The water mites of the genus *Atractides* Koch, 1837 (Acari, Hydrachnidia: Hygrobatidae) in Corsica and Sardinia

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ABSTRACT
Based on bibliographic data, material from coll. E. Angelier and own field work of the author done in the late 20th century, a survey is given on the diversity and distribution of spring- and stream-dwelling water mites of the genus *Atractides* Koch, 1837 on Corsica and Sardinia. Published information on presence of *Atractides* in the area covered was restricted to Corsica (Angelier 1954a, b; Santucci 1965, 1971, 1977; Giudicelli 1970; Gerecke & Di Sabatino 2013). Redescriptions are given of the incompletely documented species *Atractides gracilipes* (E. Angelier, 1951) (no more documented by type material) and *A. corsicus* E. Angelier, 1954 (of which six syntypes could be detected in NHMB). Published records (in brackets) are referred to the species *A. robustus* (Sokolow, 1940) and *A. acutirostris* Motaş & Angelier, 1928. In total, 24 *Atractides* species are now known from the two islands, 50% of them recorded here for the first time: *Atractides allgaier* Gerecke, 2003, *A. clavipes* Lundblad, 1954, *A. fonticolus* (K. Viets, 1950), *A. graecus* K. Viets, 1950, *A. inflatus* (Walter, 1925), *A. loricatus* Piersing, 1898, *A. macrolaminatus* Láska, 1956, *A. orghidani* Motaş & Tanasachi, 1960, *A. polyporus* (K. Viets, 1922), *A. protendens* K.O.Viets, 1955, *A. spinipes* Koch, 1837, *A. valencianus* K. Viets, 1930. Of the 20 species known from Corsica, nine are first records – from Sardinia all 19 *Atractides* species are recorded for the first time. Concerning the national faunas, six species are new for Italy (*A. allgaier*, *A. corsicus*, *A. giustinii* Gerecke & Di Sabatino, 2013, *A. gracilipes*, *A. orghidani*, *A. valencianus*), three for France (*A. graecus*, *A. macrolaminatus*, *A. protendens*).

KEY WORDS
Acari,
Hydrachnidia,
diversity,
zoogeography,
spring habitats,
running waters,
redescriptions,
new records.

RÉSUMÉ

Les acariens du genre Atractides *Koch, 1837 (Acari, Hydrachnidia: Hygrobatidae) en Corse et en Sardaigne.*

La diversité et la distribution des acariens aquatiques du genre *Atractides* Koch, 1837, inféodé aux sources et aux cours d'eau, est analysée pour la Corse et la Sardaigne sur la base de données bibliographiques, du matériel de la collection Angelier (MNHN) et des collectes effectuées dans le milieu naturel par l'auteur à la fin du xx^{e} siècle. Les seules informations publiées sur la présence d'*Atractides* dans l'aire étudiée concernent la Corse (Angelier 1954a, b; Santucci 1965, 1971, 1977; Giudicelli 1970; Gerecke & Di Sabatino 2013). Deux espèces incomplètement documentées sont redécrites, *Atractides gracilipes* (E. Angelier, 1954) (matériel type plus disponible) et *A. corsicus* E. Angelier, 1954 (six syntypes trouvés au NHMB). Les signalisations publiées (entre parenthèses) font références aux espèces *A. robustus* (Sokolow, 1940) et *A. acutirostris* Motaş & Angelier, 1928. Au total, 24 espèces d'*Atractides* sont maintenant connues des deux îles, dont 50 % signalées ici pour la première fois : *Atractides allgaier* Gerecke, 2003, *A. clavipes* Lundblad, 1954, *A. fonticolus* (K. Viets, 1950), *A. graecus* K. Viets, 1950, *A. inflatus* (Walter, 1925), *A. loricatus* Piersing, 1898, *A. macrolaminatus* Láska, 1956, *A. orghidani* Motaş & Tanasachi, 1960, *A. polyporus* (K. Viets, 1922), *A. protendens* K.O.Viets, 1955, *A. spinipes* Koch, 1837, *A. valencianus* K. Viets, 1930. Sur les 20 espèces connues de Corse, neuf sont signalées pour la première fois – pour la Sardaigne, les 19 espèces d'*Atractides* sont nouvelles. Concernant les faunes nationales, six espèces sont nouvelles pour l'Italie (*A. allgaier*, *A. corsicus*, *A. giustinii* Gerecke & Di Sabatino, 2013, *A. gracilipes*, *A. orghidani*, *A. valencianus*), et trois pour la France (*A. graecus*, *A. macrolaminatus*, *A. protendens*).

MOTS CLÉS
Acari,
Hydrachnidia,
diversité,
zoogéographie,
sources,
eaux courantes,
redescriptions,
signalisations nouvelles.

INTRODUCTION

With about 350 species described from all continents except Antarctica, *Atractides* Koch, 1837 is one of the most diverse genera of water mites world-wide. Most probably, this is a paraphyletic clade with still unclear phylogenetic relations to several other genera at present known from the southern hemisphere. During a taxonomic revision of the W Palaearctic species of the genus, several problems emerged concerning little known taxa described from the Mediterranean area (Gerecke 2003). The aim of this paper is to describe the diversity of the *Atractides* species on Corsica and Sardinia. These Tyrrhenian islands form a geographical unit with a particular palaeohistory that is reflected by particular characteristics in their water mite fauna (Gerecke & Di Sabatino 1996). Mites of the genus *Atractides* have never before been recorded from Sardinia, while data concerning Corsica are available, but with several open questions.

Since two decennia, new material is available from field work on Corsica done by Jürgen Schwoerbel and students during an excursion of the university of Freiburg (1989), Astrid Schwarz in the course of a study on leave processing in the Porto catchment (1990/1991 – Schwarz & Schwoerbel 1997), Martina Pusch during a private trip (1992), the author in the course of doctorate and postdoc-

torate projects (1986, 1991,1993), and Holger Müller during a private trip (2010). For the first time, these collections provide also faunistic data from spring habitats which had been neglected during previous investigations. First material from the previously uninvestigated island Sardinia was collected by the author in 1986 and 1991 and by Martina Pusch in 1996.

MATERIAL AND METHODS

The new material was collected with hand nets, sorted in the field from the living material and fixed in Koenike's fluid (Kraus 1984).

For the investigation of previously published material, access was possible only to parts of the collection Angelier, while the field work of Jean Giudicelli and Julien Santucci (both Marseille) is not documented by conserved specimens. During a stay at Toulouse in autumn 2013, all available remnants of the heritage Angelier were checked, sorted and transferred to MNHN Paris where the collection Angelier is now hosted (Pešić *et al.* 2012). At this occasion, the definitive destiny of the type material of Angelier's species could be cleared.

Of the newly collected material, selected representatives of all populations were dissected as described in Gerecke (2003), slide-mounted in glycerine jelly, and studied with a Leitz Laborlux K microscope. For drawings, a camera lucida of the firma Olympus was applied. Morphological features and proportions were analysed and documented following the standards proposed by Gerecke (2003).

For further explanations for morphology and measured length, see Gerecke (2003: figs 2-8). Measurements are given in µm. Subgenera and species are treated in alphabetic order. The material is presented as follows: collecting site code – total specimen number – slides in MNHN: (males/females/deutonymphs) – slides in coll. Gerecke (males/females/deutonymphs) – material in Koenike's fluid, in coll. Gerecke (males/females/deutonymphs). Material collected by Daniele Benfatti (Corsicawn "benf" sites) is conserved at MCSNV (see Gerecke & Di Sabatino 2013), material from field work of Holger Müller (Corsican "HM" sites) is in the private collection H. Müller (Rudolstadt, Germany).

Abbreviations

Morphology

I-IV-L-1-6	Legs I-IV, segments 1-6;
Ac-1-3	acetabulum 1-3;
Cx-I-IV	coxae I-IV;
D-1-4	dorsalia 1-4 (dorsal muscle attachment platelets);
Dgl-1-5	dorsoglandularia 1-5;
dL	dorsal length;
dn	deutonymph;
H	height;
HA	proximal height;
HB	central height;
HC	distal height;
L	length;
P-1-5	palp segments 1-5;
rel. L	relative L (% total L of appendage)
S-1/-2	proximal/distal sword seta on I-L-5;
V-1-3	ventralia 1-3 (ventrocaudal muscle attachment platelets);
Vgl-1-3	ventroglandularia 1-3;
vL	ventral length;
W	width.

Institutions

Coll. EA	collection E. Angelier, MNHN;
Coll. HM	collection H. Müller, Rudolstadt;
Coll. RG	collection R. Gerecke, Tübingen;
MCSNV	Museo Civico di Storia naturale, Verona;
NHMB	Naturhistorisches Museum, Basel;
MNHN	Muséum national d'Histoire naturelle, Paris.

Collection sites

In addition to the sites listed in Table 1, further records not documented by deposited material are published by Giudicelli (1970: Corte, Restonica, affl. Tavignano, without date) and Santucci (1965, 1970, 1971, 1977: Porto, "spring area, upper course, middle course" without topographical details or sampling data).

"(Int)" = separate interstitial samples are available from this site.

TABLE 1. — Water mites of the genus *Atractides* in Corsica and Sardinia – list of the collecting sites. Abbreviations: **CSC**, collecting site codes; **GC**, geographical coordinates; **Int**, separate interstitial samples are available from this site.

CSC	City	Locality	Altitude	GC	Date	Collector
Corsica (Codes within brackets refer to French departments)						
F 23	Sarténe (2A)	Roccapina F. Ortolo/P. de l'Ortolo	20 m	8°51E, 41°33N	26.IX.1991	
F 25	Serra-di Scopamène (2A)	Loreto di Tallana, spring	280 m	9°02E, 41°43N	26.IX.1991	
F 26	Serra-di Scopamène (2A)	Cargiaca, Amor di Diu	530 m	9°03E, 41°44N	26.IX.1991	
F 27a	Serra-di Scopamène (2A)	Aullène, Ceppu, spring	750 m	9°04E, 41°46N	27.IX.1991	
F 27b		Aullène, Ceppu, spring stream				
F 29	Olivese (2A)	S.-M.-Siché, Spring near Mais. cant.	1200 m	9°05E, 41°50N	27.IX.1991	
F 30b	Bastelica (2A)	M. Renoso, I Pozzi, Pietradione	1780 m	9°08E, 42°02N	28.IX.1991	
F 32	Bastelica (2A)	Downstr. Gialgone, spring stream near. Rau de Marmanu	1400 m	9°09E, 42°01N	29.IX.1991	
F 33	Bastelica (2A)	Downstr. Gialgone, spring near Rau de Marmanu	1400 m	9°09E, 42°01N	29.IX.1991	
F 35	Calacuccia (2B)	Castirla, spring E slopes Capo d'Alici	390 m	9°08E, 42°23N	30.IX.1991	
F 40	Calacuccia (Calvi) (2B)	Fango E Punta Cavita	550 m	8°48E, 42°22N		Schwarz
F 40c					26.XII.1990	
F 40f					13.II.1991	
F 40g					13.III.1991	
F 40h					18.IV.1991	
F 41	Calacuccia (Calvi) (2B)	Galeria Fango, Mündungsbereich	1 m	8°40E, 42°25N		Schwarz
F 41c					26.XII.1990	
F 41d					15.I.1991	
F 41f					19.II.1991	
F 41g					11.III.1991	
F 41h					17.IV.1991	
F 43	Ajaccio (2B)	Vico, F. Porto, Aitone, P. des Condamnés	1200 m	8°52E, 42°16N		Schwarz
F 43b					14.XII.1990	
F 43c					28.XII.1990	
F 43f					23.II.1991	
F 43g					15.III.1991	
F 43h					14.IV.1991	
F 44	Ajaccio (2B)	Vico, F. Porto Ponte Vecchiu	230 m	8°46E, 42°15N		Schwarz
F 44a					26.XI.1990	
F 44d					18.I.1991	
F 44e					02.II.1991	
F 44f					23.II.1991	
F 44g					15.III.1991	
F 44h					14.IV.1991	
F 45e	Ajaccio (2B)	Vico, mouth, Camp. municipal	4 m	8°41E, 42°16N	02.II.1991,	Schwarz

TABLE 1. — Continuation.

