Naturalista sicil., S. IV, XXXVI (3), 2012, pp. 403-419

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THE ORIGIN OF THE ITALIAN SALTICID FAUNA (*Arachnida Araneae*)

SUMMARY

The origin of the present asset of the salticid fauna of the Italian peninsula and Sicily was investigated by comparing its structure with that of the surrounding European and Mediterranean territories. Faunistic data were grouped into four large areas: Western Europe (WE), Central Europe (CE), Eastern Europe (EE) and North Africa (NA). Data from IT (Italian Peninsula – Sicily) were also used considering individually Sicily and the northern, central and southern districts of the Italian Peninsula. The high affinity between IT and EE and the dominance of Euro-Asian species in IT fauna suggest that its present composition was primarily determined by the faunal exchanges, occurred during the last glacial period and the post-ice age, with the Balkans, associated with exchanges governed by the north-south climatic gradient of the Italian Peninsula.

RIASSUNTO

L'origine del popolamento italiano di Salticidi (Arachnida Araneae). È stata indagata l'origine del presente assetto della fauna di salticidi della penisola italiana e della Sicilia, paragonando la sua struttura con quella dei circostanti territori europei e mediterranei. I dati faunistici sono stati raggruppati in quattro grandi aree: Europa occidentale (WE), Europa centrale (CE), Europa orientale (EE) e Nord Africa (NA). I dati relativi all'Italia e Sicilia sono stati utilizzati anche distinguendo la Sicilia e i distretti settentrionale, centrale e meridionale della penisola italiana. L'elevata affinità della fauna italiana con quella dell'Europa orientale e la dominanza in Italia delle specie euro-asiatiche suggeriscono che la sua presente composizione sia stata principalmente determinata da scambi faunistici con i Balcani, verificatisi durante l'ultima glaciazione e il post glaciale, associati a scambi governati dal gradiente climatico nord–sud della penisola italiana.

INTRODUCTION

In a recent paper we analyzed the relationship between the salticid fauna of Sicily and that of the Italian Peninsula (ALICATA & CANTARELLA, 2011), demonstrating the dominant role of the climatic gradient. Results of this study moved us to extend our analysis examining the faunistic relationship between the Italian Peninsula, including Sicily (Italy), and the surrounding European and Mediterranean territories. We excluded from our analysis Sardinia, Pantelleria and Lampedusa because these territories are too isolated from the rest of Italy to be considered a part of the same biogeographic system.

Our knowledge on the distribution of the salticid species, even if this spider family is one of the most studied, is far from complete; therefore, in order to make this comparison possible, we grouped the faunistic data into four large areas: Western Europe (WE), Central Europe (CE), Eastern Europe (EE) and North Africa (NA). The data from IT (Italian Peninsula + Sicily) were also used considering individually Sicily and the northern, central and southern districts of the Italian Peninsula.

MATERIALS AND METHODS

Data sources

Data were selected from the following sources:

Italian fauna: RUFFO & STOCK, 2005; ALICATA & CANTARELLA, 2011.

Species distributions: PLATNICK, 2012; PROSZYNSKI, 2012; METZNER, 2012; HELSDINGEN, 2012.

Data concerning subspecies were excluded, as well as those concerning species of which only the females were described.

Area inclusion criteria

Western Europe (WE): both France and Iberian Peninsula, or only Iberian Peninsula.

Central Europe (CE): France and the countries of Central Europe.

Eastern Europe (EE): the Balkans, Aegean Islands.

North Africa (NA): North Africa.

Italian Peninsula + Sicily (IT): Italy, excluding Sardinia, Pantelleria and Lampedusa.

N, C, S: northern, central and southern districts of the Italian Peninsula.

Si: Sicily.

Data analyses

The unsatisfactory knowledge of the distribution of most species did not allow us to properly use the chorological categories generally used for the Italian fauna; therefore we adopted the following terminology that simply refers to the available data:

Cosmopolitan	Eastern Mediterranean
African	Western Mediterranean
European	North Western Mediterranean
Central-eastern European	South Western Mediterranean
Eastern European	Central European endemism
Central European	Western European endemism
Western European	North African endemism
South European	Eastern Mediterranean endemism
Eastern-European and Asiatic	Apenninian endemism
Euro-Asiatic	Sicilian endemism
Euro-Asiatic -Mediterranean	Sicilian - Apenninian endemism
Euro-Mediterranean	Sicilian - Maltese endemism
Mediterranean	Corsican endemism

In some analyses the categories within the European (EUR), Eurasian (EURAS), and Mediterranean (MED) distributions were grouped together.

Comparisons between the five areas were performed using the Jaccard [S = a/(a+b+c)], and Russell & Rao [S = a/(a+b+c+d)] similarity indexes, where: a is the number of species shared by the two areas; b and c the species numbers present only within one of the two areas; d the species number of the total area absent in the two compared areas.

Results

The 284 species recorded in the examined area are listed in the Tab. 1. The EE area has the largest number of species (168); 123 of them are present in Greece that is the country of EE by far the most investigated. The smallest number is found in North Africa, but no doubt this is an underestimate. The other three areas have a similar number of species with a slight predominance of IT, but the WE area is certainly underestimated, due to insufficient investigations in the Iberian Peninsula.

