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DUGÈS' CAUDATUS IS A TENUIPALPIDAE AND NOT A TYDEIDAE (ACARI)

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ABSTRACT — Depending on the publication consulted, Dugès' *caudatus* is a mite listed either in the Tenuipalpidae, or in the Tydeidae, or in both. The name varies accordingly and the species is called either *Tenuipalpus caudatus* (Dugès, 1834) or *Tydeus caudatus* (Dugès, 1834). A transect was conducted on laurustinus shrubs (*Viburnum tinus*) around Montpellier (France) to retrieve the species described by the French obstetrician. It results that Dugès' *caudatus* is probably a Tenuipalpidae and not a Tydeidae. *Tenuipalpus caudatus* (Dugès, 1834) is redescribed from specimens collected in Montpellier and a neotype is deposited in Paris. The most frequent tydeid observed on *Viburnum tinus* in Montpellier was *Tydeus goetzi* Schruft, 1972, a redescription is also given. *Tydeus caudatus* (Dugès, 1834) is no longer a valid name.

KEYWORDS — *Tenuipalpus caudatus*; *Tydeus caudatus*; *Tydeus goetzi*; redescription; Montpellier; France; *Viburnum tinus*; neotype

INTRODUCTION

The "Historia Animalium" (Ancient Greek: *Ἱστορία τῶν ζῴων*) is one of the largest works of Aristotle and is sometimes translated into "Inquiry into Animals". Indeed, it was a real inquiry to guess what is Dugès' *caudatus*, what the French obstetrician and naturalist saw and described.

In 1834, the "Tétranyque à queue" was described by Antoine Dugès (Dugès, 1834b). The description was concise (eight lines) and did not include an illustration. Original description reads "4° TETR. A QUEUE, nobis, trouvé en famille dans le duvet de la face inférieure des feuilles du laurier-tin, avec des œufs jaunâtres et des larves à six pattes et de couleur très pâle. Fort petit, même à l'état adulte, il se distingue des autres Tétranyques, par sa forme allongée, étrécie en arrière, saillante en avant, et par sa couleur jaune orangé. Pattes

d'un jaune pâle, peu longues; course assez rapide. Quatre grosses soies roides, courtes, écartées lui forment une sorte de queue." Donnadieu (1875) erected two new genera, *Tenuipalpus* and *Brevipalpus*, but did not refer to Dugès. In 1958, Dugès' species was transferred to the genus *Tenuipalpus* by Pritchard and Baker (1958) and synonymized with Donnadieu's *palmarum* (Baker and Tuttle, 1972; Baker *et al.*, 1975). Consequently, Dugès' species became a member of Tenuipalpidae and was even considered the type-species of the false spider mites (Baker and Tuttle, 1972; Baker *et al.*, 1975; Mesa *et al.*, 2009). The species is also cited in the "MAF Biosecurity New Zealand Standard" published in 2009.

However, Dugès' species was already transferred to the genus *Brachytydeus* by Thor (1933) who nevertheless wrote: "Nach einer Bemerkung in Oudemans' Manuskript Schließe ich mich der Auffassung an,

daß diese Art mit *T. caudatus* Ant. Dug. Identisch sein kann. Beschreibung hauptsächlich nach Oudemans" (According to an observation in the ms van Oudemans, I transmit the opinion that the species can be the same as the *T. caudatus* Ant. Dug. Description essentially after Oudemans). This second interpretation, the transfer to the family Tydeidae, was followed in Oudemans' (1937) "*Kritisch historich Overzicht*", in Baker's (1971) revision of the genus *Tydeus*, in Spain and Luxton's (1971) catalog, in Gerson's *et al.* (2003) book and is also found in Grostal and Dicke (2000), and in Zhang (2003). The species was illustrated by Thor (1933, his Fig. 45) and Baker (1970, his Fig. 43-44). Baker's figures were published again by Jeppson *et al.* (1975). Opisthosomal setae were drawn by Castagnoli (1984, her Fig. 1). Scanning electron micrographs of *T. caudatus* were provided by Karg (1975, his Fig. 1a, b, c). A scanning electron micrograph was also published by Hajek (2004, her Fig. 5.1) although the original figure released by Agrawal (2000, his Fig. 3) did not mention a specific name.