CSC	City	Locality	Altitude	GC	Date	Collector
F 46	Porto catchment (2B)	Rau. de l'Ancina near bridge D 18			18.V.1989	Schwoerbel *et al.*
F 50	Porto catchment (2B)	undefined site				Schwoerbel *et al.*
F 52	Porto catchment (2B)	Calacuccia (Corte). Fango below Station			13.V.1989	Schwoerbel *et al.*
F 55	Ajaccio (2B)	Vico, F. Porto. P. di a Tavulella, Evisa	620 m	8°47E, 42°15N	14.V.1989	Schwoerbel *et al.*
F 61	Ajaccio (2B)	Vico, F. Porto. Evisa, downstr. Cristinacce	750 m	8°49E, 42°14N	14.V.1989	Schwoerbel *et al.*
F 62	Ajaccio (2B)	Calacuccia (Corte), Fango upstr. mouth			15.V.1989	Schwoerbel *et al.*
F 68	Ajaccio (2B)	Rau. de l'Ancina, Bridge D 18			18.V.1989	Schwoerbel *et al.*
F 69	Porto catchment (2B)	undefined site				Schwoerbel *et al.*
F 71	Calacuccia (Calvi) (2B)	Fango downstr. Station			14.V.1989	Schwoerbel *et al.*
F 73	Calacuccia (Calvi) (2B)	Fango downstr. Mont Estremo	200 m			Schwarz
F 73d					16.I.1991	
F 73f					19.II.1991	
F 73g					13.III.1991	
F 77	Cargése (2A)	Forêt d'Esigna, spring Bocca di Gradella	300 m		29.V.1993	
F 78	Cristinacce (2A)	Rau. de Tavulella downstr. Marignana	620 m		01.VI.1993	
F 79	Ota (2B)	Rau. de Furtolaccia in Gorges de Spelunca	250 m		02.VI.1993	
F 80	Ota (2B),	Rau. de Lonca, spring near Gorges de Spelunca	250 m		02.VI.1993	
F 81	Evisa (2B)	Rau. d'Aitone upstr. Gorges de Spelunca	300 m		02.VI.1993	
F 83a	Albertacce (2B)	Capu â Rughia spring stream exp. SE	1350 m		05.VI.1993	
F 83b		Capu â Rughia spring exp. SE	1400 m			
F 84	Albertacce (2B)	Col de St-Pierre, spring exp. E	1350 m		05.VI.1993	
F 86	Albertacce (2B)	Bocca di Foggiale, Fta. Monti Nielli	1800 m		06.VI.1993	
F 87	Albertacce (2B)	Golo-Oberlauf downstr. Berg. de Tula	1700 m		06.VI.1993	
F 89	Serriera (2B)	Rau. de Vetricella downstr. Rau. de Parata	65 m		09.VI.1993	

TABLE 1. — Continuation.

CSC	City	Locality	Altitude	GC	Date	Collector
F 93	Tavignano (2B)	near bridge D 39 to Erbajolo			15.06.1990	Schwarz
F 94	Corte (2B)	Restonica at bridge D 623	600 m		15.VI.1990,	Schwarz
F 96	Ota (2B)	Porto at. Ponte Vecchiu	214 m		02.VI.1990	Schwarz
F 97	Calacuccia (2B)	Rau. de Tavulella near bridge			04.06.1990	Schwarz
F 99	Evisa (2B)	Rau. de Aitone near bridge Route de Salto	1200 m		15.VI.1990	Schwarz
F 103	Ghisoni	affl. F. Orbu downstr. Berg. d. Rimugeto	740 m		07.VIII.1993	Pusch
F 104	Ghisoni	R. de Lischetto, left affl. F. Orbu	1040 m		07.VIII.1993	Pusch
F 111	Solenzara	spring near fountain at D 268 to Bavella	300 m		14.VIII.1993	Pusch
Ang 1		Marina d'Erbalunga sous le pont R.N.198	0 m		11.VIII.1950	Angelier
Ang 3		R.de l'Annonciade à 1km à l'ouest de Bastia	0 m		10.VIII.1950	Angelier
Ang 4	Bevinco	Sous le col S.Stefano	320 m		16.VIII.1950	Angelier
Ang 6	Golo	près de Ponte-Castirla	280 m		15.VIII.1950	Angelier
Ang 7	Golo	à Ponte-Leccia	160 m		30.VIII.1950	Angelier
Ang 9		R.Tartagine (affl.Golo) Forêt de Tartagine	880 m		13.VIII.1950	Angelier
Ang 10		Rivière Asco à Asco	600 m		01.IX.1950	Angelier
Ang 12 (Int)		R.Casaluna (affl.Golo) près de San-Lorenzo	500 m		31.VIII.1950	Angelier
Ang 13		R.Casaluna (Affl.Golo) bord de la route I.C.39	300 m		31.VIII.1950	Angelier
Ang 15		Fium Alto au km 8 de la R.N.847	180 m		17.VIII.1950	Angelier
Ang 20	Tavignano	pont I.C.40 6 km au sudest de Corte	300 m		23.VIII.1950	Angelier
Ang 21	Restonica	10 km W Corte Forêt de Restonica	1000 m		20.VIII.1950	Angelier
Ang 22		Rivière du Vecchio sous le col de Vizzanova	980 m		20.VIII.1950	Angelier
Ang 24	Fium Orbo	près de la route forestière N°10	130 m		26.VIII.1950,	Angelier
Ang 26 (Int)		Ruisseau affl.San Pietro 8 km NE du col de Bavella	400 m		27.VIII.1950,	Angelier
Ang 36	Taravo	aux Bains de Guitera	430 m		27.VII.1950	Angelier
Ang 37	Taravo	pont I.C.2 entre Forciolo e Olivèse	400 m		22.VIII.1950	Angelier
Ang 38	Taravo	pont R.N.196 au S des Bains de Taccana	170 m		22.VIII.1950	Angelier

TABLE 1. — Continuation.

CSC	City	Locality	Altitude	GC	Date	Collector
Ang 41	Rizzanèse	pont d'Acoravo à 6 km au NE de Sartène	350 m		27.VIII.1950	Angelier
Ang 44	R. de Crioscia (affl.Zonza)	à 3 km a NE de Zonza	700 m		18.VIII.1950	Angelier
I benf 54	Asinao	D 420 between Zonza and Puenza	750 m		24.VII.1987	Benfatti
I benf 55	Golo	Ponte Castirla			24.VII.1987	Benfatti
I benf 56	Aitone	cascatella	1000 m		29.VII.1987	Benfatti
I benf 57	Ota	Porto a valle Pte Genovese	380 m		29.VII.1987	Benfatti
I benf 58	T. Catena	between Vico and Guagno	350 m		31.VII.1987	Benfatti
I benf 59		T. Liamone			31.VII.1987	Benfatti
I benf 74		Cap F. Luri along road D 180 between Piazza and S. Severo			23.VII.1988	Benfatti
I benf 75	F. Regolu	35 km N Ghisani (D 69)	980 m		28.VII.1988	Benfatti
I benf 77	S. Lucia	Cavu (D 168)			01.VIII.1988	Benfatti
I benf 78	Solenzara	P1 – undefined collecting site			02.VIII.1988	Benfatti
I benf 79	Solenzara	P2 – unclear collecting site			02.VIII.1988	Benfatti
I benf 82	Bevinco	Gole Lancone			26.IX.1988	Benfatti
I benf 83	Golo	Ponte Castirla			27.IX.1988	Benfatti
I benf 84	S. Lorenzo	Casaluna			27.IX.1988	Benfatti
I benf 85	S. Lorenzo	Casaluna, affluent			27.IX.1988	Benfatti
I benf 86	S. Lorenzo	Casaluna, Bridge D 391			27.IX.1988	Benfatti
I benf 87	Corte	Tavignano/Bridge 0214			28.IX.1988	Benfatti
I benf 88	Corte	Tavignano/Bridge N 200			28.IX.1988	Benfatti
I benf 89	Ghisonaccia	Fium Orbo			28.IX.1988	Benfatti
I benf 90	T. Liamone	between Vico and Guagno, D23			29.IX.1988	Benfatti
I benf 170	Ota	Rau. de Lonca	214 m	42°15'22,3N, 8°45'56,0E	03.VIII.2000	Benfatti
I benf 171	Fango	between Manso and Tuvarelli	116 m	42°22'45,8N, 8°45'15,2E	05.VIII.2000	Benfatti
I benf 172	Marignana	Rau. de Tavulella	632 m	42°14'22,9N, 8°48'46,4E	07.VIII.2000	Benfatti
F HM 4	Corse, Marine de Giottani	Rau de Furcone, stream	30 m	42°51'52N, 09°20'52E	07.IX.2010	Müller
F HM 5	Corse, Ortali	Ruisseau de Misinca, stream	40 m	42°52'36N, 09°26'55E	07.IX.2010	Müller
F HM 7	Corse, Asco	Gorges de l'Asco, stream	470 m	42°27'19N, 09°03'11E	08.IX.2010	Müller
F HM 10	Asco	Gorges de l'Asco, stream	330 m	42°28'06N, 09°06'23E	08.IX.2010	Müller
F HM 11	Corse, Castirla	Rau de Pedicinque, Grundwasser neben Bach	340 m	42°22'46N, 09°09'04E	08.IX.2010	Müller

TABLE 1. — Continuation.

CSC	City	Locality	Altitude	GC	Date	Collector
F HM 26	Corte	Gorges de la Restonica, stream	470 m	42°17'25N, 09°08'06E	11.IX.2010	Müller
F HM 28	Francardo	Le Golo	230 m	42°25'30N, 09°12'05E	11.IX.2010	Müller
F HM 29	Bocognano	la Gravona, stream	890 m	42°05'36N, 09°06'07E	11.IX.2010	Müller
F HM 62	Suaricchio	la Gravona, stream	210 m	42°02'32N, 08°55'16E	17.IX.2010	Müller
Sardinia (Codes within brackets refer to Italian provinces, codes in U.T.M. format)						
I 335	Sarrabus (CA)	R.Malliu upstr. Arcu Neriddu	400 m	NJ 36 50	02.V.1986	
I 336	Sarrabus (CA)	R.di Cannas downstr. R.de su Perdosu	400 m	NJ 39 56	02.V.1986	
I 337	Sarrabus (CA)	R.Longu downstr.S.Gregorio	150 m	NJ 30 49	02.V.1986	
I 340	Fluminese (CA)	F. Antas S.Tempio di Antas	300 m	MJ 57 60	05.V.1986	
I 345	M.Ferru (OR)	Séneghe, stream Pardu Maiore	450 m	MK 68 39	08.V.1986	
I 346	M.Ferru (OR)	S.Lussurgiu F. sa Preda Lada	730 m	MK 70 46	08.V.1986	
I 349	Cuglieri (OR)	R.Mannu N Sennariolo	250 m	MK 61 54	09.V.1986	
I 350	Bosa (NU)	Riu Mesu NW Montresta	270 m	MK 57 70	09.V.1986	
I 352	M.Limbara (SS)	Lu Colbu Bach o.Giagone	400 m	NL 08 19	13.V.1986	
I 355	Monti (SS)	P. Ittia, R. de s'Eleme/S.S.389	460 m	NL 30 10	15.V.1986	
I 358	Gocéano (SS)	M.Rasu. stream at C.Pisanella	750 m	MK 98 74	16.V.1986	
I 359	Fonni (NU)	Lodine. R.Pirastreddu	650 m	NK 20 44	16.V.1986	
I 361	Gennargentu (NU)	Bacu de Seardu, spring 1	1550 m	NK 27 28	17.V.1986	
I 364b	Gennargentu (NU)	Brcu. Spina, springs exp. NE	1550 m	NK 25 31	18.V.1986	
I 366	Gennargentu (NU)	Fonni, R.Mattalle	1150 m	NK 24 31	18.V.1986	
I 367	Gennargentu (NU)	Fonni, spring at .R.Mattalle	1150 m	NK 24 31	18.V.1986	
I 368	Gennargentu (NU)	Aritzo, spring Brcu.Istiddi	580 m	NK 14 26	19.V.1986	
I 369	Sarcidano (NU)	Láconi, R.Bidissariu	700 m	NK 07 14	19.V.1986	
I 370a	Seui (NU)	M.Tonneri, spring R.de Sadali	950 m	NK 30 15	21.V.1986	
I 370b		M.Tonneri, spring stream R. de Sadali	930 m			
I 372	Urzulei (NU)	M.Fennau, Rio Codula di Luna	690 m	NK 47 38	22.V.1986	
I 373	Gallura (SS)	R.Piatu Bivio La Maciona	210 m	NL 23 35	23.V.1986	
I 375	Gallura (SS)	Arzachena, R. S.Giovanni/S.S.125	46 m	NL 36 42	24.V.1986	
I 376	Gallura (SS)	Telti. R.Taroni upstr.Telti	320 m	NL 27 26	25.V.1986	
I 378	M. Limbara (SS)	Lu Colbu, spring stream upstr. Giagone	450 m	NL 08 19	25.V.1986	
I 379	M. Limbara (SS)	Lu Colbu stream upstr. Giagone	400 m	NL 08 19	25.V.1986	
I 380	Alghero (SS)	R.Serra S Cantoniera Rudas	20 m	MK 47 96	26.V.1986	
I 381	Villanova Monteleone (SS)	R. Lacanu/S.S.292	400 m	MK 50 81	28.V.1986	

TABLE 1. — Continuation.