Table 1
List of the species recorded in the five areas

Species	chorology	IT	NA	EE	WE	CE
Aelurillus aeruginosus (Simon, 1871)	Mediterranean	*		*	*	
Aelurillus basseleti (Lucas, 1846)	South Western Mediterranean		*			
Aelurillus blandus (Simon, 1871)	Eastern Mediterranean			*		
Aelurillus bosmansi Azarkina, 2006	Western European endemism				*	
Aelurillus concolor Kulczyn'ski, 1901	Eastern-European and Asiatic			*		
Aelurillus cretensis Azarkina, 2002	East Mediterranean endemism			*		
Aelurillus cypriotus Azarkina, 2006	East Mediterranean endemism			*		
Aelurillus guecki Metzner, 1999	East Mediterranean endemism			*		
Aelurillus hirtipes Denis, 1960	North African endemism		*			
Aelurillus kochi Roewer, 1951	Eastern Mediterranean			*		
Aelurillus laniger Logunov et Marusik, 2000	Eastern-European and Asiatic			*		
Aelurillus leipoldae (Metzner, 1999)	East Mediterranean endemism			*		
Aelurillus lopadusae Cantarella, 1983	Western Mediterranean	(*)	*			
Aelurillus luctuosus (Lucas, 1846)	Western Mediterranean	*	*		*	
Aelurillus nigrum Kulczyn'ski, 1891	*Eastern-European and Asiatic*			*		
Aelurillus monardi (Lucas, 1846)	Mediterranean	(*)	*		*	
Aelurillus numidicus (Lucas, 1846)	North African endemism		*			
Aelurillus plumipes (Thorell, 1875)	South Western Mediterranean		*			
Aelurillus politiventris (O P-Cambridge, 1872)	Eastern Mediterranean			*		
Aelurillus schembrii Cantarella, 1982	Sicilian - Maltese endemism	*				
Aelurillus simoni (Lebert, 1877)	Central European endemism					*
Aelurillus simplex (Herman, 1879)	Central European endemism					*
Aelurillus spinicrus (Simon, 1871)	North African endemism		*			
Aelurillus steinmetzi Metzner, 1999	East Mediterranean endemism			*		
Aelurillus steliosi Dobroruka, 2002	East Mediterranean endemism			*		
Aelurillus v-insignitus (Clerck, 1757)	Euro-Asiatic	*		*	*	*
Afraflacilla antineae (Denis, 1954)	North African endemism		*			
Afraflacilla epiblemoides (Chyzer, 1891)	Central-eastern European	*		*		*
Asianellus festivus (C L Koch, 1834)	Euro-Asiatic	*		*	*	*
Ballus armadillo (Simon, 1871)	South European	*		*	*	
Ballus chalybeius (Walckenaer, 1802)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Ballus rufipes (Simon, 1868)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Ballus variegatus Simon, 1876	North Western Mediterranean	*			*	
Bianor albobimaculatus (Lucas, 1846)	Euro-Asiatic -Mediterranean	*	*	*	*	
Carrhotus affinis Caporiacco, 1934	North African endemism		*			
Carrhotus xanthogramma (Latreille, 1819)	Euro-Asiatic	*		*	*	*
Chalcoscirtus alpicola (L Koch, 1876)	Euro-Asiatic	*				*
Chalcoscirtus brevicymbialis Wunderlich, 1980	Euro-Asiatic	*		*		*
Chalcoscirtus infimus (Simon, 1868)	Euro-Asiatic	*		*	*	*
Chalcoscirtus nigritus (Thorell, 1875)	Euro-Asiatic			*		*
Cyrba algerina (Lucas, 1846)	Euro-Asiatic -Mediterranean	*	*	*	*	
Dendryphantes hastatus (Clerck, 1757)	Euro-Asiatic			*		*
Dendryphantes rudis (Sundevall, 1833)	Euro-Asiatic	*		*		*

Segue: Table 1

Continua: Table 1

Species	chorology	IT	NA	EE	WE	CE
Euophrys acripes (Simon, 1871)	North Western Mediterranean				*	
Euophrys albimana Denis, 1937	North African endemism		*			
Euophrys alticola Denis, 1955	Western European				*	
Euophrys astuta (Simon, 1871)	North African endemism		*			
Euophrys baliola (Simon, 1871)	Corsican endemism				*	
Euophrys convergentis Strand, 1906	Mediterranean		*			
Euophrys difficilis (Simon, 1868)	South European	*		*	*	
Euophrys frontalis (Walckenaer, 1802)	Euro-Asiatic -Mediterranean	*	*	*		*
Euophrys gambosa (Simon, 1868)	Mediterranean	*	*	*	*	
Euophrys herbigrada (Simon, 1871)	Euro-Mediterranean	*	*	*	*	*
Euophrys innotata (Simon, 1868)	Western Mediterranean	(*)	*		*	
Euophrys littoralis Soyer, 1959	Western European endemism				*	
Euophrys luteolineata (Simon, 1871)	Corsican endemism				*	
Euophrys manicata (Simon, 1871)	Western Mediterranean	*	*			
Euophrys nigripalpis Simon, 1937	North Western Mediterranean				*	
Euophrys nigritarsis (Simon, 1868)	Western European endemism				*	
Euophrys patellaris Denis, 1957	Western European endemism				*	
Euophrys pexa Simon, 1937	Western European endemism				*	
Euophrys rufibarbis (Simon, 1868)	Euro-Mediterranean	*	*	*	*	*
Euophrys rufimana (Simon, 1875)	Western European				*	
Euophrys sedula (Simon, 1875)	Western European endemism				*	
Euophrys semiglabrata (Simon, 1868)	Western European				*	
Euophrys sulphurea (L Koch, 1867)	Mediterranean	*	*	*	*	
Euophrys terrestris (Simon, 1871)	Mediterranean	*	*	*	*	*
Evarcha arcuata (Clerck, 1757)	Euro-Asiatic -Mediterranean	*	*	*		*
Evarcha falcata (Clerck, 1757)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Evarcha jucunda (Lucas, 1846)	Euro-Mediterranean	*	*	*	*	*
Evarcha laetabunda (C L Koch, 1846)	Euro-Asiatic -Mediterranean	*	*	*		*
Evarcha michailovi Logunov, 1992	Euro-Asiatic				*	
Evarcha nigricans (Dalmas, 1920)	North African endemism		*			
Habrocestum egaeum Metzner, 1999	East Mediterranean endemism			*		
Habrocestum graecum Dalmas, 1920	East Mediterranean endemism			*		
Habrocestum ibericum Dalmas, 1920	Western European endemism				*	
Habrocestum latifasciatum (Simon, 1868)	Eastern Mediterranean	*	*	*		
Habrocestum lepidum Dalmas, 1920	North African endemism		*			
Habrocestum ornaticeps (Simon, 1868)	Western Mediterranean		*		*	
Habrocestum papilionaceum (L Koch, 1867)	Eastern Mediterranean			*		
Habrocestum simoni Dalmas, 1920	North African endemism		*			
Habrocestum verattii Caporiacco, 1936	North African endemism		*			
Hasarius adansoni (Audouin, 1826)	Cosmopolitan	*	*	*	*	*
Heliophanillus fulgens (O P-Cambridge, 1872)	Eastern Mediterranean			*		
Heliophanus acutissimus Wesolowska, 1986	North African endemism		*			
Heliophanus aeneus (Hahn, 1832)	Euro-Asiatic	*		*	*	*
Heliophanus agricola Wesolowska, 1986	Western Mediterranean		*		*	