The tydeid species is involved in management of vineyards in Hungary (Györfyné Molnár, 1990a, b, 1997; Dellei and Lászlóné, 1991; Koleva *et al.*, 1996; Szendrey and Voigt, 2000), Italy (Duso and De Lillo, 1996; Duso *et al.*, 2005; Sabbatini Peverieri *et al.*, 2009; Lorenzon *et al.*, 2009; Zandigiacomo, 2009) and Spain (Gallardo *et al.*, 2004; Ferragut *et al.*, 2008; Rubio *et al.*, 2007). Beside the above references, the taxon seems to have a very large geographical distribution and is cited from France (Thor, 1933), Germany (Karg, 1975), Sweden (Momen and Lundqvist, 1996), The Netherlands (Helle and Wysoki, 1983; Heitmans *et al.*, 1986; Faraji *et al.*, 2004), Great Britain (Evans, 1954), Ireland (Curry, 1976; Emmanuel *et al.*, 1985; Momen, 1987), Poland (Dończyk, 2006), Latvia (Salmane n. d.), Hungary (Dellei and Lászlóné, 1989; Dellei and Szendrey, 1989, 1991a, b, c; Bozai, 1997; Ripka and Kazmier-ski, 1998; Ripka *et al.*, 2002), Serbia (Stojnić *et al.*, 2002), Italy (Castagnoli, 1984; Castagnoli *et al.*, 1984; Vacante, 1986; Camporese and Duso, 1995), Spain (Garcia Mari *et al.*, 1985; Garcia Mari *et al.*, 1986; Del Rivero, 1991), Moldova (Kulikova, 2010a, b), Turkey (Akyazı and Ecevit, 2005; Elma and Alaoğlu, 2008;

Göven *et al.*, 2009). The tydeid species is also listed among mites collected in Madeira (Carmona, 1973; Borges *et al.*, 2008), Tanzania (Tapley, 1953 (with a question mark); Bigger, 2009), and New Zealand (Lamb, 1952; Tomkins *et al.*, 1997, 2000; Zhang *et al.*, 2001). The taxon was frequently intercepted at the U. S. quarantine (Girard, 1974; Anonym, 1979, 1981). The tydeid species is also cited in technical papers published by Biosecurity Australia (2003, 2006).

Currently, Dugès' *caudatus* is thus a mite belonging either to Tenuipalpidae or Tydeidae depending on the publication consulted. The name varies accordingly and the species is called either *Tenuipalpus caudatus* (Dugès, 1834) or *Tydeus caudatus* (Dugès, 1834). The two names even coexist in the list published by Bernini *et al.* (1993-95), in the Checklist of the species of the Italian fauna (Stoch, 2003), in Joel Hallan's biology catalog (Hallan, 2003), and in the Fauna Europaea Web Service (2004).

MATERIAL AND METHOD

Antoine Louis Dugès

Antoine Louis Dugès (1797-1838) was a French obstetrician and naturalist who was born in Charleville-Mézières. He was appointed professor of obstetrics at the University of Montpellier where a room still bears his name. As a zoologist, he first studied worms (Dugès, 1928), then other organisms. He attempted to reconcile the ideas of Cuvier and Geoffroy Saint-Hilaire and published several laws (Dugès, 1832; McBirney and Cook, 2009). Dugès conducted osteological and myological studies of amphibians (Dugès, 1834a), and also performed extensive research involving mites (Dugès 1834b, c, d). A spider still bears his name, *Spermophora senoculatus* (Dugès, 1836). With Henri Milne Edwards, he was responsible of arachnids in the famous book edited by Baron Cuvier "*Le règne animal distribué d'après son organisation*" (the exact publication date is discussed by Cowan, 1976). In 1838, he published an influential work on comparative physiology, titled "*Traité de physiologie comparée de l'homme et des animaux*" and dedicated to E. Geoffroy Saint-Hilaire.

TABLE 1: Mites, with status, biotope and locality, treated in Dugès' (1834b) memoir (authors and abbreviations as in the memoir).