CSC	City	Locality	Altitude	GC	Date	Collector
I 382	Monteleone (SS)	F.Temo near Puntas Rugias	160 m	MK 65 78	28.V.1986	
I 384	M. Linas (CA)	Villacidro, P.S.Miali, spring near C. Coxinas	650 m	MJ 74 67	30.V.1986	
I 386	M. Linas (CA)	Villacidro, stream 2 near P.S.Miali	600 m	MJ 74 67	30.V.1986	
I 387	Fluminese (CA)	R. Figu near Domusnovas	120 m	MJ 72 52	31.V.1986	
I 388	Gerrei (CA)	Dolianova, R.Flumini/S.S.387	170 m	NJ 14 61	31.V.1986	
I 389	Gerrei (CA)	Dolianova, R.Lassini/road to S. Nicolo	800 m	NJ 22 65	01.VI.1986	
I 849	Óschiri (SS)	stream at S.S. 392 to Tempio Pausania, km 9 VI, right affluent, stony, hygropetric, in Quercus ilex forest, shaded, in elongated pool (1,5 m) near a water cistern		40°46'18, 09°03'09E, 21,4°C	09.VIII.1996	Pusch
I 1152	Genna Cruxi (NU)	Small stream N Urzulei	700 m	NK 44 39	12.IX.1991	
I 1153	Talána (NU)	Bacu e Pisucerbu, S. Basilio di Manurri	470 m	NK 43 36	12.IX.1991	
I 1154	Talána (NU)	Mount Telemula. spring near R. de Ficarba	700 m	NK 41 30	13.IX.1991	
I 1155	Talána (NU)	Mount Telemula. spring stream near R. de Ficarba	700 m	NK 41 30	13.IX.1991	
I 1159	Gennargentu (NU)	East of La Marmora spring Vallada Tedderi	1400 m	NK 28 27	14.IX.1991	
I 1160	Gennargentu (NU)	Tedderieddu, spring Bacu Sinseni	1200 m	NK 30 25	14.IX.1991	
I 1161	Gennargentu (NU).	Mount Tuddai. spring Vallada Tedderi	1000 m	NK 31 25	14.IX.1991	
I 1162 (Int)	Gennargentu (NU)	Vallada Tedderi/Bacu s'Argiolas	800 m	NK 32 25	15.IX.1991	
I 1165 (Int)	Gerrei (CA)	Dolianova. R. Lassini/C. Porru	380 m	NJ 21 64	17.IX.1991	
I 1166	Gerrei (CA)	Dolianova. spring near Lassini/C. Porru	380 m	NJ 21 64	17.IX.1991	
I 1168	Gerrei (CA)	Dolianova. Minza sei Gradi/C. Perra	550 m	NJ 21 64	18.IX.1991	
I 1169	Barbágia Seúlo (NU)	W Seúlo, Contr. Tornolù	650 m	NK 17 14	18.IX.1991	
I 1171	Gennargentu (NU)	Aritzo F.Cheressia/Brcu.Istiddi	580 m	NK 14 26	19.IX.1991	
I 1172	Gennargentu (NU)	Aritzo S. Illare /S.ra G.na Uà	600 m	NK 11 25	20.IX.1991	
I 1177	Gocéano (SS)	Pattada. M. Sa Muzzère. spring Sa Maltigusa	850 m	NK 07 86	23.IX.1991	
I 1178	Gocéano (SS)	Pattada. M. Sa Muzzère. spring Sa Maltigusa	800 m	NK 07 86	23.IX.1991	
I 1181	Gocéano (SS)	Bono. stream W pass b'Uccaidu	850 m	MK 99 75	24.IX.1991	
I 1183 (Int)	Gocéano (SS)	R. Pirastru near M. Ruiu (road Villalba-S.Teresa)	50 m	ML 97 39	25.IX.1991	

RESULTS

Genus *Atractides* Koch, 1837
Subgenus *Atractides* s.s. Koch, 1837

Atractides allgaier Gerecke, 2003

MATERIAL EXAMINED. — **Corsica.** F 35, 1 ♂; F 79, 1 ♀; F 83b, 1 ♂, 1 ♀; F 84, 1 ♂, 1 ♀. **Sardinia.** I 1155, 1 ♂; I 1159, 1 ♀; I 1160, 1 ♂; I 1162, 1 ♂ (MNHN).
Corsica. F 79, 2 ♀♀; F 83b, 4 ♀♀; F 84, 2 ♀♀, 2 ♂♂. **Sardinia.** I 1172, 1 ♂ (Coll. RG).

DISTRIBUTION. — West Palaearctic. Central and Southern Europe, Turkey, few ascertained records probably due to previous confusion with *A. distans* (K. Viets, 1914). First records from the area covered; new for Italy.

HABITAT. — Rhithrobiont, in Corsica crenophilous. Nearly exclusively in springs, often at high altitude, in the area covered from 250 to 1400 m.

REMARKS
This species, confused over long time with *A. distans* (see Gerecke 2003), has been recently discovered in many parts of the Western Palaearctic. Some specimens from Corsica and Sardinia combine rather large glandularia with extended coxal borders of secondary sclerotization. In these cases, also Vgl-1+2 which are typically separate in this species may fuse, but the origin from two separate platelets remains always visible due to an irregular indented border line.

Atractides clavipes Lundblad, 1954

MATERIAL EXAMINED. — **Corsica.** F 27a, 1 ♂; F 61, 1 ♀; F 77, 2 ♀♀; F 80, 1 ♀. **Sardinia.** I 368, 1 ♀; I 1152, 1 ♀; I 1153, 1 ♂, 2 ♀♀, 2 dn (MNHN).
Corsica. F 61, 2 ♀♀; F 77, 1 ♀. **Sardinia.** I 1153, 2 ♂♂, 1 ♀; I 1161, 1 ♀; I 1168, 1 ♂; I 1171, 1 ♀; I Pusch 43, 1 ♀ (Coll. RG).

DISTRIBUTION. — Western and Central Europe (Mediterranean, Iberian peninsula to Alps), very rare. First records from the area covered.

HABITAT. — Crenophilous. Weakly seeping rheohelocrenes, low order streams, preferably at middle altitudes, in the area covered from 250 to 1000 m.

REMARKS
In my revision of the genus (Gerecke 2003), based on type material, I stated that *A. tenerifensis* Lundblad, 1962, could be distinguished from *A. clavipes* on the base of the male idiosoma sclerotization (muscle insertions smooth, sclerotized in *A. clavipes*), shape of I-L-6 (relatively longer, L ratio I-L-5/6, 1.1-1.2, in *A. clavipes* 0.9, and more slender) and position of the sword seta of P-4 (near proximoventral, in *A. clavipes* near distoventral seta). Unfortunately, I reversed this information in the key for males (loc. cit. p. 355) where erroneously a relatively long I-L-5 is attributed to *A. clavipes*, a shorter one to *A. tenerifensis*. For measuring the L/H ratio I used the "HB value" (central height) which is not really suitable in a segment continuously thickened from base to tip. If the L/maximum H ratio of the segment is calculated, a range of 3.7-3.9 results for *A. tenerifensis*, of 2.8-3.2 for *A. clavipes*. In the latter character, both sexes of the *A. clavipes*-populations from Sardinia and Corsica are typical (L/H ratio 3.0-3.5 – in males 118-120/35-40, in females 135-155/40-55), the segment is furthermore characteristic in a proximally concave, distally protruding ventral margin (in *A. tenerifensis* straight from base to tip). Instead, the L ratio I-L-5/6 (0.96-1.10) is generally higher than in the type series and probably not generally suitable for distinguishing the species from *A. tenerifensis* (1.10-1.20). As the dorsal sclerites of males are little extended, it is well possible that juvenile specimens with unsclerotized muscle insertions may also exist. In most cases, the sword seta on P-4 is located near the distoventral seta as described for *A. clavipes*, but occasionally it may be placed halfway between ventral setae, or asymmetrically, near the proximal seta on one side, near the distal one on the other.

Atractides corsicus E. Angelier, 1954
(Fig. 1)

MATERIAL EXAMINED. — **Corsica.** MNHN Paris, 4 ♀♀ syntypes, all labelled "*Atractides nodipalpis corsicus* E. Ang. ♀", numbered by Angelier as follows:
No. 2337. [the name "*nodipalpis*" later cancelled] "Tavignano Pont de l' I.C. 40 (Corse), 23.VIII.1950" (F Ang 20); state: Mounting medium dried, leaving only remnants

surrounding the mounted parts; idiosoma in toto, ventral view, squeezed; gnathosoma and one I-L detached, one palp in situ, the other not found (MNHN-Ac1186). (Observations: integument lineated, Vgl-1+2 fused; I-L-5 dL 250, vL 140, HA 75, HB 80, HC 110, distance S-1-2, 55, L/W S-1, 130/12, S-2, 90/21; L I-L-6, 210, HA 30, HB 25, HC 27. P-2 distoventral margin convexly protruding; P-4 sword seta halfway between ventral setae).
No 2338. [the name "*nodipalpis*" later cancelled] "Taravo Pont d'Abra (Corse) 22.VIII.1950" (Ang 38); state: Mounting medium dried, idiosoma in toto, ventral view, squeezed; gnathosoma and one I-L detached, one palp and one chelicera in situ, the other palp and chelicera detached (MNHN-Ac1187). (Observations: integument lineated, postgenital area unclear; I-L-5 dL 250, vL 165, HA 67, HB 70, HC 105, distance S-1-2, 52, L/W S-1, 135/13, S-2, 82/20; L I-L-6, 198, HA 24, HB 18, HC 22. P-2 distoventral margin convexly protruding; P-4 sword seta halfway between ventral setae).
No. 2342. "Golo Ponte Castirla (Corse) 15.VIII.1950" (Ang 6); state: juvenile specimen with distorted appendages, idiosoma in toto, ventral view, squeezed, right I-L-2-6 detached, wrinkled, gnathosoma detached and folded, one palp undestroyed, in lateral position (MNHN-Ac1188). (Observations: Integument lineated, Vgl-1+2 fused; I-L-5 dL 225, vL 135, HA-C not measurable, distance S-1-2, 50, L/W S-1, 125/-, S-2, 90/18; L I-L-6, 180, HA 25, HB 15, HC 20. P-2 distoventral margin convexly protruding; P-4 sword seta halfway between ventral setae).
No. 2345b. "Type", "Ruis. Crioscia Ospédale (Corse) 18.VIII.1950" (Ang 44); state: only one I-L and gnathosoma, sagitally cut into two parts, one with palp, the other with palp and chelicerae, all slightly squeezed (MNHN-Ac1189). (Observations: integument and postgenital area unclear; I-L-5 dL 260, vL 170, HA-C not measurable, distance S-1-2, 42, L/W S-1, 120/8, S-2, 100/13; L I-L-6, 190, HA 30, HB 20, HC 25. P-2 distoventral margin not protruding; P-4 sword seta near distal seta).
Corsica. F 23, 2 ♂♂, 1 ♀; F 44h, 1 dn. **Sardinia.** I 340, 1 ♂; I 349, 1 ♂; I 352, 1 ♂, 1 ♀; I 379, 3 ♂♂; I 386, 1 ♀; I 389, 1 ♂; I 1165, 1 ♂; I 1165 Int, 2 ♂♂, 2dn (MNHN).
Corsica. HM 62, 1 ♀ (Coll. HM). **Sardinia.** I 340, 2 ♀♀; I 352, 2 ♂♂; I 379, 2 ♂♂, 1 ♀; I 386, 1 ♀; I 389, 1 ♂, 13 ♀♀ (Coll. RG).

PUBLISHED RECORDS. — (sites documented by type material: Ang 6, Ang 20, Ang 38, Ang 44) **Corsica.** Ang 4, 1 ♀; Ang 6, 1 ♀; Ang 13, 1 ♀; Ang 20, 1 ♂, 3 ♀♀; Ang 22, 1 ♀; Ang 24 (no specimen numbers specified); Ang 37, 1 ♀; Ang 38, 1 ♀; Ang 44, 3 ♀♀ (E. Angelier 1954b); I benf 74 "*Atractides* sp.", 1 ♂ (Gerecke & Di Sabatino 2013); Corte, *R. Restonica* (affl. *Tavignano*) (no specimen numbers specified) (Giudicelli 1970); Porto, middle course (200-1000 m) (no specimen numbers specified) (Santucci 1971).

DISTRIBUTION. — Corsica and Sardinia, endemic. First records from Sardinia, new for Italy.

HABITAT. — Rhithrobiont. Middle order streams, preferably in the macchia vegetation belt at middle and low altitudes, in the area covered from 20 to 1000 m.

REMARKS

Of the originally 15 syntypes, Angelier had probably selected several, including the only male, for a separate type collection. This reference collection went lost (Angelier, pers. comm.). During the early stage of his scientific activities, he used to mount selected specimens on two slides (idiosoma, generally labelled "a", resp. gnathosoma and selected appendages, labelled "b"). Obviously slide 2345a ended up with the lost material.

The remaining slides allow to correct the interpretation of Angelier's description by Gerecke (2003) in two important points: 1) the integument of *A. corsicus* is distinctly lineated, not striated; 2) Vgl-1+2 are fused.

Furthermore, it is probable that the syntypes on which Angelier based his description represented a mix of two species (female P-2 distoventrally protruding or not, P-4 sword seta between ventral setae or near distoventral seta).