Segue: Table 1

Continua: Table 1

Species	chorology	IT	NA	EE	WE	CE
Heliophanus apiatus Simon, 1868	North Western Mediterranean	*			*	
Heliophanus auratus C L Koch, 1835	Euro-Asiatic	*		*	*	*
Heliophanus conspicuus Wesolowska, 1986	North African endemism		*			
Heliophanus creticus Giltay, 1932	East Mediterranean endemism			*		
Heliophanus cupreus (Walckenaer, 1802)	Euro-Asiatic -Mediterranean	*	*	*		*
Heliophanus dampfi Schenkel, 1923	Central-eastern European			*		*
Heliophanus decoratus L Koch, 1875	Mediterranean	(*)	*			
Heliophanus dubius C L Koch, 1835	Euro-Asiatic	*		*		*
Heliophanus edentulus Simon, 1871	Mediterranean		*	*	*	
Heliophanus encifer Simon, 1871	Mediterranean	*		*	*	
Heliophanus equester L Koch, 1867	Eastern Mediterranean	*	*	*		
Heliophanus flavipes (Hahn, 1832)	Euro-Asiatic	*		*	*	*
Heliophanus ibericus Wesolowska, 1986	Western European endemism				*	
Heliophanus kochii Simon, 1868	Euro-Asiatic	*		*	*	*
Heliophanus lineiventris Simon, 1868	Euro-Asiatic	*		*	*	*
Heliophanus machaerodus Simon, 1909	South Western Mediterranean		*			
Heliophanus melinus L Koch, 1867	Euro-Asiatic	*		*		*
Heliophanus mordax (O P-Cambridge, 1872)	Eastern-European and Asiatic			*		
Heliophanus patagiatus Thorell, 1875	Euro-Asiatic			*		*
Heliophanus ramosus Wesolowska, 1986	Western Mediterranean		*		*	
Heliophanus rufithorax Simon, 1868	Euro-Asiatic	*		*	*	
Heliophanus simplex Simon, 1868	Euro-Asiatic			*		*
Heliophanus stylifer Simon, 1878	South Western Mediterranean		*			
Heliophanus tribulosus Simon, 1868	Euro-Asiatic	*		*	*	*
Hyllus insularis Metzner, 1999	Eastern-European and Asiatic			*		
Icius congener Simon, 1871	Western Mediterranean	*	*		*	
Icius crassipes (Simon, 1868)	Western Mediterranean		*			
Icius hamatus (C L Koch, 1846)	Euro-Mediterranean	*	*	*	*	*
Icius insolitus Alicata et Cantarella, 1994	Western European endemism				*	
Icius simoni Alicata et Cantarella, 1994	North African endemism		*			
Icius subinermis Simon, 1937	European	*		*	*	*
Leptorchestes algerinus Wesolowska et Szeremeta, 2001	North African endemism		*			
Leptorchestes berolinensis (C L Koch, 1846)	Euro-Asiatic	*		*	*	*
Leptorchestes mutilloides (Lucas, 1846)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Leptorchestes peresi (Simon, 1868)	Western European				*	
Macaroeris nidicolens (Walckenaer, 1802)	Euro-Asiatic	*		*	*	*
Macaroerisf flavicomis (Simon, 1884)	Euro-Asiatic -Mediterranean	*	*	*		*
Marpissa muscosa (Clerck, 1757)	Euro-Asiatic	*		*		*
Marpissa nivoyi (Lucas, 1846)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Marpissa pomatia (Walckenaer, 1802)	Euro-Asiatic	*		*		*
Marpissa radiata (Grube, 1859)	Euro-Asiatic	*		*		*
Mendoza canestrinii (Ninni, 1868)	Euro-Asiatic	*	*	*	*	*
Menemerus davidi Prószyn'ski et Wesolowska, 1999	Mediterranean		*			
Menemerus desertus Wesolowska, 1999	North African endemism		*			

