CIANFICCONI) almost exclusively on — or amongst —



Figs. 10-12. *Chaetopteryx trinacriae* sp. n., ♀ genitalia : 10, dorsal ; 11, lateral ; 12, ventral.

dead beech leaves on the brook's bed. Five additional males emerged in the laboratory at Perugia some time later, from pupae collected the same day. It is possible that there is a scarceness of females in this species. 1 ♂ holotype, 1 ♀ allotype (both in alcohol, in the Zoölogisch Museum Amsterdam), and 19 ♂ paratypes, some in alcohol, some pinned, in the Zoölogisch Museum Amsterdam and the Istituto di Zoologia, Perugia.

Description. — Wing expanse : ♂ 27.2-36.5 mm ; unique ♀ : 32.3 mm. On fore-wings, rigid hairs arising from small warts, on veins as well as on membrane, as usual in *Chaetopteryx*, hairs on veins generally longer than on membrane. Body and wings mainly light brown, darker parts being : antennae in most specimens (but not the two first segments), anterior warts on head, distinct dark-brown pattern on meso- and metathorax (leaving scutelli light-brown). Ventral edge of femur and tibia of 1st pair of legs (♂) with distinct stripe of black hairs.

Genitalia ♂. Spiny zone on VIIIth tergite with distinct median longitudinal "groove". IXth segment reduced dorsally to narrow ridge, ventrally to broader ridge ; laterally not strongly developed. Superior and intermediate appendage on either side firmly connected. Superior appendages large, in

lateral view with posterior margin deeply excised (superior lobe much smaller than inferior lobe), cup-like (i.e. with deep hollow on median and ventral sides). Dorsal part of intermediate appendages strongly sclerotized (black), in lateral view roughly rounded (not produced posteriorly), laterally slightly concave ; in dorsal view strongly divergent, with blunt terminal point directed laterally ; ventral part of intermediate appendages very large, like rounded plates when seen from behind. Inferior appendages, in lateral view, remarkably long (reaching the excision of superior appendages), slender, especially in their terminal part which is well-limited, slightly concave medially, blackened, tip slightly turned anteriad ; in dorsal, ventral, or apical views, the shape of these appendages is subject to important variations, depending on position, but usually tips bluntly projecting mediad. Each half of terminal part of phallus with finger-like, well-projecting median lobe, separated from lateral angle (which is acute and directed laterad) by almost horizontal margin.

Genitalia ♀. In lateral view, ventral limit of complex formed by dorsal part of segment IX + segment X, characteristically sinuous. The two appendages representing the Xth segment are remarkably broad, rather short, with parallel sides, separated by a space as broad as each appendage ; a rather small, shallow depression laterally on their dorsal side ; a distinct but small sinus of distal margin of each appendage separates a strong, conical, median lobe from a much smaller, pointed, lateral lobe. The "ventral pieces of the IXth segment" very large, somehow angular ; space separating them posteriorly limited at level with posterior end of the two "ventral pieces". Median lobe of "vulvar scale" broad, rounded.

Derivatio nominis. — The new species is named after Trinacria, one of the antique names given to Sicily, meaning "the tri-angular".

Discussion. — The new species belongs to the *villosa* group of species, but it occupies a somehow isolated position within this group, being related to *C. vulture* MALICKY, 1971 (MALICKY, 1971, 1983), a species known from Basilicata and Calabria (MORETTI & CIANFICCONI, 1981) where it is presently the only known representative of the Chaetopterygini. The two are possibly sister-species. They share two characters in the ♂ genitalia which are unique for the group : hollow, cup-like superior appendages, and remarkably short and stodgy intermediate appendages. It is possible that these characters are derived, in comparison with the remaining species of the *villosa* group.

The genital characters distinguishing *trinacriae* from *vulture* are, in the ♂ : IXth segment much narrower laterally ; distal emargination of superior appendages stronger ; intermediate appendages broader, not forming sharp hooks, their ventral plates rounded, not triangular ; inferior appendages much longer and more slender, especially in their distal part ; phallus

medio-distally with digitiform lobes, not merely very small "buttons". In the ♀: the two appendages representing segment X stronger, apically broader and bilobed, with dorso-lateral shallow depressions (shape quite different in *vulture*), and ventral pieces of IXth segment large and more angular.