Species name	Status	Biotope	Locality
<i>Raphignathus</i> , nobis			
<i>Raphignathus ruberrimus</i> , nobis	n.sp.	stones	In the South of France
<i>Tetranychus</i> , Dufour			
<i>T. telarius</i> L.			In the North and South of France
<i>T. prunicolor</i> , nobis	n.sp.	leaves of pear and plum trees	?
<i>T. cristatus</i> , nobis	n.sp.	slight pubescence, underleaves	In the South of France, in Paris
<i>T. caudatus</i> , nobis	n.sp.	Laurestinus, underleaf	?
<i>Ryncholophus</i> , nobis			
<i>R. cinereus</i> , nobis	n.sp.	stones	in the neighborhood of Montpellier
<i>R. rubescens</i> , nobis	n.sp.	idem	southern
<i>Smaridia</i> , Latreille			
<i>S. papillosa</i> Herm.		elder tree	Our city (= Montpellier)
<i>Trombidium</i> , Fabr.			
<i>T. phalangii</i> , nobis	n.sp.	on harvestmen	In the South of France
<i>T. elongatum</i> , nobis	n.sp.	under stones	In the South of France
<i>T. glabrum</i> , nobis	n.sp.	under stones	?
<i>Erythraeus</i> , Latr.			
<i>E. ruricola</i> , nobis	n.sp.	under stones	in the neighborhood of Montpellier
<i>E. cornigerum</i> Hermann			Ardenne, Ain

Montpellier samples

A first batch of 20 leaves of laurustinus (*Viburnum tinus*) collected by M. Bertrand in the park surrounding his laboratory at the University of Montpellier were received on 24 June 2002.

Transect samples

In addition to the leaves collected in Montpellier 19 series (Table 1) of 20 leaves were collected on September 2002, along a transect of North Spain and southern France Mediterranean forests (Table 2).

Sample treatment

Leaves were deposited in a plastic bag and labeled accordingly. Part of leaflets were immediately surveyed using a dissecting microscope. Other leaflets, protected in the plastic bag, were sent by post to the lab in Belgium where they were also surveyed using a dissecting microscope. Most mites were thus mounted in Hoyer's medium and identified under

a light microscope. Some specimens were studied with a Scanning Electron Microscope (SEM).

Redescriptions

Redescriptions are based on pictures as explained in André and Ducarme (2003) and detailed in André *et al.* (2010). Notation system used by Beard *et al.* (2005) and Mesa *et al.* (2009) were applied on idiosoma, designations or nominations of setae on tydeid tarsus proposed by André (1981) were again used.

RESULTS

The type locality

Dugès' (1834b) did not give the type locality of his *caudatus*. In his memoir, Dugès dealt with 13 different species and described 10 of them (Table 1). The type locality was given for seven out of the ten described species; for all of them, it was the South of France or near Montpellier, "his" city. This strongly suggests that the type locality of Dugès' *caudatus*

TABLE 2: Sample transect of North Spain and southern France Mediterranean forests. All dates refer to September 2002.

Day	Region	Locality & country	Series #	Biotope	Host plant	Remark
9	Drôme provençale	Mirmande, F	1	Garden (Les Fougères)	<i>V. tinus</i>	
			2	ibidem	<i>L. nobilis</i>	
			3	ibidem	<i>N. oleander</i>	Smooth underleaf
		Loriol, F	4	Valbrian wood	<i>V. tinus</i>	Under beech
10	Cévennes	Les Vans, F	5	Garden (Carmel)	<i>V. tinus</i>	
			6	Païolive wood	<i>V. tinus</i>	S hrubs under downy oaks
			7	ibidem	<i>Q. pubescens</i>	
16	Languedoc	Viols-le-Fort, F	8	Garrigue	<i>V. tinus</i>	Under holm oaks & maple
		Viols-le-Fort, F	9	Garrigue	<i>V. tinus</i>	idem
		Viols-le-Fort, F	10	Garrigue	<i>V. vinifera</i>	Abandoned vineyard
		Montpellier, F	11	Route de Mende (University)	<i>V. tinus</i>	Plants along a fence
17	Les Albères	Banyuls-sur-Mer, F	12	Garden (Mas de la Serre)	<i>V. tinus</i>	High shrubs
18		Albanyá, E	13	Wood along the Muga river	<i>V. tinus</i>	Mixed with holm oak foliage
			14	ibidem	<i>Q. ilex</i>	Mixed with laurustinus foliage
			15	ibidem	<i>A. monspessulanum</i>	
19	Barcelona	Vallvidrera, E	16	Parc de Collserola	<i>V. tinus</i>	
22		Barcelona, E	17	Garden (Ganduxer)	<i>V. tinus</i>	Small isolated shrubs
			18	Parc Güell	<i>V. tinus</i>	Under pines
			19	Passeig de Gracia	<i>V. tinus</i>	Under plane tree

Host plant: *A. monspessulanum* = *Acer monspessulanum*; *L. nobilis* = *Laurus nobilis*; *N. oleander* = *Nerium oleander*; *Q. ilex* = *Quercus ilex*; *Q. pubescens* = *Quercus pubescens*; *V. tinus* = *Viburnum tinus*; *V. vinifera* = *Vitis vinifera*

was probably the South of France as for most of the other species he described.