Segue: Table 1

Continua: Table 1

Species	chorology	IT	NA	EE	WE	CE
Menemerus falsificus Simon, 1868	European			*	*	*
Menemerus guttatus Wesolowska, 1999	North African endemism		*			
Menemerus illigeri (Audouin, 1826)	Mediterranean		*			
Menemerus modestus Wesolowska, 1999	North African endemism		*			
Menemerus semilimbatus (Hahn, 1829)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Menemerus soldani (Audouin, 1826)	Euro-Asiatic -Mediterranean		*		*	
Menemerus taeniatus (L Koch, 1867)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Mogrus incertus Denis, 1955	African		*			
Mogrus neglectus (Simon, 1868)	Eastern-European and Asiatic			*		
Myrmarachne formicaria (De Geer, 1778)	Euro-Asiatic	*		*		*
Myrmarachne myrmicaeformis (Lucas, 1871)	Mediterranean		*			
Myrmarachne simonis (Herman, 1879)	Eastern European			*		
Myrmarachne tristis (Simon, 1882)	African		*			
Neaetha cerussata (Simon, 1868)	Eastern Mediterranean	*	*	*		
Neaetha membrosa (Simon, 1868)	Euro-Mediterranean	*	*	*	*	*
Neaetha ravoisiei (Lucas, 1846)	North African endemism		*			
Neon convolutus Denis, 1937	Western Mediterranean		*			
Neon levis (Simon, 1871)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Neon muticus (Simon, 1871)	Corsican endemism				*	
Neon pictus Kulczynski, 1891	Euro-Asiatic			*		*
Neon rayi (Simon, 1875)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Neon reticulatus (Blackwall, 1853)	Euro-Asiatic	*		*		*
Neon robustus Lohmander, 1945	European				*	*
Neon valentulus Falconer, 1912	Euro-Asiatic	*		*		*
Pellenes arciger (Walckenaer, 1837)	Mediterranean	*	*	*	*	
Pellenes brevis (Simon, 1868)	European	*		*	*	*
Pellenes diagonalis (Simon, 1868)	Eastern Mediterranean			*		
Pellenes durieui (Lucas, 1846)	North African endemism		*			
Pellenes epularis (O P-Cambridge, 1872)	Eastern Mediterranean			*		
Pellenes flavipalpis (Lucas, 1853)	East Mediterranean endemism			*		
Pellenes geniculatus (Simon, 1868)	Euro-Asiatic	*		*	*	*
Pellenes laevigatus (Simon, 1868)	Eastern Mediterranean			*		
Pellenes lagrecai Cantarella et Alicata, 2002	Apenninian endemism	*				
Pellenes lapponicus (Sundevall, 1833)	Euro-Asiatic					*
Pellenes minimus (Caporiacco, 1933)	North African endemism		*			
Pellenes moreanus Metzner, 1999	East Mediterranean endemism			*		
Pellenes nigrociliatus (Simon, 1875)	Euro-Asiatic	*		*	*	*
Pellenes seriatus (Thorell, 1875)	Eastern-European and Asiatic	*		*		
Pellenes siculus Alicata et Cantarella, 2000	Sicilian endemism	*				
Pellenes tripunctatus (Walckenaer, 1802)	Euro-Asiatic	*		*	*	*
Philaeus albovariegatus (Simon, 1868)	North Western Mediterranean	*			*	
Philaeus chrysops (Poda, 1761)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Philaeus fallax (Lucas, 1846)	North African endemism		*			
Philaeus stellatus Franganillo, 1910	Western European endemism				*	

Segue: Table 1

Continua: Table 1

Species	chorology	IT	NA	EE	WE	CE
Philaeus superciliosus Bertkau, 1883	Central European endemism					*
Philaeus varicus (Simon, 1868)	European			*	*	*
Phintella castriesiana (Grube, 1861)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Phlegra bresnieri (Lucas, 1846)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Phlegra cinereofasciata (Simon, 1868)	Euro-Asiatic	*		*	*	*
Phlegra fasciata (Hahn, 1826)	Euro-Asiatic	*		*		*
Phlegra fulvotrilineata (Lucas, 1846)	North African endemism		*			
Phlegra loripes Simon, 1876	Western European				*	
Phlegra nitidiventris (Lucas, 1846)	South Western Mediterranean		*			
Phlegra rogenhoferi (Simon, 1868)	Central European					*
Phlegra sapphirina (Thorell, 1875)	North African endemism		*			
Phlegra sierrana (Simon, 1868)	Western European endemism				*	
Phlegra theseusi Logunov, 2001	East Mediterranean endemism			*		
Phlegra yaelae Prószyn'ski, 1998	Mediterranean		*			
Plexippoides flavescens (O P-Cambridge, 1872)	Eastern-European and Asiatic			*		
Plexippoides gestroi (Dalmas, 1920)	Eastern Mediterranean			*		
Plexippus clemens (O P-Cambridge, 1872)	Mediterranean		*			
Plexippus devorans (O P-Cambridge, 1872)	Eastern Mediterranean			*		
Plexippus paykulli (Audouin, 1826)	Cosmopolitan	*	*	*	*	*
Pseudeuophrys erratica (Walckenaer, 1826)	Euro-Asiatic	*		*		*
Pseudeuophrys lanigera (Simon, 1871)	Euro-Asiatic	*		*	*	*
Pseudeuophrys nebrodensis Alicata et Cantarella, 2000	Apenninian endemism	*				
Pseudeuophrys obsoleta (Simon, 1868)	Euro-Asiatic	*		*	*	*
Pseudeuophrys pallidipes Dobroruka, 2002	East Mediterranean endemism			*		
Pseudeuophrys vafra (Blackwall, 1867)	Euro-Asiatic -Mediterranean	*	*	*	*	*
Pseudicius badius (Simon, 1868)	Mediterranean	*		*	*	
Pseudicius courtauldi Bristowe, 1935	Eastern-European and Asiatic			*		
Pseudicius cultrifer Caporiacco, 1948	Eastern European			*		
Pseudicius encarpatus (Walckenaer, 1802)	Euro-Asiatic	*		*		*
Pseudicius kulczynskii Nosek, 1905	Eastern Mediterranean			*		
Pseudicius picaceus (Simon, 1868)	Euro-Asiatic -Mediterranean	*	*	*		*
Pseudicius tamaricis Simon, 1885	Mediterranean		*			
Pseudicius vankeeri Metzner, 1999	East Mediterranean endemism			*		
Saitis ariadneae Logunov, 2001	East Mediterranean endemism			*		
Saitis barbipes (Simon, 1868)	European	*		*	*	*
Saitis graecus Kulczyn'ski, 1905	Eastern European			*		
Saitis imitatus (Simon, 1868)	Eastern European			*		
Saitis sengleti (Metzner, 1999)	East Mediterranean endemism			*		
Saitis tauricus Kulczyn'ski, 1905	Eastern-European and Asiatic			*		
Salticus cingulatus (Panzer, 1797)	Euro-Asiatic	*		*		*
Salticus confusus Lucas, 1846	Mediterranean		*	*	*	
Salticus conjunctus (Simon, 1868)	North Western Mediterranean	*			*	
Salticus iteacus Metzner, 1999	East Mediterranean endemism			*		
Salticus major (Simon, 1868)	Western European				*	