As *Atractides* females display much less characters suitable for species definition in view of the bad conservation state of the syntypes, I renounce to a lectotype designation. In the following, the specimens 2337-2338 and 2342 are used in comparison with newly collected populations for a redescription and better founded definition of *A. corsicus*.

REDESCRIPTION

Both sexes

Integument lineated, muscle insertions unsclerotized, glandularia small, round; coxae in three groups, posteromedial margin Cx-I+II broadly rounded, posterior margin of Cx-IV in mature specimens slightly irregular due to a narrow border of secondary sclerite. I-L-5 elongate subrectangular, with ventral and dorsal margins slightly diverging from base to S-1 insertion, in the extended area between S-1 and -2 subparallel; S-1 long and slender, distally equally narrowed, tip slightly truncated, forming a fine denticle on the inner side; S-2 distinctly

shorter, the inner margin strongly protruding in basal third, tip bluntly pointed. Excretory pore smooth, Vgl-I+II fused. Gnathosoma without particularly projecting rostrum, palp with sexual dimorphism; P-4 with maximum H near distoventral seta, sword seta between ventral seta insertions, ventral sectors nearly equal in length.

Males

Idiosoma L/W 500-650/360-430, venter: Fig. 1A; coxal field L/W 290-345/330-390; Cx-I+II medial L 95-120, lateral L 185-225, W 250-310. I-L-5/6: Fig. 1C; I-L-5 dL/vL 155-195/105-133, ratio 1.5-1.6; HA 44-49, HB 48-56, HC 60-80, ratio dL/HB 3.3-3.7; S-1 L/W 88-110/6-9, ratio 11.1-14.7; S-2 L/W 68-81/9-11, ratio 6.9-7.9; distance S-1-2, 23-38, L ratio S-1/-2, 1.2-1.4; I-L-6 dL 125-160, HA 19-24, HB 15-18, HC 15-18; ratio dL/HB 7.1-9.7; dL ratio I-L-5/6, 1.23-1.29. Genital field L/W 77-90/85-100, rounded, anterior margin equally convex or with a slightly protruding medial extension, posterior margin with a shallow medial indentation that may be filled with a slightly protruding area of porose secondary sclerite; gonopore L 60-65, acetabula in a curved line, surrounded by about 20 pairs of setae (fine, hair like laterally, longer and stronger medially and at posteromedial edge). Palp (Fig. 1C) total L 265-316; L/H (ratio, rel. L [%]) P-1, 26-35/28-30 (1.0-1.3, 10-11); P-2, 63-75/58-65 (1.1-1.2, 22-25); P-3, 55-68/43-50 (1.2-1.4, 21-23); P-4, 88-105/34-39 (2.5-2.8, 32-33); P-5, 30-35/10-14 (2.4-3.3, 11-12); L ratio P-2/P-4, 0.71-0.78; P-3/P-4, 0.63-0.70. P-2 with a strongly developed, apically rounded (sometimes finger-like narrowed) distoventral projection; P-3 relatively short and stout, ventral and dorsal margins diverging, distoventral edge little sclerotized; P-4 with dense cover of fine, hair-like setae, sword seta in segment centre.

Females

Idiosoma L/W 480-900/390-750, venter: Fig. 1D; coxal field L/W 340-435/390-590; Cx-I+II medial L 120-130, lateral L 230-270, W 335-440. I-L-5/6: Fig. 1F; I-L-5 dL/vL 225-260/130-155, ratio 1.7; HA 58-63, HB 60-69, HC 100-118, ratio dL/HB 3.6-4.2; S-1 L/W 130-145/9-11, ratio 12.8-16.3; S-2 L/W 90-105/13-16, ratio 6.5-7.2; distance S-1-2, 48-58, L ratio S-1/-2, 1.3-1.4; I-L-6 dL 188-225, HA 23-26, HB 16-19, HC 16-21; ratio dL/HB 10.7-12.9; dL ratio I-L-5/6, 1.16-1.28. Genital field L/W 120-180/120-175, prae- and postgenital sclerites strong, genital plates L/W 90-108/28-36, weakly curved, anteriorly pointed, posteriorly rounded, bearing about ten pairs of fine, hair-like setae. Palp (Fig. 1E) total L 355-403; L/H (ratio, rel. L [%]) P-1, 35-40/30-34 (1.1-1.2, 10); P-2, 78-90/58-65 (1.2-1.6, 21-23); P-3, 90-113/43-48 (2.1-2.4, 25-28); P-4, 110-123/30-30 (3.5-4.1, 30-32); P-5, 38-40/13-14 (2.9-3.0, 9-11); L ratio P-2/P-4, 0.61-0.73; P-3/P-4, 0.82-0.92. P-2 distoventral margin considerably bowed out in its distal part; P-3 and -4 long and more slender than in males, P-4 sword seta closer to distoventral seta.

Remarks

In all important features, the newly collected populations agree with the original description of *A. corsicus* and/or the information obtained from the study of the type material (integument structure, excretory pore area, L proportions of segments). Differences emerging from the comparison of L/H proportions of I-L or palps are probably due to squeezing of appendages in Angelier's slides. Furthermore, from a comparison between S-1/-2 of syntypes (with truncated resp. rounded tips) and Angelier's figs 93/97 (with pointed tips) results that he did not take care of this morphological detail. As stated earlier (Gerecke 2003), *A. corsicus* is phylogenetically far distant from *A. nodipalpis* of which it was considered a subspecies by Angelier. The combination of heteromorphic setae S-1/2, an unsclerotized excretory pore, fused Vgl-1+2, a rounded anterior male genital field margin is unique within Western Palaearctic *Atractides* species. *Atractides lunipes* Lundblad, 1956, a species similar in the combination of fused Vgl-1+2 and a large interspace S-1-2, differs in longer setae S-1-2, a more slender and more strongly curved I-L-6, and lineated integument.

A re-examination of a specimen published by Gerecke & Di Sabatino (2013) without species identification from site I benf 47 demonstrates that it represents a further record of *A. corsicus*.

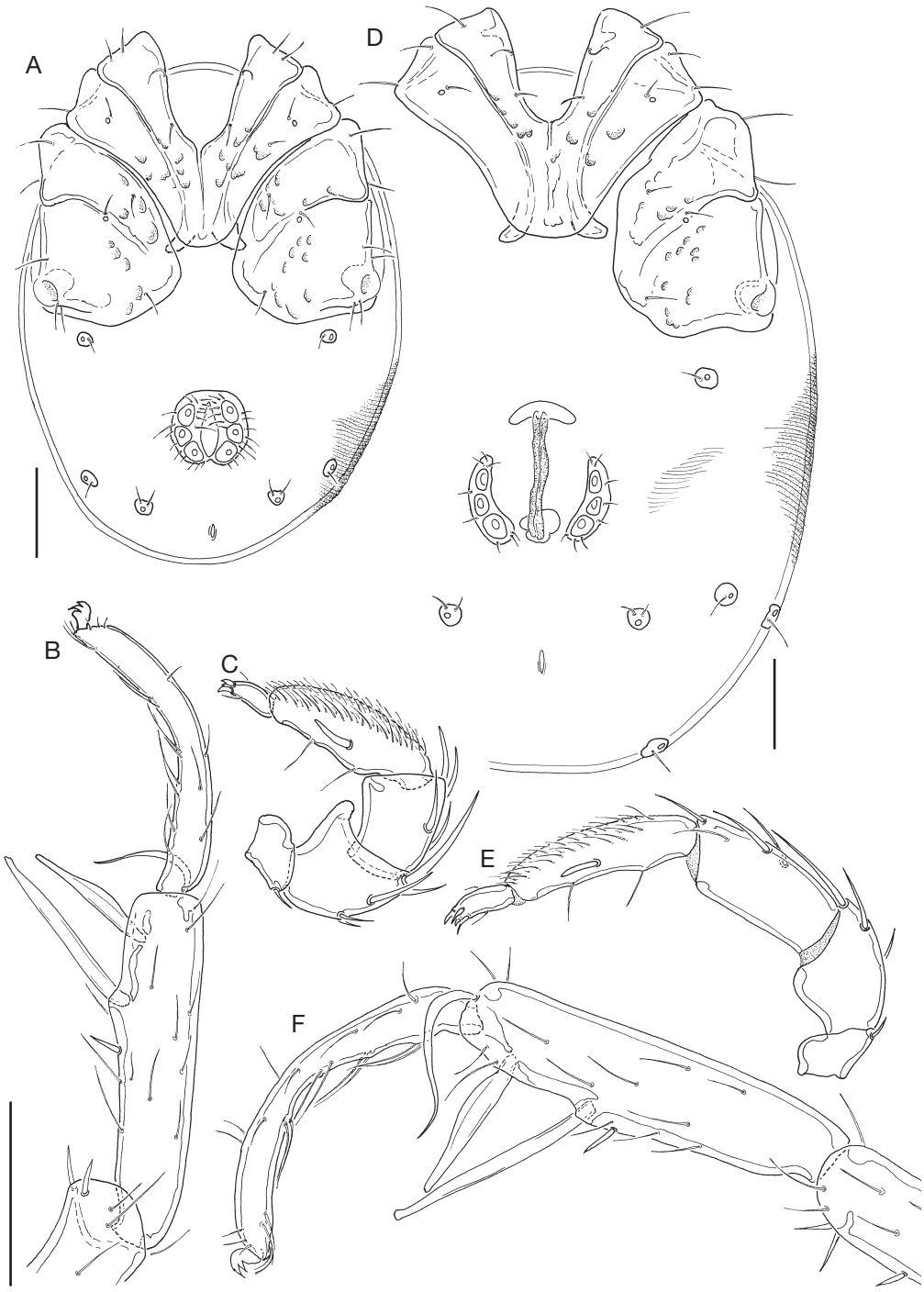

Fig. 1. — *Atractides corsicus* E. Angelier, 1954, specimens from Sardinia: **A**-**C**, 1 ♂, l 389: **A**, venter; **B**, l-L-5/6; **C**, palp; **D**, 1 ♀, l 379, venter, partial view; **E**, **F**, 1 ♀, l 379: **E**, palp; **F**, l-L-5/6. Scale bars: 100 µm.

Atractides fonticolus (K. Viets, 1950)

MATERIAL EXAMINED. — **Sardinia.** I 346, 1 ♂, 2 ♀♀; I 349, 1 ♀, 11 dn; I 368, 1 ♀ (MNHN).
Sardinia. I 340, 1 ♂, 1 ♀, 1 dn; I 346, 2 ♂♂, 1 ♀; I 1181, 1 ♂ (Coll. RG).

DISTRIBUTION. — Most parts of Europe, Kaukasus, Israel. Not reported from the British Isles and Northern Fennoscandia. First records from the area covered.

HABITAT. — Crenophilous. Rheocrenes and low order streams, at middle altitude, in the area covered from 250 to 850 m.

REMARKS
The specimens collected in Sardinia agree only in part with the definition given by Gerecke (2003). In two of the three males, palps display characters typical for *A. pennatus* (K. Viets, 1920) (ventral sectors P-4, 2:1:3, sword seta anterior to distoventral seta), but the lower genital setae number is typical for *A. fonticolus*. In addition, palps of two males show particular deformations (multiplication of setae and atypical arrangement of P-4 setae). Females are typical in the relatively stout I-L-5 (L/H 3.6-4.0 [4.4]) and relatively short S-1/-2, but in size and proportions of I-L-6 (L 135-170, L/H ratio 5.6-6.5) they cannot be separated from *A. pennatus*. By the moment, the majority of the character states suggest to attribute the Sardinian specimens to *A. fonticolus*, but the diagnostic features of *A. fonticolus* and *A. pennatus* need reconsideration at a larger geographical scale.

Atractides gibberipalpis Piersig, 1898

MATERIAL EXAMINED. — **Sardinia.** I 1162, 1 ♂, 1 dn (MNHN).
Corsica. F HM 28, 1 ♂; F HM 29, 1 ♂ (Coll. HM).
Sardinia. I 1162, 2 ♂♂ (Coll. RG).

PUBLISHED RECORDS. — **Corsica.** Porto, middle course (200-1000 m) (no specimen numbers specified) (Santucci 1971); benf 85, 1 ♂; benf 90, 1 ♂, 1 ♀ (Gerecke & Di Sabatino 2013, MCSNV).

DISTRIBUTION. — Most parts of Europe, Asia Minor. Not reported from Northern Fennoscandia. First record from Sardinia.

HABITAT. — Rhithrobiont. Low and medium order streams, in the area covered from 200 to 900 m.

Atractides giustinii Gerecke & Di Sabatino, 2013

MATERIAL EXAMINED. — **Corsica.** F 81, 1 ♂. **Sardinia.** I 335, 1 ♂, 1 ♀; I 372, 1 ♀; I 376, 1 ♀; I 381, 1 ♂; I 382, 1 ♂ (MNHN).
Sardinia. I 386, 1 ♂, 2 ♀♀; I 388, 1 ♀; I 1162, 1 ♂ (Coll. RG).