Montpellier samples

The host plant, *Viburnum tinus*, is a forest element of Mediterranean stock with a circum-Mediterranean distribution (Quézel *et al.*, 1999). This is another observation pleading in favor of the South of France as the type locality of Dugès' *caudatus*.

However, we cannot formally exclude the possibility that *caudatus* was found in Paris. Indeed, Dugès was a student of E. Geoffroy Saint-Hilaire, professor of vertebrate zoology at the "Muséum d'histoire naturelle" and he said to have collected mites in Paris where he was graduated (Dugès, 1834b: 28). On the other hand, the host plant was already cultivated in Paris in that time (Boisduval, 1867).

Out of 20 leaves of laurustinus collected in Montpellier (series "0" in Table 3), nineteen leaves were inhabited by tydeid mites. Four species were found to coexist on the leaf undersurface: a *Tenuipalpus*, a slow-moving bright red mite; an Acarididae (four females) and two tydeid species. A tydeid species, very small, was represented by a single female.

All the other tydeid specimens belonged to the same species, *Tydeus goetzi*, and included only two females among numerous immatures. Out of the 30 specimens mounted, there were two females, three tritonymphs, 17 deutonymphs, seven protonymphs and a single larva. The real immature/adult ratio was certainly higher as small specimens were more difficult to detect and capture than females.

TABLE 3: Number of mites collected in the series described in Table 2. For each series, species are listed in decreasing order of abundance.

Series #	Species	Abundance	Series #	Species	Abundance
0	<i>Tydeus goetzi</i>	30	9	<i>Tydeus goetzi</i>	16
	<i>Tenuipalpus</i> sp.	7		Stigmaeidae	3
	Acaridae	4		Triophyeinae	1
	<i>Acanthotydidies</i> n. sp.	1	10	Pronematinae	7
1	<i>Tydeus goetzi</i>	5		<i>Tydeus goetzi</i>	4
	Pronematinae	3		Stigmaeidae	2
	Triophyeinae	1		<i>Calotydeus</i> sp. (paralorryia-type)	3
	Acaridae	1		<i>Brevipalpus</i> sp.	1
	Gamasida	1		Gamasida	1
2	<i>Tydeus goetzi</i>	7	11	<i>Tydeus goetzi</i>	22
3	nihil	0		Pronematinae	1
4	<i>Tydeus goetzi</i>	2	12	Pronematinae	5
5	Stigmaeidae	3		<i>Tydeus goetzi</i>	1
	<i>Tydeus goetzi</i>	2	13	Stigmaeidae	2
	Triophyeinae	2	14	Stigmaeidae	1
	<i>Brevipalpus</i> sp. 1	1	15	Pronematinae	15
6	Pronematinae	5		Tetranychidae	2
	<i>Brachytydeus</i> sp.	6		<i>Brevipalpus</i> sp.	1
	Triophyeinae	4	16	<i>Tydeus goetzi</i>	22
	Cunaxidae	1		Pronematinae	1
7	Pronematinae	9	17	Stigmaeidae	11
	Triophyeinae	4		<i>Tydeus goetzi</i>	3
	<i>Brachytydeus</i> sp.	2		Oribatida	1
8	<i>Tydeus goetzi</i>	25	18	<i>Tydeus goetzi</i>	11
	Triophyeinae	12		Gamasida	8
	Stigmaeidae	2		Stigmaeidae	5
	Gamasida	1		Pronematinae	2
			19	<i>Tydeus goetzi</i>	4
				Gamasida	1

The transect samples

The identifications of mites collected along the transect are summarized in Table 3.