Segue: Table 1

Continua: Table 1

Species	chorology	IT	NA	EE	WE	CE
Salticus mandibularis (Simon, 1868)	East Mediterranean endemism			*		
Salticus modicus (Simon, 1875)	Western European endemism				*	
Salticus mutabilis Lucas, 1846	Euro-Mediterranean	*	*	*	*	*
Salticus noordami Metzner, 1999	East Mediterranean endemism			*		
Salticus olivaceus (L Koch, 1867)	Mediterranean			*	*	
Salticus propinquus Lucas, 1846	Mediterranean	*	*	*	*	
Salticus quagga Miller, 1971	Central European					*
Salticus scenicus (Clerck, 1757)	Euro-Asiatic	*		*		*
Salticus scitulus (Simon, 1868)	North Western Mediterranean	*			*	
Salticus truncatus Simon, 1937	Western European endemism				*	
Salticus unciger (Simon, 1868)	European	*		*	*	*
Salticus unicolor (Simon, 1868)	East Mediterranean endemism			*		
Salticus unispinus (Franganillo, 1910)	Western European endemism				*	
Salticus zebraneus (C L Koch, 1837)	European	*		*	*	*
Sibianor aurocinctus (Ohlert, 1865)	Euro-Asiatic	*		*		*
Sibianor larae Logunov, 2001	Euro-Asiatic					*
Sibianor tantulus (Simon, 1868)	European				*	*
Sitticus atricapillus (Simon, 1882)	Central-eastern European	*		*		*
Sitticus caricis (Westring, 1861)	Central-eastern European	*		*		*
Sitticus damini (Chyzer, 1891)	Eastern-European and Asiatic			*		
Sitticus distinguendus (Simon, 1868)	Euro-Asiatic	*		*	*	*
Sitticus dzieduszyckii (L Koch, 1870)	Euro-Asiatic			*		*
Sitticus exiguus (Bösenberg, 1903)	Central European endemism					*
Sitticus floricola (C L Koch, 1837)	Euro-Asiatic	*		*		*
Sitticus inexpectus Logunov et Kronestedt, 1997	Euro-Asiatic	*		*		*
Sitticus longipes (Canestrini, 1873)	Central European	*				*
Sitticus manni (Doleschall, 1852)	Eastern European			*		
Sitticus penicillatus (Simon, 1875)	European	*		*	*	*
Sitticus pubescens (Fabricius, 1775)	Euro-Asiatic	*		*	*	*
Sitticus rivalis Simon, 1937	Western European				*	
Sitticus rupicola (C L Koch, 1837)	European	*		*	*	*
Sitticus saltator (O P-Cambridge, 1868)	Euro-Asiatic	*		*		*
Sitticus saxicola (C L Koch, 1846)	Euro-Asiatic	*		*		*
Sitticus strandi Kolosváry, 1934	Central European endemism					*
Sitticus terebratus (Clerck, 1757)	Euro-Asiatic	*		*		*
Sitticus zimmermanni (Simon, 1877)	Euro-Asiatic	*		*		*
Stenaelurillus ambiguus Denis, 1966	African		*			
Stenaelurillus nigricaudus Simon, 1886	African		*			
Synageles albotrimaculatus (Lucas, 1846)	Western Mediterranean	*	*		*	
Synageles dalmaticus (Keyserling, 1863)	Euro-Mediterranean	*	*	*	*	*
Synageles hilarulus (C L Koch, 1846)	Euro-Asiatic	*		*		*
Synageles subcingulatus (Simon, 1878)	Euro-Asiatic					*
Synageles venator (Lucas, 1836)	Euro-Asiatic	*		*	*	*
Talavera aequipes (O P-Cambridge, 1871)	Euro-Asiatic	*		*		*

Segue: Table 1

Continua: Table 1

Species	chorology	IT	NA	EE	WE	CE
Talavera aperta (Miller, 1971)	Euro-Asiatic					*
Talavera inopinata Wunderlich, 1993	Central European					*
Talavera krocha Logunov et Kronestedt, 2003	Euro-Asiatic			*		*
Talavera milleri (Brignoli, 1983)	Central European					*
Talavera monticola (Kulczyn'ski, 1884)	Central-eastern European	*		*		*
Talavera parvistyla Logunov et Kronestedt, 2003	European				*	*
Talavera petrensis (C L Koch, 1837)	Euro-Asiatic	*		*		*
Talavera thorelli (Kulczyn'ski, 1891)	Euro-Asiatic	*				*
Thyene imperialis (Rossi, 1846)	Euro-Asiatic -Mediterranean	*	*	*	*	
Thyene phragmitigrada Metzner, 1999	East Mediterranean endemism			*		
Yllenus algarvensis Logunov et Marusik, 2003	Western European endemism				*	
Yllenus arenarius Menge, 1868	Euro-Asiatic			*		*
Yllenus auriceps (Denis, 1966)	African		*			
Yllenus gavdos Logunov et Marusik, 2003	Mediterranean			*	*	
Yllenus horvathi Chyzer, 1891	Eastern European			*		
Yllenus saliens O P-Cambridge, 1876	African		*			
Yllenus salsicola (Simon, 1937)	Western Mediterranean	*	*		*	
Yllenus squamifer (Simon, 1881)	Western European				*	
Yllenus tschoni (Caporiacco, 1936)	African		*			
Yllenus univittatus (Simon, 1871)	Euro-Asiatic				*	*
Yllenus vittatus Thorell, 1875	Eastern-European and Asiatic			*		
Total number of species		**121**	**100**	**168**	**119**	**118**

(*) Species included in the Italian fauna, but not falling in the IT area.