PUBLISHED RECORDS. — **Corsica.** benf 54, 1 ♀; benf 59, 2 ♀♀; benf 77, 2 ♂♂, 1 ♀; benf 90, 2 ♂♂, 1 ♀; benf 171, 2 ♂♂, 1 ♀ (Gerecke & Di Sabatino 2013, MCSNV).

DISTRIBUTION. — Corsica, Sardinia, endemic. First record from Sardinia, new for Italy.

HABITAT. — Rhithrobiont. Middle order streams in the macchia vegetation belt, in the area covered from 100 to 800 m.

Atractides gracilipes (E. Angelier, 1951) (Fig. 2)

MATERIAL EXAMINED. — **Sardinia.** I 1162 int, 1 ♂; I 1165 int, 1 ♀ (MNHN).
Corsica. HM 04, 1 ♀ (Coll. HM).

PUBLISHED RECORD. — **Corsica.** Ang 26, 1 ♂ (Angelier 1954a, holotype, lost).

DISTRIBUTION. — Corsica, Sardinia, endemic. First record from Sardinia, new for Italy.

HABITAT. — Hyporheobiont (judging from the few data available). Middle order streams in the macchia vegetation belt, all specimens found in the interstitial habitat, from 30 to 800 m.

REDESCRIPTION
Both sexes
Integument finely striated, muscle insertions in the female from Corsica partly sclerotized (D-2 as small round platelets, D-3 elongated, medially fused to Dgl-4, V-1 as larger rounded platelets). This is probably the typical situation in adults, with the sclerotization in males to be expected more extended than in females; the specimens from Sardinia are juveniles with unsclerotized muscle attachments, but areas of granulate integument at the places of D-2, D-3 and V-1. Glandularia small, round; coxae in three groups, posteromedial margin Cx-I+II pointed. I-L-5 with ventral and dorsal margins slightly diverging from

base to S-1 insertion, ventral seta doubled, ventral margin not particularly protruding near S-1 insertion; S-1-2 not far distanced, long and slender, distally equally narrowed, tip rounded; S-1 slightly bowed inwards in basal part; S-2 shorter, slightly thickened in proximal half. I-L-6 ventral margin convex in proximal and distal part, in the centre, where the segment is distinctly narrowed, strongly concave. Excretory pore surrounded by a sclerotized ring, Vgl-I+II fused. Gnathosoma without particularly projecting rostrum, palp without sexual dimorphism; P-2 ventral margin strongly convex in distal part, without particular extension; P-3 ventral margin weakly rounded, P-4 maximum H near proximoventral seta, sword seta between ventral seta insertions, closer to proximoventral one, ventral sectors 2:3:2.

Male

Idiosoma L/W 600/400, venter: Fig. 2A; coxal field L/W 340/340; Cx-I+II medial L 150, lateral L 235, W 270. I-L-5/6: Fig. 2B; I-L-5 dL/vL 155/114, ratio 1.3; HA 43, HB 50, HC 58, ratio dL/HB 3.1; S-1 L/W 100/9.5, ratio 10.5; S-2 L/W 80/10, ratio 8.0; distance S-1-2, 15, L ratio S-1/-2, 1.3; I-L-6 dL 123, HA 26, HB 18, HC 24; ratio dL/HB 7.0; dL ratio I-L-5/6, 1.27. Genital field L/W 110/120, rounded, antero- and posteromedial margins nearly straight; gonopore shortened (L 50), acetabula subtriangular, surrounded by about 20 pairs of setae (fine, hair like laterally, longer and stronger medially and at posteromedial edge). Palp (Fig. 2C) total L 333; L/H (ratio, rel. L [%]) P-1, 30/28 (1.1, 9); P-2, 70/58 (1. 2, 21); P-3, 85/52 (1.7, 26); P-4, 125/35 (3.6, 38) [H and L/H measurements influenced by crushing]; P-5, 23/13 (1.8, 7); L ratio P-2/P-4, 0.56; P-3/P-4, 0.68.

Females (I 1165, in parentheses mature specimen HM 04)

Idiosoma L/W 670/460 (900/750), venter: Fig. 2D; coxal field L/W 415/460 (390/480); Cx-I+II medial L 160 (160), lateral L 250 (270), W 310 (330). I-L-5/6: Fig. 2F; I-L-5 dL/vL 215/160 (205/145), ratio 1.3 (1.4); HA 50 (60), HB 58 (65), HC 75 (76), ratio dL/HB 3.7 (3.5); S-1 L/W 135/11 (120/11), ratio 12.0 (11.0); S-2 L/W 103/16 (98/15), ratio 6.3 (6.5); distance S-1-2, 25 (23), L ratio S-1/-2, 1.3 (1.2); I-L-6 dL 168 (155), HA 30 (29), HB 16 (16), HC 23 (23); ratio dL/HB 10.3 (9.7); dL ratio I-L-5/6, 1.28 (1.32). Genital field L/W 130/135 (damaged), pregenital sclerite fine and slender, also in the mature specimen (W 70), postgenital sclerites weakly developed in juvenile specimen, in mature specimen pentagonal, genital plates L/W 100/35 (110/42), weakly curved, anteriorly bluntly pointed, posteriorly rounded, bearing about ten pairs of fine, hair-like setae. Palp of juvenile (Fig. 2E): total L 454; L/H (ratio, rel. L [%]) P-1, 34/33 (1.0, 7); P-2, 93/68 (1.4, 20); P-3, 123/60 (2.0, 27); P-4, 163/34 (4.8, 36); P-5, 43/18 (2.4, 9); L ratio P-2/P-4, 0.57; P-3/P-4, 0.75. Palp of mature specimen: total L 444; L/H (ratio, rel. L [%]) P-1, 33/35 (0.9, 7); P-2, 90/75 (1.2, 20); P-3, 120/75 (1.6, 27); P-4, 158/43 (3.7, 35); P-5, 43/16 (4.8, 10); L ratio P-2/P-4, 0.56; P-3/P-4, 0.75.

Remarks

From investigations on the heritage Angelier results that the male holotype and only existing specimen of *A. gracilipes* is lost. Consequently, the character combination of this taxon can be deduced only from the information given in the preliminary diagnosis (Angelier 1951) and a more detailed description published by Angelier in 1954a: (1) idiosoma L/W 600/450, integument "fine" (probably striated) with small dorsal and posteroventral glandularia, without sclerotized muscle insertions; (2) coxal field L/W 320/420; with narrow, pointed posteromedial edge of Cx-I, Cx-III+IV medial margin rounded, posterior margin nearly straight; (3) I-L-5 slender, dorsal and ventral margins subparallel, S-1/2 close to each other, heteromorphic (L S-1, 95; S-2, 75, distinctly broader than S-1); (4) I-L-6 equally curved, distally not narrowed, L I-L-5/6, 150/120 (ratio 1.25); (5) genital field nearly circular, with a narrow posteromedial indentation; gonopore relatively short, extending between the levels of anterior margins of Ac-1 and Ac-3, acetabula relatively small, subtriangular; (6) excretory pore with sclerotized ring, Vgl-1+2 fused; (7) palp robust, P-2 ventral margin rounded, without projection, P-4 central ventral sector slightly longer than proximal and distal one, sword seta between ventral setae, more proximal; L/H P-1, 25/25; P-2, 80/55; P-3, 90/47; P-4, 130/38; P-5, 37/-.

In most character states, the male found in interstitial habitat in Sardinia agrees well with the description of *A. gracilipes*. Of particular significance is the narrow, pointed posteromedial margin of Cx-I+II which is not found in any of the species treated here. Also most measurements of the described male are close to the data published by Angelier, but the following differences in comparison with Angelier's figures merit discussion: 1) Angelier (1954a) figures S-1/2 with pointed, not rounded tips. As in syntypes of *A. corsicus*, another species figured with pointed setae S-1/2 by Angelier (1954b), tips of these setae were found truncated or rounded (see above), we can assume that the author gave little attention to this detail. 2) A particular feature of the specimens from Sardinia, yet more expressed in the females than in the male, is the central narrowing of I-L-6. This detail is not given explicitly in Angelier's fig. 28, eventually due to the fact that this appendage was drawn in a squeezed state. 3) A further character state in merit of future attention is the doubling of the ventral seta on I-L-5 in all three specimens described here. In other *Atractides* species, this phenomenon may be observed as a rare aberration, in *A. gracilipes* it could be a species-specific character that may be easily overlooked. Angelier's fig. 28 gives a single ventral seta at I-L-5.

The good agreement in size and segment length proportions of appendages demonstrates that the specimen from Corsica (with sclerotized platelets D-2/-3 and V-1) is conspecific with the female from Sardinia without sclerotized muscle attachments due to juvenile age). The lower L/H proportions in the female from Corsica are probably not representative and best explained by the fact that the palps of this specimen were squeezed during slide-mounting.

Atractides graecus K. Viets, 1950

MATERIAL EXAMINED. — **Corsica.** F 87, 1 ♂; F 111, 2 ♀♀ (MNHN).

DISTRIBUTION. — Mediterranean. Previously reported only from the Balkan peninsula and Turkey. First record from the area covered; new for France.

HABITAT. — Crenophilous. In Corsica in a spring (300 m) and a low order stream (1700 m).

Atractides inflatipalpis K. Viets, 1950

MATERIAL EXAMINED. — **Corsica.** F 27, 1 ♂, 1 ♀; F 29, 1 ♂, 1 ♀; F 50, 1 ♀; F 55, 1 ♀. — **Sardinia.** I 368, 1 ♀; I 369, 1 ♂; I 384, 1 ♀; I 1154, 2 ♂♂, 2 ♀♀; I 1160, 2 ♀♀ (MNHN).
Corsica: HM 05, 1 ♀ (Coll. HM). — **Sardinia:** I 384, 2 ♀♀; I 1152, 3 ♀♀; I 1154, 11 ♂♂, 13 ♀♀; I 1160, 4 ♂♂, 5 ♀♀; I 1168, 3 ♀♀ (Coll. RG).

PUBLISHED RECORDS. — **Corsica.** benf 58, 1 ♂; benf 85, 3 ♀♀, 1 dn (Gerecke & Di Sabatino 2013, MCSNV).

DISTRIBUTION. — Mediterranean. Previously reported only from the Balkan peninsula. First record from the area covered; new for France.

HABITAT. — Rhithrobiont, in the area covered apparently crenophilous. Springs (mostly rheohelocrenes) and low order streams at middle and higher altitude, in the area covered from 350 to 1200 m.

REMARKS

As the variability of this species is still little documented, measurement ranges and some morphological details are here given for the specimens from the area covered.

Both sexes

Glandularia small, round, also dorsocentrally with relatively short setae. Coxae without secondary sclerotization. I-L-5 elongate subrectangular, ventral and dorsal margins slightly diverging from base to S-1 insertion, in the extended area between S-1 and -2 only slightly converging; S-1 long and slender, distally equally narrowed, tip oblique truncated, forming a fine denticle on the inner side; S-2 distinctly shorter, the inner margin strongly inflated in basal half, tip bluntly pointed. Palp with weak sexual dimorphism; P-4 with maximum H near proximoventral seta, sword seta near distoventral seta insertions, proximal and distal ventral sectors shorter than central one.