A tough decision

Viburnum tinus is a forest element of Mediterranean stock with a circum-Mediterranean distribution (Quézel *et al.*, 1999). The laurustinus leaves have numerous domatia (8.5 ± 0.1 per leaf), i.e. small tufts of trichomes (Figure 1A) in the primary vein axils on the leaf undersurface (Walter and O'Dowd, 1992). These structures alter the abundance, distribution and reproductive of dwelling mites (Donnadieu, 1875; Lundstrøm, 1887; Willson, 1991; Walter and O'Dowd, 1992; Grostal and O'Dowd, 1994; O'Dowd and Pemberton, 1998 ;

Wiggers *et al.*, 2005). Tydeidae represent up to 70% of the acarocenosis associated with laurustinus domatia (Grostal and O'Dowd, 1994). Acarodomatia are known to provide protection against drying humidity conditions or predaceous arthropods to tydeid mites (Norton *et al.*, 2001). It is thus tempting to conclude that Dugès' *caudatus* is a Tydeidae.

However, the question is not knowing if the Tydeidae are common on the laurustinus leaves, but knowing what species Dugès saw and described in his memoir. In 1834, Renucci made his famous experiment on scabies in Paris (Renucci, 1835; Ghesquier-Pourcin, 2009). While basic microscope technology and optics were available to Dugès, it is much more recently that techniques in sample illumination were developed to generate the high quality images seen today. For example, Köhler il-

FIGURE 1: (A) – Trichome on the underleaf of a *Viburnum tinus*. (B) – A tydeid, probably a *Tydeus*, pupating on the leaf of a *Viburnum tinus*. (C) – A *Tenuipalpus* on the vein of a *Viburnum tinus* (all pictures from material collected in Montpellier).

lumination was discovered only in 1893. Nevertheless, several other French scientists made similar observations, mites running on the leaf undersurface of the same host plant, the laurustinus: Boisduval (1867), Donnadiou (1875), and Girard (1880).

First of all, the Latin binomen (*Tetranychus caudatus*) as well as the French name (Tétranyque à queue) designate a Tetranychidae. Characters used in the comparison between Dugès' original description and current observations are listed in Table 4. Triophtydeinae were not retained, the presence of three eyespots is observed even with a dissecting microscope and is not reported by Dugès (1834b – character 8). Pronematinae were also not

retained as the absence of apotele I is easy to see (character 12). Remain two species that are both frequent on laurustinus in Montpellier (Figures 1B, C). The presence of numerous eggs in gravid females of the genus *Tydeus* would have been reported by Dugès (1834b), yet the French physician wrote that there was only one egg in gravid females (character 1). This observation accords with the biology of *Tenuipalpus* (see for instance, Pontier *et al.* 2000). The genus has a clear constriction at the level of trochanter III, a peculiarity noted by Dugès (character 10). This corresponds to the anterior margin of opisthosoma abruptly narrowing in *Tenuipalpus* and already reported by Baker (1945). The opisthosoma

TABLE 4: Comparison between Dugès' description and mites collected under leaves of *Viburnum tinus*.

	Character	Page	Dugès' description	Tydeidae (<i>Tydeus</i>)	Tenuipalpidae (<i>Tenuipalpus</i>)
1	Fecondity	28	1 egg	7-8 eggs	> 1 egg
2	Size	29	very small	ca 400 µm	300 to 350 µm
3	Color	30	orangey yellow	white to orange	red
4	Peculiarities	30	4 bristles	?	4 setae
5	"	30	stiff	?	stiff
6	"	30	apart	?	apart
7	Habitat	30	underleaf	trichome	underleaf
8	Eyes	-	?	eyespot	ocelli
9	Body shape	29	elongate	short	elongate
10	Body shape	29	narrower behind	regular	clear constriction
11	Body shape	29	ahead projecting	?	chelicerae protruding
12	Apotele I	-	?	present	present
13	Motion	30	pretty fast	fast	slow

The symbol "?" means that the character was not described by Dugès or the criterion does not apply. Characters concern mites observed in France and Western Europe. See the text for discussion.

FIGURE 2: *Tenuipalpus caudatus* (Dugès, 1834). (A) – Dorsal view, (B) – Genital area (C) – Partial view of prodorsum, (D) – "Tail" explaining the species name, *caudatus*, (E) – Ventral view of epimera I to III (Scale bars: A: 100 µm; B, D, E: 30 µm; C: 50 µm – Specimens collected in Montpellier).