Comparison between the five areas

The analysis of the similarities between the areas calculated with the Russel & Rao index (Fig. 1 and Tab. 2) shows the particular affinity of IT with EE; both have a good affinity with CE. This result is consistent with the hypothesis that the IT salticid fauna has been strongly influenced by migrations from the east and that the same flows also influenced Central Europe. On the other hand, faunistic exchanges between Central Europe and the Italian peninsula were greatly hampered by the Alpine barrier. Minor affinities are found between IT and both NA and WE.

Fig. 2 shows the number of species of the IT sectors in common with EE and/or CE. The high species number in common with EE-CE produces a negative north-south gradient; however, an inverse gradient of the species in common only with EE is evident. The former indicates the penetration of Eurasian or Eurosiberian species, the latter could indicate a penetration from the southern Balkans. The three species in common with CE (absent from S and Si) could be the evidence of the southward migration through the Alps of

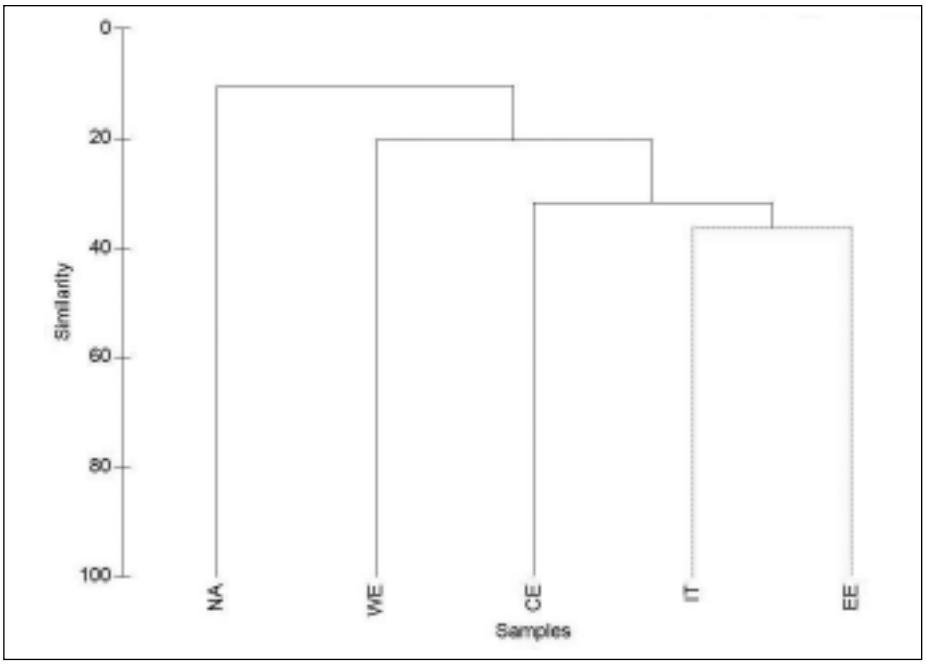

Fig. 1 — Similarity diagram of the five areas. Values of the Russell & Rao index [S = a/(a+b+c+d)] are reported in the Tab. 2.

Tab. 2
Values of the Russell & Rao index [S = a/(a+b+c+d)] of similarity between the areas here considered.

	IT	NA	EE	WE	CE
IT					
NA	17.25				
EE	36.27	14.79			
WE	26.76	15.14	25.00		
CE	31.69	10.56	33.80	20.42	

European species that survived the Ice Age in ice-free refuges. The 14 species absent in EE and/or CE (grouped in Others) are mainly present in Sicily.

Comparison of the frequency of grouped chorologies between IT and all the considered areas

The frequency of the grouped chorologies in the total area and in IT are reported in Fig. 3. In the total area Eurasian and Mediterranean chorologies are the most frequent, followed by the European one. In IT, the Eurasian

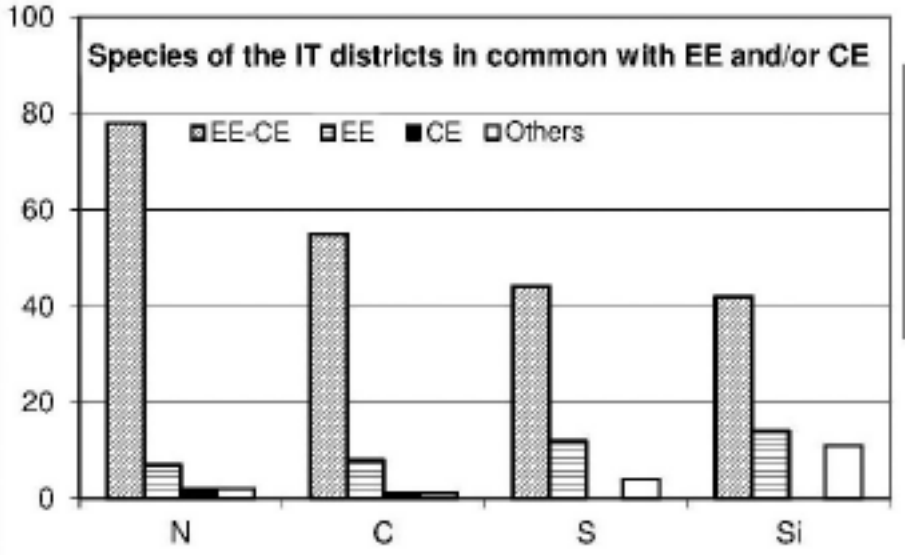

Fig. 2 — Analysis of the frequency of species in common with EE and/or CE in the IT districts (species in common with other districts are included in Others).