Males

Idiosoma L/W 500-700/400-500, coxal field L/W 260-350/320-400; Cx-I+II medial L 90-105, lateral L 185-250, W 270-330. I-L-5 dL/vL 155-210/95-135, ratio 1.5-1.6; HA 43-55, HB 48-63, HC 68-85, ratio dL/HB 3.2-3.4; S-1 L/W 93-115/7-10, ratio 11,0-14,0; S-2 L/W 75-85/44-15,

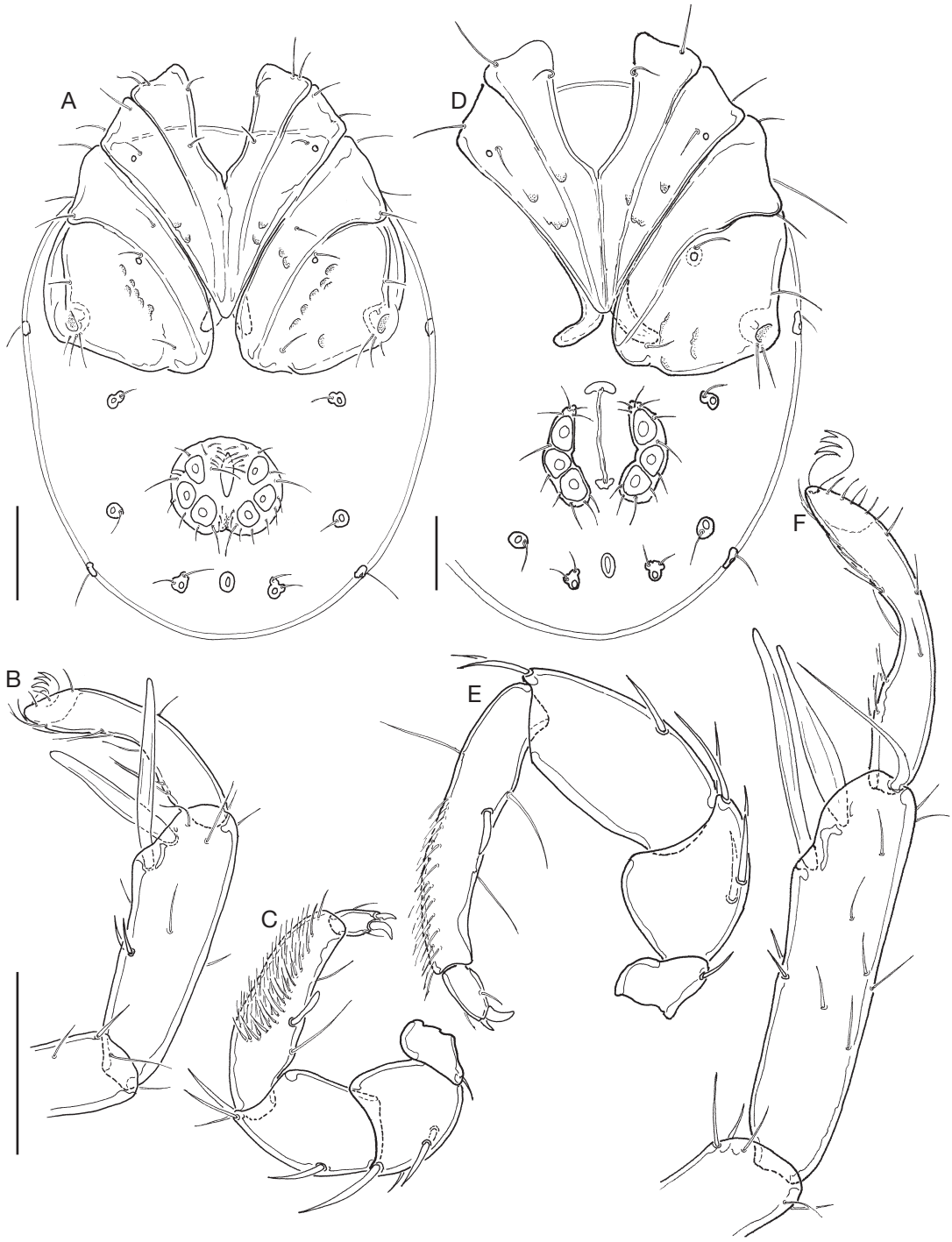

Fig. 2. — *Atractides gracilipes* (E. Angelier, 1951), specimens from Sardinia: **A**-**C**, 1 ♂, I 1162: **A**, venter, partial view; **B**, I-L-5/6; **C**, palp; **D**-**F**, 1 ♀, I 1165: **D**, venter; **E**, palp; **F**, I-L-5/6. Scale bars: 100 µm.

ratio 5.7-6.7; distance S-1-2, 25-33, L ratio S-1/-2, 1.2-1.4; I-L-6 dL 133-165, HA 24-28, HB 19-20, HC 18-20; ratio dL/HB 7.1-8.3; dL ratio I-L-5/6, 1.17-1.27. Genital field L/W 75-105/100-125, rounded, anterior margin slightly convex, posterior margin with a shallow medial indentation that may be filled with a slightly protruding area of porose secondary sclerite; gonopore L 50-75, acetabula in a curved line, surrounded by about 20 pairs of setae (fine, hair like laterally, longer and stronger medially and at posteromedial edge). Palp total L 285-338; L/H (ratio, rel. L [%]) P-1, 30-35/25-31 (1.1-1.2, 10-11); P-2, 65-78/48-60 (1.3-1.4, 22-23); P-3, 63-80/41-53 (1.5-1.7, 22-24); P-4, 95-110/35-40 (2.7-3.0, 32-33); P-5, 33-40/11-13 (2.6-3.6, 10-12); L ratio P-2/P-4, 0.67-0.72; P-3/P-4, 0.66-0.73. P-2 ventral margin proximally concave, distally convexly protruding, forming a right angle with distal margin; P-3 relatively short and stout, ventral and dorsal margins diverging, distal quarter of ventral margin hyaline P-4 with dense cover of fine, hair-like setae.

Females

Idiosoma L/W 700-900/550-700, coxal field L/W 320-410/380-570; Cx-I+II medial L 90-125, lateral L 210-280, W 320-400. I-L-5 dL/vL 225-270/135-180, ratio 1.4-1.7; HA 60-81, HB 68-85, HC 103-121, ratio dL/HB 3.0-3.6; S-1 L/W 128-155/10-13, ratio 10.4-13.5; S-2 L/W 88-110/18-24, ratio 4.3-6.3; distance S-1-2, 40-58, L ratio S-1/-2, 1.3-1.5; I-L-6 dL 185-230, HA 25-30, HB 18-20, HC 21-25; ratio dL/HB 9.3-13.1; dL ratio I-L-5/6, 1.17-1.25. Genital field L/W 120-200/140-220, pre- and postgenital sclerites strong, genital plates L/W 105-135/30-33, weakly curved, anteriorly and posteriorly rounded, bearing 10-12 pairs of fine, hair-like setae; Ac similar in size, occasionally Ac-2 slightly larger than Ac-3. Palp total L 348-432; L/H (ratio, rel. L [%]) P-1, 33-40/33-35 (0.9-1.1, 8-10); P-2, 75-93/50-65 (1.4-1.5, 22-23); P-3, 95-118/43-53 (2.0-2.3, 27-28); P-4, 108-130/30-35 (3.5-3.8, 30-32); P-5, 35-43/13-14 (2.7-3.2, 10-11); L ratio P-2/P-4, 0.70-0.74; P-3/P-4, 0.86-0.92. P-2 straight in proximal quarter, from here to distal edge weakly convex, with slightly rugose surface; P-3 and P-4 long and more slender than in males, ventral margin P-3 in distal half hyaline.

Atractides inflatus (Walter, 1925)

MATERIAL EXAMINED. — **Corsica.** F 41d, 1 ♂; F 62, ♀. **Sardinia.** I 335, 2 ♀♀, 3 dn; I 336, 2 ♀♀; I 337, 1 ♀ 2 dn; I 345, 1 dn; I 355, 3 dn; I 358, 3 dn; I 372, 1 ♂, 1 ♀; I 373, 1 ♀; I 376, 1 ♀; I 388, 1 ♂; I 1183, 2 ♂♂, 2 dn; I 1183 Int, 2 dn (MNHN).
Corsica. F 41c, 1 ♀; F 41d, 2 ♂♂, 1 dn; F 44e, 1 ♂♂. – Sardinia: I 336, 2 ♀♀; I 358, 4 ♀♀; I 372, 1 ♀; I 388, 2 ♂♂; I 1183, 15 ♂♂, 5 dn (Coll. RG).

DISTRIBUTION. — Mediterranean, Iran. First records from the area covered.

HABITAT. — Middle and higher order streams at low and middle altitude, in the area covered from sea level to 750 m. In surface benthos, but at site I 1183 Int, deutonymphs in the interstitial.

Atractides cf. *latipes* (Szalay, 1935)

Megapus remyi E. Angelier, 1951: 501.

Atractides latipes – E. Angelier 1954a: 521.

MATERIAL EXAMINED. — No material available.

PUBLISHED RECORDS. — Corsica, Ang 6, 2 ♀♀; Ang 7, 1 ♀; Ang 22, 1 ♀; Ang 26, 1 ♀ (Angelier 1954a); Porto, middle course (200-1000 m) (no specimen numbers specified) (Santucci 1971).

DISTRIBUTION. — Central and Southern Europe. Scattered records from the Karpathians, the Apennines, the Pyrenees and Central European mountain ranges.

HABITAT. — Rhithrobiont, adapted to summer dry streams with year-round subterranean flow. Middle order streams at low and middle altitude, in the area covered from 100 to 1000 m, all records from the interstitial.

REMARKS

From the description given by Angelier (1954a) results that the proportions of I-L-5/6 agree with the diagnosis of *A.* cf. *latipes* (I-L-5 dL/HB ratio 2.4, I-L-6 distally narrowed), but following the published measurements the L ratio I-L-5/6 (1.38) is higher and the palp is more slender (concerning the latter aspect, Angelier's measurements contradict his figures). Furthermore, following Angelier's figure 88, the specimens have S-1/2 sharply pointed, not apically rounded as in *A.* cf. *latipes* females, but the author gave obviously little attention to this character (see

discussion of *A. corsicus*). More information on diagnostic characters (fusion of Vgl-1/2, integument structure, sexual dimorphism) is necessary in order to ascertain the published records of *A.* cf. *latipes* from Corsica. We cannot exclude the presence, in Corsica, of an *Atractides* species with enlarged I-L-5, but different from *A. giustinii*. Another possibility that cannot be cleared any more is that *A. giustinii* represents the same taxon published by Angelier under the name *A. remyi*, and subsequently synonymized with *A.* cf. l*atipes*.

Atractides loricatus Piersig, 1898

MATERIAL EXAMINED. — **Sardinia.** I 361, 1 ♀; I 364b, 1 ♂, 2 ♀♀; I 1159, 9 ♀♀; I 1161, 7 ♀♀ (Coll. RG). First records from the area covered.

DISTRIBUTION. — Central and Southern Europe, from the Pyrenees to the Carpathians. First records from the area covered.

HABITAT. — Crenobiont. In the area covered only in the upper Gennargentu mountains of Sardinia, in rheohelocrenic springs from 1000 to 1550 m.

REMARKS

All specimens agree in idiosoma sclerotization and setation of appendages with specimens from continental Europe (Gerecke 2003), but differ in measurements and proportions of I-L-5/6 (both segments longer, L ratio I-L-5/6 > 4.3, setae S-1/-2 longer and more distanced, and P-3/-4 (more slender). Furthermore, the female genital plates are more elongate, with acetabula arranged in a weakly curved line while they are triangular in central European specimens. Before weighting the genetical significance of these differences, more information is necessary on variability in the still understudied central European populations. In the following, I give a survey of measurements of the Sardinian specimens.

Males

Idiosoma L/W 480/350, coxal field L/W 280; further coxae measurements impossible due to damage. I-L-5 dL/vL 145/115, ratio 1.26; HA 36, HB 43, HC 48, ratio dL/HB 3.4; S-1 L/W 71/7, ratio 10,5; S-2 L/W 63/10, ratio 6.6; distance S-1-2, 10, L ratio S-1/-2, 1.1; I-L-6 dL 103, HA 26, HB 18, HC 24; ratio dL/HB 4.6; dL ratio I-L-5/6, 1.41. Genital field L/W 105/110. Palp total L 290; L/H (ratio, rel. L [%]) P-1, 28/23 (1.2, 9); P-2, 61/48 (1.3, 21); P-3, 69/38 (1.8, 24); P-4, 100/32 (3.1, 34); P-5, 23/13 (2.9, 11); L ratio P-2/P-4, 0.61; P-3/P-4, 0.69.

Females

Idiosoma L/W 590-650/400-530, coxal field L/W 280-320/330-370; Cx-I+II medial L 100-115, lateral L 195-225, W 275-295. I-L-5 dL/vL 163-175/125-138, ratio 1.3; HA 38-43, HB 48-53, HC 53-58, ratio dL/HB 3.3-3.5; S-1 L/W 79-85/7-8, ratio 11.0-12.1; S-2 L/W 70-78/9-10, ratio 7.0-8.9; distance S-1-2, 10-13, L ratio S-1/-2, 1.1-1.2; I-L-6 dL 108-118, HA 29-30, HB 24-25, HC 23-26; ratio dL/HB 4.5-4.7; dL ratio I-L-5/6, 1.42-1.53. Genital field L/W 165-180/160-170, genital plates L/W 100-110/30-40. Palp total L 313-340; L/H (ratio, rel. L [%]) P-1, 28-33/24-25 (1.1-1.3, 9-10); P-2, 66-73/45-50 (1.4-1.5, 21-22); P-3, 80-88/36-41 (2.1-2.2, 25-26); P-4, 105-113/26-29 (3.8-4.0, 33-34); P-5, 31-35/11-12 (2.7-2.9, 10); L ratio P-2/P-4, 0.63-0.64; P-3/P-4, 0.76-0.80.

Atractides lunipes Lundblad, 1956

MATERIAL EXAMINED. — **Corsica.** F 41d, 1 ♀ (MNHN); HM 10, 1 ♀ (Coll. HM).

PUBLISHED RECORDS. — **Corsica.** benf 57, 2 ♀♀; benf 59, 1 ♀; benf 86, 3 ♀♀; benf 90, 3 ♂♂, 2 ♀♀, 1 dn (Gerecke & Di Sabatino 2013, MCSNV).

DISTRIBUTION. — Western and Southwestern Europe, Asia Minor, Iran.

HABITAT. — Rhithrobiont. Middle order streams at low elevations, in the area covered from 1 to 400 m, rare.

Atractides macrolaminatus Láska, 1956

MATERIAL EXAMINED. — **Corsica.** F 32, 1 ♂, 1 ♀ (MNHN), 1 ♀ (Coll. RG).