FIGURE 3: *Tenuipalpus caudatus* (Dugès, 1834). Shape of setae. (A) – Simple as *1a* on epimeron, (B) – Serrate as *p'* on leg III, (C) – Foliaceous as *se*, (D) – Thin as *trI*, (E) – Minute as *vi* (Scale bars: 10 µm – Specimens collected in Montpellier).

prolongs into four foliaceous setae which forms the "tail" also reported by Dugès (characters 4 to 6). Again, the "tail" recalls that observed in *Tenuipalpus* and already reported by Baker (1945). Characters 7 (habitat) and 2 (size) are not decisive even if they apply more to a *Tenuipalpus* than a *Tydeus*.

Arguments in favor of Tydeidae are the color (character 3) and the speed (character 13). Yet, the food content directly affects the color of *Tenuipalpidae* which is variable (Morishita, 1954; Haramoto, 1969). Last, *Tenuipalpidae* observed in Western Europe are stationary when feeding and move slowly when disturbed. This contrasts with the speed observed in Tydeidae which are fast running species.

After elements listed in Table 4, it is concluded that Dugès' *caudatus* is probably a *Tenuipalpidae* and not a Tydeidae. Dugès' original description is thus completed in the next section, from specimens collected in Montpellier.

Redescription of *Tenuipalpus caudatus* (Dugès, 1834)

Habitus as in Fig. 2A, opisthosoma with a clear constriction at the level of trochanter III and the "tail" mentioned by Dugès (1834b) (Fig. 2D). Shape of setae variable (Fig. 3), from minute setae, flagelliform, squamous, lanceolate, or foliaceous, thin and long, to serrate or plumose organs.

Prodorsal shield (Fig. 2A, C) with longitudinal cells on a median crest except for a small posterior portion with irregular and transverse cells, lateral

part with transverse striae and minute pores, anterolateral shield with two ocelli, posterolateral corners of prodorsum angulate. Prodorsal setae, (*v2*) and (*s1*) minute, slightly serrate; *s2* on a small tubercle behind a anterolateral projection and broadly lanceolate.

Opisthoma with a strong median crest prolonged anteriorly by another crescent-like crest. Cells on the crest with well-defined borders and rounded contours, with more or less transverse striae along the median crest. A second projection over trochanter III. A pair of opisthosomal pores distinct, (*po*). Setae minute (*e1*, *d3*), or foliaceous (*c1*, *d1*, *c3*), "tail" composed of four pairs of foliaceous setae (*e2*, *f1*, *f2* and *h1*) plus one pair of flagelliform setae (*h2*).

Epimeral formula: 3-2-2-1, 3a being central (Fig. 2E). Genital opening transverse in females, with transverse striae (Fig. 2B). Genital formula: two pairs of genitals, (*g1*) and (*g2*), and one pairs of aggenitals, (*ag1*). Anal lips with longitudinal striae and flanked by pseudanals, (*ps*).

Whip-like chelicerae (*ch*) as in the superfamily, bordered by an adoral seta, (*ad1*), and likely to protrude as in Figure 4A. Two-segmented palp with 1 flagelliform dorsal seta on the proximal segment and 2 small setae (probably eupathidial) on the distal one (Fig. 4B, C).

Leg formula (Fig. 4E–G):

I (8(1)-4-3-4-1), ventrals on tibia serrate, ventrals on femur and seta on trochanter very thin, most other setae squamous or foliaceous

FIGURE 4: *Tenuipalpus caudatus* (Dugès, 1834). (A) – Protruded chelicerae and first epimera in ventral view, (B) – Palp in dorsal views, (C) – Palp in lateral views, (D) – Tenent hairs and tarsus IV in lateral view, (E) – Legs I in dorsal view, (F) Leg II in dorsal view, (G) Legs III and IV in dorsal view. (Scale bars: A – D: 20 µm; E – G: 50 µm – Specimens collected in Montpellier).

II (8(1)-4-3-4-1), idem

III (5-3-1-2-2) ventral setae on trochanter, femur and tibia thin, the other foliaceous,

IV (5-3-0-2-1), idem.