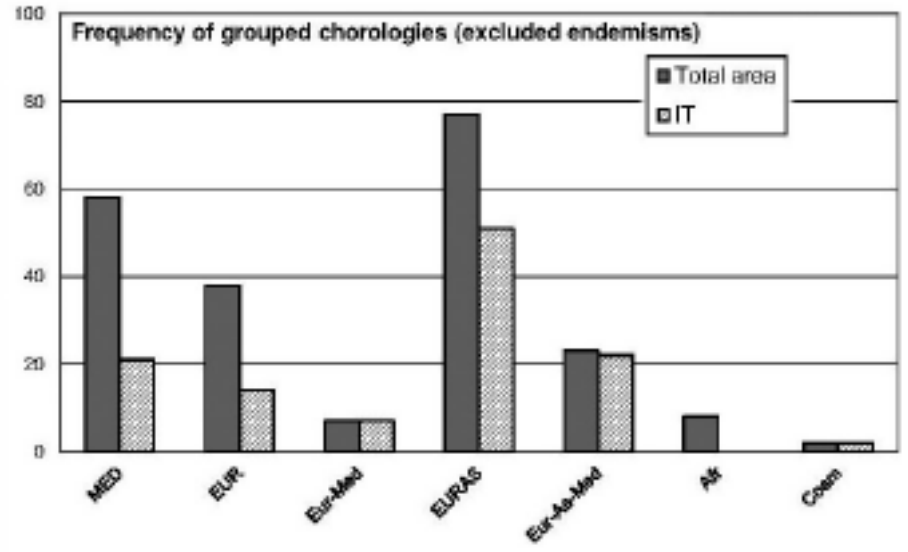

Fig. 3 — Frequency of the grouped chorologies in IT and in the other areas. Endemic taxa were excluded.

chorology is proportionally more represented, followed by the Mediterranean and Eurasian-Mediterranean ones. Eurasian species have provided the major contribution to the formation of the Italian Salticid fauna.

European chorologies

As regards the European chorologies (Fig. 4) in IT, the European and Central - Eastern European chorologies are the most frequent both in the total area and in IT. However, it should be noted that while only half of the European species are present in the peninsula, only 1 of the 5 Central-Eastern European species is not present in IT.

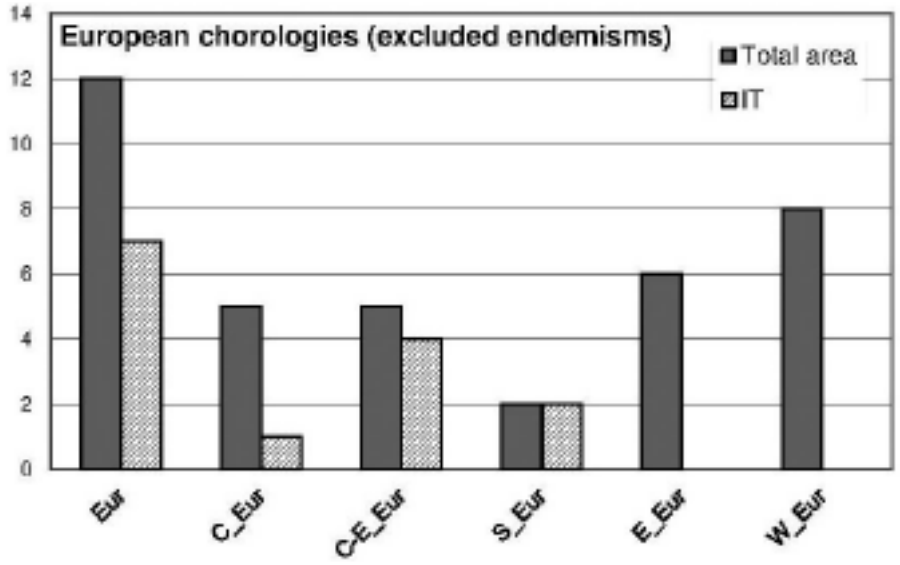

Fig. 4 — Frequency of the European chorologies in IT and in the total area. Endemic taxa were excluded.

Northerh Eurasian species

Tab. 3 shows the analysis of Eurasian species, whose distribution demonstrates their capacity to recolonize territories covered by glaciers during the last glaciation (data from the catalogue of LOGUNOV & MARUSIK, 2000). Nomenclature follows LOGUNOV & MARUSIK (2000).

All the species are present in CE and almost all are also present in IT and EE. The limited number present in WE indicates the reduced capacity of this

Tab. 3
Eurasian species numbers that were able to recolonize territories covered by glaciers during the last glaciation.

Chorology	CE	EE	IT	WE
Circum-Holarctic	1		1	
Euro-Central Asian	1	1	1	1
European	2	2	2	
Euro-Siberian	7	6	6	1
Euro-Siberio-Central Asian	3	3	3	1
Holarctic	3	2	2	
Trans-eurasian	12	12	11	5
Trans-Palearctic	1	1	1	1
Total number	**30**	**27**	**27**	**9**

species to expand into the Iberian Peninsula. Trans-Eurasian and Euro-Siberian are prevalent. In the IT districts, the number of these species shows a negative south-north gradient (Fig. 5). This gradient has a strong accentuation between C and S, mainly determined by the absence of Euro Siberian species and by the decrease of the Trans-Eurasian ones.