DISTRIBUTION. — Central and Southern Europe, known from scattered sites in the Tatra, the Alps and Corsica. First record from the area covered; new for France.

HABITAT. — Crenophilous. In the area covered only in one low order stream at high elevation, 1400 m.

Atractides protendens K. O. Viets, 1955

MATERIAL EXAMINED. — **Corsica.** F 27a, 1 ♀; F 35, 1 ♀; F 77, 1 ♀, 2 dn. **Sardinia.** I 358, 1 ♀, 1 dn; I 370b, 1 ♀; I 384, 1 ♂; I 1153, 1 ♂; I 1154, 1 ♀; I 1160, 1 ♂, 1 ♀; I 1161, 1 ♀; I 1168, 1 ♂, 1 ♀, 1 dn; I 1169, 1 ♂, 1 ♀; I 1171, 1 ♂, 1 ♀ (MNHN).
Corsica. F 27a, 1 ♂; F 27b, 1 ♀. **Sardinia.** I 384, 1 ♂; I 1153, 1 ♂, 1 ♀; I 1154, 2 ♀♀; I 1169, 2 ♀♀; I 1172, 3 ♂♂, 1 ♀, 5 dn; I 1177, 1 ♀; I 1178, 3 ♂♂, 2 ♀♀ (Coll. RG).

DISTRIBUTION. — Central Europe, central Mediterranean area. First records from the area covered; new for France.

HABITAT. — Crenobiont. Preferably in weakly seeping springs, in exceptional cases in low order streams, in the area covered from 300 to 1200 m.

Atractides pumilus (Szalay, 1946)

MATERIAL EXAMINED. — **Corsica.** F 40g, 1 ♀; F 43h, 1 ♂; F 44f, 1 ♀; F 44g, 1 ♀; F 73f, 2 ♀♀; F 79, 1 ♀; F 87, 1 ♀; F 89, 1 ♂, 1 ♀, 2 dn. **Sardinia.** I 366, 1 ♀; I 376, 1 ♀; I 387, 1 ♀ (MNHN).
Corsica. F 43h, 1 ♂; F 89, 1 ♂, 1 ♀. **Sardinia.** I 375, 1 ♀ (Coll. RG).

PUBLISHED RECORD. — **Corsica.** benf 171, 4 ♀♀ (Gerecke & Di Sabatino 2013, MCSNV).

DISTRIBUTION. — Central and Southern Europe, from the Pyrenees to the Carpathians. First records from Sardinia.

HABITAT. — Considered hyporheobiont, but all specimens from the area covered collected in surface water, in middle order streams in the macchia vegetation belt, from 100 to 800 m.

Atractides robustus (Sokolow, 1940)

Atractides nodipalpis sensu Angelier, 1955 (partim): 64 ff.

MATERIAL EXAMINED. — **Corsica.** Ang 38, 1 ♂, 2 ♀♀; F 78, 1 ♂; F 81, 1 ♂, 1 ♀, 1 dn; F 93, 1 ♂, 1 ♀, 1 dn) (MNHN).
Corsica. HM 07, 1 ♂; HM 11, 1 ♂ (Coll. HM); F 68, 1 ♂, 2 dn; F 81, 4 ♂♂, 1 ♀, 14 dn; F 93, 2 ♂♂, 4 ♀♀; F 94, 3 ♂♂, 1 ♀; F 96, 3 ♂♂, 2 ♀♀.
Sardinia. I 373, 3 ♂♂, 6 ♀♀; I 381, 1 ♂, 1 ♀; I 387, 1 ♂ (Coll. RG).

UNCERTAIN RECORDS (BASED ON FEMALES). — **Corsica.** Ang 4, 2 ♀♀; Ang 7, 1 ♀ – unpubl. specimen); Ang 10, 1 ♀; Ang 20, 7 ♀♀; Ang 21, 3 ♀♀; Ang 24, 2 ♀♀; Ang 36, 1 ♀; Ang 37, 1 ♀; Ang 44, 3 ♀♀; F 30b, 1 ♀; F 41c, 1 ♀; F 43b, 2 ♀♀; F 43c, 2 ♀♀; F 43f, 1 ♀; F 44a, 1 ♀; F 44d, 2 ♀♀; F 44e, 1 ♀; F 44f, 6 ♀♀; F 44h, 1 ♀; F 55, 1 ♀; F 71, 1 ♀; F 73f, 1 ♀; F 99, 1 ♀; F 103, 1 ♀; F 104, 1 ♀ (MNHN); HM 10, 3 ♀♀, HM 26, 1 ♀, HM 29, 1 ♀ (Coll. HM).
Sardinia. I 352, 4 ♀♀, 1 dn; I 359, 1 ♀, 1 dn; I 378, 1 ♀; I 379, 1 ♀, 2 dn (MNHN).

PUBLISHED RECORDS. — benf 54, 3 ♂♂, 3 ♀♀; benf 55, 1 ♂, 12 ♀♀, 1 dn; benf 56, 2 ♂♂, 2 ♀♀, 8 dn; benf 57, 1 ♂, 3 ♀♀, 1 dn; benf 58, 3 ♂♂, 6 ♀♀, 4 dn; benf 59, 2 ♂♂, 5 ♀♀; benf 75, 1 ♂, 4 dn; benf 78, 1 ♂; benf 82, 1 ♂; benf 87, 3 ♂♂, 1 ♀; benf 90, 11 ♂♂, 11 ♀♀; benf 171, 2 ♀♀; benf 172, 1 ♂, 2 ♀♀ (Gerecke & Di Sabatino 2013, MCSNV); (under the name "*A. nodipalpis*"): Ang 1, 1 ♀; Ang 4, 1 ♂, 1 ♀; Ang 10, 1 ♀; Ang 20, 8 ♀♀; Ang 20 I, 1 ♂, 3 ♀♀; Ang 21, 1 ♂, 4 ♀♀; Ang 24, 4 ♀♀; Ang 36, 1 ♀; Ang 37, 1 ♀; Ang 38, 1 ♂′, 2 ♀♀; Ang 44, 3 ♀♀ (Angelier 1954b, partim MNHN); Porto, middle course (200-1000 m) (no specimen numbers specified) (Santucci 1971).

DISTRIBUTION. — Most parts of Europe (not reported from the British Isles and Northern Fennoscandia), Asia Minor, Iran. First records from the area covered.

HABITAT. — Rhithrobiont. Middle order streams, in the area covered from 100 to 1800 m, most records from middle elevations.

REMARKS

In his general list, Angelier (1954b) published various records of *A. nodipalpis*, but without discussing the species. The only male deposited under this name in his collection (idiosoma only), as well as all other *nodipalpis* species-group males available from the area covered with a smooth excretory pore, show clearly the IV-L characters of *A. robustus*. An unambiguous separation of the latter species from *A. nodipalpis* is impossible in the female sex. However, in view of the taxonomic homogeneity of the documented males, I attribute most females from the area covered combining a finely striated integument, unsclerotized excretory pore, separate Vgl-1/2 and an I-L-5 with pointed, distanced setae S-1/2 to *A. robustus*. The only exception is made for three females under the name "*A. nodipalpis*" in coll. Angelier which are characterized by an excretory pore sclerite and represent *A. ruffoi* Gerecke & Di Sabatino, 2013 (see

below). The presence of *A. nodipalpis* on Corsica is not confirmed. The arrangement of the acetabula is rather variable in these specimens, in most cases with the medial margin indented anterior and posterior to the medially rounded, subtriangular Ac-2. The range of the distance S-1-2 is 18-40, in most specimens 20-30 (mean 26), the S-1 is bluntly pointed, generally with a tiny, medially-directed denticle, the range of the L ratio I-L-5/6 is 1.38-1.68 (mean 1.55), the L/H ratio IV-L-5 is 3.1-3.5 (mean 3.4), of I-L-6, 6.3-8.0 (mean 7.0).

Atractides ruffoi Gerecke & Di Sabatino, 2013

Atractides nodipalpis sensu Angelier, 1955 (partim): 64 ff.

MATERIAL EXAMINED. — **Corsica.** Ang 1, 1 ♀; Ang 15, 1 ♀; Ang 20, 1 ♀ (all sub nom. *A. nodipalpis*); F 41d, 2 ♀♀; F 111, 2 ♀♀ (MNHN).

PUBLISHED RECORDS. — **Corsica.** benf 79, 2 ♂♂, 3 ♀♀; benf 88, 1 ♂ (Gerecke & Di Sabatino 2013, MCSNV); (under the name "*A. nodipalpis*"): Ang 1, 1 ♀; Ang 15, 1 ♀; Ang 20, 1 ♀ (Angelier 1954b, MNHN).

DISTRIBUTION. — Corsica, endemic.

HABITAT. — Rhithrobiont. Medium order streams at low elevations, from sea level to 300 m.

REMARKS

This species, recently discovered in material from the heritage Benfatti (Verona), is similar to *A. nodipalpis*, but distinct in the presence of a sclerotized anal pore (Gerecke & Di Sabatino, 2013).

Atractides spinipes Koch, 1837

MATERIAL EXAMINED. — **Corsica.** F 40b, 3 ♀♀; F 40f, 1 ♀; F 40h, 1 ♂; F 41d, 1 ♂; F 41g, 1 ♂; F 43g, 1 ♀; F 44d, 1 ♂, 1 ♀; F 44e, 1 ♀; F 44f, 1 ♂, 1 ♀; F 73d, 2 ♀♀; F 73f, 2 ♀♀; F 73g, 1 ♀; F 79, 1 ♀; F 81, 1 ♀. **Sardinia.** I 335, 1 ♀, 1 dn; I 336, 1 ♀; I 373, 1 ♀ (MNHN). **Corsica.** F 44f, 2 ♀♀; F 73d, 1 ♂, 1 ♀; F 73f, 3 ♀♀; F 79, 2 ♀♀; F 81, 1 ♀ (Coll. RG).

DISTRIBUTION. — Western, Central and Southern Europe, scattered records. Data published in the past centuries referring to other species (Gerecke 2003). First records from the area covered.

HABITAT. — Rhithrobiont. Low and middle order streams, in the area covered from 100 to 1800 m, most records from middle elevations.

REMARKS

The distribution area of this only recently defined species is still rather unclear (Gerecke 2003). As elsewhere, also in the area covered it has been probably overlooked due to its particular life cycle, with adults emerging in late autumn and present mostly during the cold season. This phenological pattern finds confirmation also in Corsica thanks to the unpublished [?]seasonal study conducted by Astrid Schwarz in the Fango and Porto catchments on Corsica (sites F 40-41, 44, 73, Schwarz & Schwoerbel 1997).

Atractides subasper Koenike, 1902

MATERIAL EXAMINED. — **Corsica.** Ang 6, 1 ♀; Ang 12, 6 ♀♀; Ang 15, 1 ♂; Ang 38, 1 ♀; F 41c, 1 ♀; F 44f, 1 ♀; F 46, 3 ♂♂, 1 ♀, 1 dn; F 69, 1 ♀. **Sardinia.** I 369, 1 ♀, 1 dn; I 1162, 1 ♀ (MNHN).
Corsica. F 41d, 2 ♀♀; F 41g, 1 ♂; F 44f, 1 ♂, 2 ♀♀, 1 dn; F 46, 1 ♂, 2 ♀♀; F 50, 1 ♂; F 52, 1 ♀; F 68, 1 ♀; F 69, 6 ♂♂, 1 ♀; F 78, 1 ♀; F 81, 1 ♀. **Sardinia.** I 369, 3 ♀♀, 2 dn; I 382, 1 ♀; I 389, 1 ♂; I 1162, 1 ♀ (Coll. RG).

DISTRIBUTION. — Central and Southern Europe, North Africa. First record from Sardinia.

HABITAT. — Rhithrobiont. Medium order streams, preferably at low altitude, in the area covered from 100 to 800 m.

PUBLISHED RECORDS. — **Corsica.** benf 54, 1 ♀; benf 59, 2 ♀♀; benf 77, 1 ♂, 1 ♀; benf 78, 3 ♂♂, 3 ♀♀, 2 dn; benf 82, 2 ♂♂; benf 83, 1 ♂; benf 87, 1 ♂, 2 ♀♀, 2 dn; benf 88, 1 ♂, 6 ♀♀, 3 dn; benf 89, 1 ♂, 1 ♀; benf 90, 7 ♂♂, 6 ♀♀, 3 dn; benf 171, 1 ♀ (Gerecke & Di Sabatino 2013, MCSNV); Ang 6, 1 ♀; Ang 12, 2 ♂♂, 8 ♀♀, 2 dn; Ang 15, 1 ♂; Ang 38, 1 ♀; Ang 41, 1 ♀ (Angelier 1954b, MNHN partim); Porto, spring area ("stat. Io"), upper (1000-1300 m) and middle course (200-1000 m) (no specimen numbers specified) (Santucci 1971).