The tribus Chaetopterygini of the family Limnephilidae includes species quite diverse in their ♂ and ♀ genitalia, but sharing an extremely interesting complex of morphological, ethological, ecological, and phenological peculiarities. The adults of all the species have a clearly "cold-adapted" shape, being stout, stodgy insects with strong and rather short legs; fore-wings coarse, with strong venation, and with characteristic strong hairs arising from distinct "tubercles", either only on the veins, or also on the membrane; the wings are generally short, and in many species there is a more or less clear tendency towards brachyptery; the size of the specimens in one population is often subject to a remarkably important variability. These are clumsy insects, very slowly moving, and awkwardly flying only on sunny days or hours; copulation occurs especially during cold, cloudy days or hours, and may last as long as one week. They are inhabitants of cold or cool, oligotrophic, well oxygenated waters (running or stagnant), the group being almost exclusively European (s. lat.), most of its species being montane with restricted distributions (with quite a few more expansive species inhabiting the northern lowlands, too). All species are univoltine, adults being on the wing exclusively during autumn (starting with September) and in many cases also during the first winter months, when they are seen crawling on snow or ice.

It is not surprising that the distribution and speciation of the Chaetopterygini are sometimes interpreted as being tightly determined by events during the Pleistocene glaciations (for two very different cases see: BOTOSANEANU, 1973; MEY & BOTOSANEANU, 1985). The surprising presence of a Chaetopterygine in Sicily requires an explanation in the same context. Sicily, presently an island with — generally speaking — a warm and dry climate, was never glaciated, but it is beyond doubt that the peak of the Pleistocene glaciations influenced it strongly, determining a colder and more humid climate. It is quite plausible that *Chaetopteryx trinacriae* sp. n. (or, more probably its ancestor, which also produced, e.g., *C. vulture*) had at that time a (much) wider distribution in Sicily, or on the Calabro-Sicilian microplate, and that its distribution area shrank subsequently, due also to anthropogenic factors, to the present area including only the upper zones of the Rhithral (certainly also the Crenal) in higher, well afforested mountains of north Sicily. The situation is probably similar to that of the slightly more meridional *Psilopteryx esparaguera* SCHMID, 1952, endemic to the high altitudes of the Sierra Nevada, Spain (a formerly glaciated range), and considered by its author (SCHMID, 1952) as being a relict. In our opinion,

Table I

Physical and chemical parameters of water in sampling localities

	Fiume Cava Grande	Vallone del Caffaro	Fiume Simeto	Fiume Cutò	Sorgenti Fiume Morello (two different spring-brooks)
Date	22.XI.	21.XI.	19.XI.	19.XI.	20.XI.
Water temperature	11°C	16.3°C	14.9°C	12°C	5-5.6°C
O ₂ % s.v.	86.50	91.34	240		80-93
Total hardness °F	32	70	28		5-10
CaCO ₃ mg/l	24	97	26	14	2-5
Organic matter mg/l	2.03	5.26	3.16		3.91-1.35
NH ₃ mg/l	1	1.7	0.7		0.3-1.1
Conductivity µS at 18°C	483	217	540		56-110
pH	8.1	8.2	7.4	7.2	6.4-7

C. trinacriae sp. n. is a conservative, non-expansive relict from a colder climatic period corresponding to some peak of the Pleistocene glaciations in Europe. We use the term "relict" in the sense of the definition given by THIENEMANN (1950 : 192, etc.) : "Der Bestand einer Art ist in einer Gegend ein Relikt, wenn sein Dörtsen nur so zu verstehen ist, daß die Art selbst oder ihre Stammform dort unter Naturverhältnissen zurückgelassen wurde, die der betreffenden Gegend jetzt fremdartig sind."

We suspect that the distribution of *C. trinacriae* sp. n. is rather restricted in Sicily, maybe to (some parts of) the Monti Nebrodi, perhaps to the Madonie too. It is perhaps interesting to note that careful search, under favourable meteorological conditions and at the right time, in an apparently good potential habitat of Monti Nebrodi (station f in our faunistic survey) did not yield a single specimen : perhaps the negative factor here is lack of shelter from forest.

Summary

The late autumn fauna of Caddisflies was sampled in Sicily. Lists of the sampled species, with comments on some of them, are given. In cold spring-brooks (Serra del Re, Monti Nebrodi) a new species of *Chaetopteryx* STEPHENS was discovered ; this is a remarkable relict in the fauna of Sicily.

Zusammenfassung

Aus Sizilien wurden die im Spätherbst auftretenden Köcherfliegen gesammelt. Das Verzeichnis der gefangenen Arten enthält morphologisch-taxonomische Details.

Eine neue Art von *Chaetopteryx* STEPHENS wurde in einem kalten Quellbächlein (Serra del Re, Monti Nebrodi) entdeckt (ein Relikt in die Fauna von Sizilien).

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