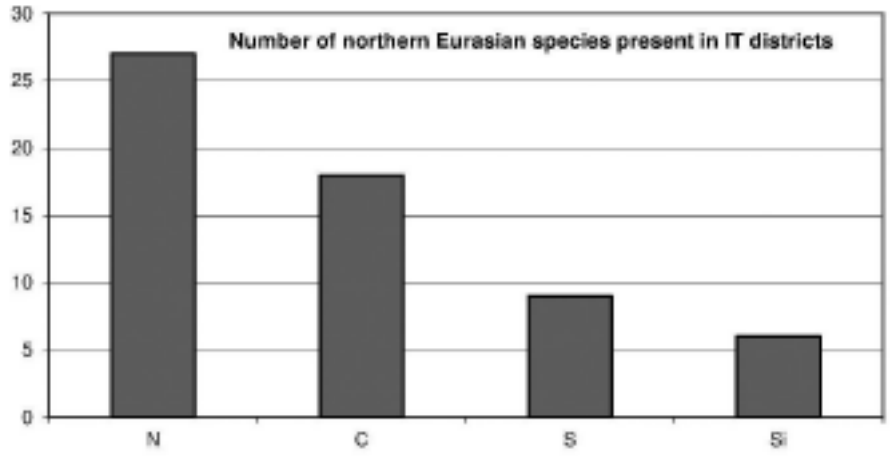

Fig. 5 — Number of northern Eurasian species in the IT districts

Mediterranean species

The Mediterranean chorology includes 79 species (23 in Italy), of which 27 are endemic (2 in Italy). These are the values of the similarity index (Jac-

card index) between IT and the other areas (endemic taxa were excluded from counts):

	IT
EE	0.3056
CE	0.0476
WE	0.5313
NA	0.3023

IT has the highest affinity with WE. This is due to the presence of a large number of species with western Mediterranean chorology.

Endemisms

In all the areas, 71 endemic species are currently known. The largest number, 24, is found in NA (16 endemic species in Algeria, 3 in Morocco, 3 in Libya, and 2 in Tunisia). However, more extensive research in Africa could modify the picture considerably. There are also numerous endemic species (20) known for the eastern Mediterranean area: they are all located in Greece and the Aegean islands. There are numerous endemisms also in WE (15), 5 are those known in CE, and 3 in Corsica.

The IT endemisms are the following four:

Aelurillus schembrii Cantarella, 1982 (Sicilian - Maltese endemism) is related to *Aelurillus monardi* (Lucas, 1846), a Mediterranean species.

Pellenes lagrecai Cantarella et Alicata, 2002 (Apenninian endemism) is related to *Pellenes seriatus* (Thorell, 1875), an eastern European – Asiatic species.

Pellenes siculus Alicata et Cantarella, 2000 (Sicilian endemism) is related to *Pellenes arciger* (Walckenaer, 1837), a Mediterranean species.

Pseudeuophrys nebrodensis Alicata et Cantarella, 2000 (Sicilian - Apenninian endemism) is related to *Pseudeuophrys erratica* (Walckenaer, 1826), an European species.

Discussion

The "ballooning" capacity makes the Salticid fauna poorly influenced by territorial discontinuities, the role of climate gradients being more important (Alicata & Cantarella, 2011). The weight of this factor is highlighted by the high number of species whose distribution could have been determined by migration and diffusion influenced by the climatic gradients of the last glacial period and of the current postglacial one.

The high affinity between IT and EE and the dominance of Euro-Asian species in IT fauna suggest that its present structure was determined by events that occurred during the last glacial period and post-ice age. In particular, the present fauna of the Italian peninsula and Sicily suggests that its composition was mainly determined by the faunal exchanges with the Balkans associated with exchanges governed by the north-south climatic gradient of the Italian peninsula.

The other major component of the salticid fauna, consisting of species with Mediterranean chorology, is the result of the interaction of palaeo-geographic, palaeo-climatic and ecological factors, which the present state of our knowledge make impossible to reconstruct. However, the quite large group of species with western Mediterranean distribution could be what remains of the species that lived in the pre-Quaternary Tyrrhenid and in the lands that subsequently incorporated portions of it. Ecological constraints (such as climate, competition and predation) could have prevented the extension of their range during the Quaternary. The other species with a wider distribution in the Mediterranean have an uncertain, probably pre-Quaternary, origin. We cannot exclude, however, that some of them have the same origin as the previous group and that a greater ecological capacity allowed the expansion of their range.

The species of Italian salticid fauna with very wide distribution (Palaearctic and Eurasian-Mediterranean) can be considered to have a wide ecological niche and a high dispersal power. Their range may have expanded in the post-glacial period. The picture of the distribution of endemic species, in the absence of detailed studies on their affinities, contributes little to reconstruct the biogeographic history of territory here considered. However, the scarcity of IT endemisms (only four species) among the compared areas strenghtens the belief that the isolation processes of populations have been unimportant for the salticids. Two endemisms, *Aelurillus schembri* and *Pellenes siculus*, being related to species with wide distribution in the Mediterranean region, might be the result of either the narrowing of the range of species more widespread in the past, or a speciation process of isolated populations. Conversely, migrations caused by alternating glacial-interglacial periods might have given origin to two other endemic species of the IT area (*Pellenes lagrecai* and *Pseudeuophrys nebrodensis*).

Finally, there are still many gaps in our knowledge concerning the processes that led to the present configuration of the IT salticid fauna. A progress will only be possible with the development of faunistic researches that could more fully ascertain the accurate distribution of species and with the development of studies that could clarify their relationships.

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