Atractides valencianus K. Viets, 1930

MATERIAL EXAMINED. — **Sardinia.**: I 350, 1 ♀, 3 dn; I 359, 1 ♀; I 370b, 1 ♀; I 381, 1 ♀; I 389, 1 ♀; I 1159, 2 ♀♀ (MNHN).
Sardinia. I 350, 1 ♀; I 387, 1 ♂; I 389, 2 ♀♀; I 1159, 2 ♀♀ (Coll. RG).

UNCERTAIN RECORDS (SEE BELOW). — **Sardinia.** I 380, 1 ♀; I 388, 1 ♀.

DISTRIBUTION. — West Mediterranean. First record from the area covered; new for Italy.

HABITAT. — Rhithrobiont. Medium order streams, in the area coeverd from 20 to 1400 m.

REMARKS

As in the case of *A. inflatipalpis*, a species similar from many points of view (see above), also the variability of *A. valencianus* is still little documented. In the following, measurement ranges and some morphological details are given for the specimens from the area covered, and the differences between the two species are discussed.

Both sexes

Glandularia small, round, also dorsocentrally with relatively short setae. Coxae without secondary sclerotization. I-L-5 elongated, ventral margin distal to ventral seta concave, forming a blunt projection near S-1 insertion in the area between S-1 and -2 parallel to dorsal margin; S-1 long and slender, distally equally narrowed, tip oblique truncated, forming a fine denticle on the inner side; S-2 distinctly shorter, slightly enlarged in proximal third, tip bluntly pointed. Palp with weak sexual dimorphism; P-4 with maximum H near proximoventral seta, sword seta near distoventral seta insertions, proximal and distal ventral sectors slightly shorter than central one.

Male (n = 1)

Idiosoma L/W 600/420, coxal field L/W 350/390; Cx-I+II medial L 100, lateral L 245, W 300. I-L-5 dL/vL 200/1/45, ratio 1.4; HA 48, HB 55, HC 68, ratio dL/HB 3.6; S-1 L/W 93/7, ratio 13.2; S-2 L/W 80/8, ratio 10.0; distance S-1-2, 18, L ratio S-1/-2, 1.2; I-L-6 dL 145, HA 28, HB 25, HC 26; ratio dL/HB 5.8; dL ratio I-L-5/6, 1.38. Genital field L/W 110/125, rounded, anterior margin slightly convex, posterior margin with a shallow medial indentation; gonopore L 65, acetabula in a curved line, surrounded by 28-36 pairs of setae (fine, hair like laterally, longer and stronger, in a double or triple line medially, single longer setae at antero- and posterolateral edges of acetabula). Palp total L 343; L/H (ratio, rel. L [%]) P-1, 33/35 (0.9, 9); P-2, 80/65 (1.2, 23); P-3, 80/50 (1.6, 23); P-4, 113/45 (2.5, 33); P-5, 38/11 (3.3, 11); L ratio P-2/P-4, 0.71; P-3/P-4, 0.71. P-2 ventral margin proximally concave, distally convexly protruding, forming an acute angle with distal margin; P-3 relatively short and stout, ventral and dorsal margins diverging, distal quarter of ventral margin hyaline P-4 with dense cover of fine, hair-like setae.

Females (n = 7)

Idiosoma L/W 650-850/460-650, coxal field L/W 340-380/400-510; Cx-I+II medial L 90-125, lateral L 215-250, W 305-350. I-L-5 dL/vL 210-225/140-149, ratio 1.5-1.6; HA 53-60, HB 58-69, HC 80-90, ratio dL/HB 3.1-3.9; S-1 L/W 113-120/9-10, ratio 11.3-12.9; S-2 L/W 90-100/13-15, ratio 6.3-7.5; distance S-1-2, 28-35, L ratio S-1/-2, 1.2-1.3; I-L-6 dL 163-170, HA 28-31, HB 18-20, HC 21-25; ratio dL/HB 8.1-9.4; dL ratio I-L-5/6, 1.27-1.35. Genital field L/W 130-170/160-190, pre- and postgenital sclerites strong, genital plates L/W 110-115/30-35, weakly curved, anteriorly and posteriorly rounded, bearing 10-12 pairs of fine, hair-like setae; Ac-3 often distinctly larger than Ac-2. Palp total L 335-370; L/H (ratio, rel. L [%]) P-1, 35-38/29-33 (1.1-1.3, 10-11); P-2, 73-80/53-60 (1.3-1.4, 22-23); P-3, 83-100/39-55 (2.0-2.5, 24-27); P-4, 110-118/28-31 (3.5-4.0, 32-33); P-5, 33-40/11-14 (2.6-3.1, 10-11); L ratio P-2/P-4, 0.65-0.70; P-3/P-4, 0.74-0.85. P-2 ventral margin concave in proximal, convex in distal half, with slightly rugose surface; P-3 and -4 long and more slender than in males, ventral margin P-3 in distal half hyaline.

Excluded from this measurement series are two females (I 380, I 388) which agree in most morphological details, but have distinctly larger measurements - e.g., idiosoma L/W 900-1300/650-900; genital plate L 123-145; palp total L 440-475, P-3 L/H 113-128/55-65, I-L-5 dL/vL 255-280/180-195. These specimens differ also in proportions of segments (most significant: relative L P-2 major, 24 %, P-4 minor, 30 %, P-2/4 L ratio 0.81-0.83; P-4 stouter, L/H 3.2-3.4; I-L-5 dL/vL ratio minor, 1.42-1.44, and segment more slender, L/HB 3.8-3.9. Studies of further populations are necessary

in order to make clear if these data indicate a wider variability range of *A. valencianus*, or the presence of a further species from the taxonomic neighbourhood *A. inflatipalpis*/*A. valencianus* in the area covered.

Remarks

Both sexes of *A. inflatipalpis* differ from *A. valencianus* mostly in the shape of I-L-5/6, with: (1) a higher dL/vL ratio of I-L-5 (males: > 1.5, females > 1.6), (2) a stouter S-2 with more strongly inflated inner margin (L/W in males < 7.0, in females < 6.0), (3) a higher distance S-1-2 (> 25 in males, > 35 in females), and (4) a lower I-L-5/6 dL ratio (< 1.30 in males, < 1.25 in females). In the male sex, *A. inflatipalpis* differs from *A. valencianus* furthermore in a more slender P-4 (L/H > 2.65) with the sword seta located more distally, but in first line in the by far weaker setation of the genital field. This latter character state is well visible in published figures (e.g., Gerecke 2003), but has not been taken in consideration so far: on each side of the anterior gonopore, in *A. inflatipalpis*, 7-8 setae are inserted in a single line flanking the medial margin of Ac-1. Instead, in *A. valencianus* this area is covered by 12-20 paired setae arranged in double or triple lines and posteriorly extending until the anterior margin of Ac-3.

Atractides (s.s.) sp.

Material examined. — **Corsica.** F 41f, 1 ♀; F 45e, 1 ♀; F 93, 1 ♀ (MNHN).
Corsica. F 46, 1 dn; F 83a, 1 dn; F 93, 1 ♀ (Coll. RG), HM 07, 1 dn (Coll. HM). **Sardinia.** I 1154, 6 dn; I 1172, 1 dn (Coll. RG).

Published records. — Corsica: benf 59, 1 dn; benf 77, 1 dn; benf 84, 1 dn; benf 90, 2 dn; benf 170, 1 dn; benf 171, 3 dn; benf 173, 45 dn (Gerecke & Di Sabatino 2013, MCSNV); Ang 9, 19 dn; Ang 12, 1 dn; Ang 12 I, 2 dn; Ang 26 I, 2 dn (Angelier 1954b); "*Atractides* sp. (n.?)" [unpubl. taxon] Porto, 320-900 m, interstitial (Santucci 1965, 1977).

Remark

The former female and deutonymph specimens could not be attributed to a described species due to unclear intermediate character states.

Subgenus *Polymegapus* K. Viets, 1926

Atractides orghidani Motaş & Tanasachi, 1960

Material examined. — **Sardinia.** I 376, 1 ♀ (MNHN).

Distribution. — Carpathians, Balkan peninsula, Appennines. First record from the area covered; new for Italy.

Habitat. — Rhithrobiont, hyporheophilous. In the area covered only a single record from a medium order stream in the macchia vegetation belt, at 320 m.

Atractides polyporus (K. Viets, 1922)

Material examined. — **Corsica.** F 33, 2 ♀♀; F 84, 1 ♀; F 86, 1 ♂, 1 ♀. **Sardinia.** I 370a, 2 ♂♂, 2 ♀♀; I 1155 1 ♂ (MNHN).
Corsica. F 25, 2 ♂♂; F 26, 2 ♂♂, 1 ♀; F 27b, 1 ♂; F 29, 1 ♀; F 33, 2 ♀♀; F 35, 1 ♂♂; 2 dn; F 77, 1 ♂, 1 ♀; F 86, 2 ♂♂, 42 ♀♀. **Sardinia.** I 370a, 3 ♂♂, 16 ♀♀; I 370b, 1 ♀; I 384, 1 ♂, 16 ♀♀; I 1153, 4 ♂♂, 1 ♀; I 1154, 12 ♂♂, 4 ♀♀; I 1159, 1 ♀; I 1160, 1 ♂, 3 ♀♀; I 1161, 1 ♂; I 1166, 1 ♀; I 1168, 59 ♂♂, 19 ♀♀; I 1169, 3 ♂♂, 13 ♀♀; I 1172, 71 ♂♂, 60 ♀♀; I 1178, 5 ♂♂, 5 ♀♀ (Coll. RG).

Distribution. — Central Europe, Mediterranean. First records from the area covered.

Habitat. — Crenobiont. With a total of 366 specimens from the area covered the *Atractides* species recorded in the highest abundance, but restricted to weakly seeping rheohelocrenes and therefore previously overlooked. Preferably in shaded valleys, in the area covered from 280 to 1800 m.

Subgenus *Tympanomegapus* Thor, 1923

Atractides acutirostris Motaş & Angelier, 1928

Atractides pavesii E. Angelier, nec Maglio, 1905: 148.

Material examined. — **Corsica.** MNHN Paris 2280 "*Atractides pavesii* [species name replacing cancelled earlier determination « *acutirostris* »] ♀ (Mts. et Ang.) 1927, no. 2280, Annonciade Bastia (Corse) 10.VIII.1950"; F 46, 1 ♀; F 97, 1 ♀. **Sardinia.** I 340, 1 ♂; I 369, 1 ♀ (MNHN).

Published records. — **Corsica.** benf 89, 1 ♀; benf 90, 1 ♂ (Gerecke & Di Sabatino 2013, MCSNV); (under the

name "*A. pavesii*"): Ang 03, 1 ♀; Ang 15, 2 ♀♀ (Angelier 1954b, MNHN partim); Porto, upper (1000-1300 m) and middle course (200-1000 m) (no specimen numbers specified) (Santucci 1971).

DISTRIBUTION. — Central and Southern Europe, Ireland. First record from Sardinia.

HABITAT. — Rhithrobiont. Medium order streams with not too turbulent flow, in the area covered at various altitudes.

REMARKS

The identity of the material published by Angelier (1954b) from Corsica under the name *A. pavesii* with *A. acutirostris*, proposed by Gerecke (2003) on the base of the published figures, is here confirmed after control of the only available specimen from his collection.

DISCUSSION

Of the 24 *Atractides* species now known from Corsica and Sardinia, 50 % were recorded from there for the first time in the course of this study. Both, this high amount of first records and the fact that several species (*A. graecus*, *A. loricatus*, *A. macrolaminatus*, *A. orghidani*, *A. gracilipes*) are known from single collecting sites or very restricted areas, suggests that the number of *Atractides* species could further increase considerably with further field in future.

However, at the present state of documentation it does not appear premature to line out some characteristics of this fauna.

Most of the species have a wide distribution area in the Mediterranean, in Europe or in the Western Palaearctic, while *A. corsicus*, *A. gracilipes*, *A. gracilipes* and *A. ruffoi* are to be considered Corsican-Sardinian endemites. The question if the distribution of these four species is really restricted to the two islands, should be further investigated with field work in other, still understudied parts of the Central mediterranean area (e.g., Northern Africa, Sicily). However, presence of such endemites would not be surprising in view of the long-term geohistorical isolation of the studied islands (Gerecke & Di Sabatino 1996).

Another interesting aspect is the probable absence of several species widely distributed in continental Europe, e.g., the spring dwelling *A. adnatus*, *A. walteri* and *A. vaginalis* or the rhithrobionts *A. distans*, *A. nodipalpis* and *A. tener*. As outlined by Gerecke & Di Sabatino (1996) for other water mite taxa on the islands, also several *Atractides* species appear to have undergone a shift in their habitat preference, possibly as a consequence of long term isolation and availability of free ecological niches. Under this point of view its is interesting that *A. allgaier*, known as a rhithrobiont in many parts of the W Palaearctic, in Corsica and Sardinia is found nearly exclusively in springs, while *A. clavipes*, a species previously recorded exclusively from springs, in the area covered is found also in higher order streams. As described by Santucci (1970) for *Acherontacarus* species, also the hyporheobiont *A. pumilus* shows on Corsica a tendency to colonize the benthic sediment surface.

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