Tarsi III and IV (Fig. 5) with an antixial dorsal flagelliform seta arising from a tubercle, *ft*, two serrate prorals arising also from tubercles, (*p*), and two plumose ventral setae (*u*). Tarsi I and II with a paraxial dorsal flagelliform seta arising from a tubercle, *ft'*, this elbowed element seems to form a pair with a squamous seta arising from a tubercle, *ft''*. Under this dorsal pair, also arising from their own tubercle, a pair of typical eupathidia, (*p*). Between the prorals, the solenidion ω , also on a tubercle. Last, the two pairs of setae, (*tc*) and (*u*). All the apoteles with 3 bifid elements (*ol'*, *om* and *ol''*) equipped with tenent hairs (Fig. 4D).

Redescription of *Tydeus goetzi* Schruft, 1972

The most frequent tydeid found in trichomes of *laurustinus* from Montpellier was *T. goetzi*. The original description did not give information on striae and is completed here. Figure 6A gives a whole view with the three distinct clavate setae at the tip of the opisthoma, the "spätelförmig" setae of Schruft (1972). Serrate setae with a radial symmetry are clearly distinct from clavate setae, characterized by a radial symmetry at the base and a bilateral symmetry in the distal part (Fig. 6B).

Striae density measured through $NS(vi)=29$ and $NS(ep)=30$ (Fig. 6C, D).

Striae form circular patterns at the base of clavate setae and delineate two distinct angles at the tip of anal lips (Fig. 6B).

Compact striation pattern on genital lips. Dorsal setae on genu III and tibiae III and IV are blunt

FIGURE 5: *Tenuipalpus caudatus* (Dugès, 1834). Tarsus I: (A) – dorsal view, (B) – ventro-lateral views. Tarsus II: (C) – dorsal view, (D) – ventral view. Tarsus IV: (E) – dorsal view, (F) – ventral view. (Scale bars: A: 30 μm; B: 20 μm; C – F: 30 μm – Specimens collected in Montpellier).

FIGURE 6: *Tydeus goetzi* Schruft, 1972. (A) – Dorsal view, (B) – Tip of the opisthosoma in dorsal view, (C-D) – Striae density estimated by NS(*ep*) (C) and NS(*vi*) (D) (Scale bars: A: 300 μ m; B – D: 20 μ m – Specimens collected in Montpellier).

distally.

CONCLUSIONS

The Tydeidae and Tenuipalpidae are two distinct and well-defined families of Prostigmata. The Tydeidae belong to the superfamily Tydeoidea, supercohort Eupodides, while the Tenuipalpidae are members of the superfamily Tetranychoidae, supercohort Eleutherengonides (Walter *et al.*, 2009). Dugès' *caudatus* cannot belong to different families depending on the publication.

Dugès (1834b) did not mention a type. Although *Tenuipalpus caudatus* is the type species of the genus and the family, there is no depository listed in recent catalogs (Mesa *et al.*, 2009). Accordingly, a neotype is designated and deposited in Paris (Muséum national d'Histoire naturelle). This deposition will clarify the taxonomic status of the species described by Dugès (1834b) and will prevent the species from being listed in different and unrelated families, namely the Tydeidae and Tenuipalpidae. It will also clarify the type locality of the species, Montpellier, where Dugès made most of his observations. Voucher specimens are also deposited in Brussels (Institut royal des Sciences naturelles de Belgique).

Tenuipalpus caudatus is recorded in Greece (Hatzinikolis, 1986, 1987) and Spain (De Andrés Cantero, 1981). It is reported in France, Italy and Portugal (Childers *et al.*, 2001a, b; Vacante, 2010a, b), India (Sadana and Chhabra, 1980) and is even thought to have a worldwide distribution (Gerson, 2003). It was intercepted at the plant quarantine of Narita Airport (Japan) on *Viburnum* sp. imported from Italy (Ehara and Masaki, 2001), an interception reported by Kyseláková (2005). The tenuipalpid is not recorded on conifers, even in Montpellier (Gutierrez *et al.*, 1989).

Accordingly, *Tydeus caudatus* is thus a name that does not conform to the rules of the International Code of Zoological Nomenclature and therefore is not available for use as a valid name. This accords with Oudemans' (1937) statement that *Tydeus caudatus* is a *nomen nudum* although, according to the Dutch acarologist, Dugès' species was considered a synonym of *Tydeus spathulatus*. This conclu-

sion does not apply to the Tydeidae described by Kuznetsov (1979) under the name *Venilia caudata*.

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