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New records and distributional data on *Sarcophaga* (*Heteronychia*) (Diptera: Sarcophagidae) from Turkey

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Abstract: Sixteen species belonging to subgenus *Heteronychia* Brauer & Bergenstamm, 1889 of *Sarcophaga* Meigen, 1826 were recorded from the Bayburt, Erzincan, and Erzurum provinces of Turkey during 2008–2010. Five of these species, *Sarcophaga* (*Heteronychia*) *armeniaca* (Rohdendorf, 1937), *S. (H.) bulgarica* (Enderlein, 1936), *S. (H.) clarahenae* (Lehrer, 1999), *S. (H.) monspellensia* Böttcher, 1913, and *S. (H.) recta* (Rohdendorf, 1937) represent new records for the Turkish fauna. With these new records, the number of species belonging to subgenus *Heteronychia* known from Turkey has been increased from 19 to 24.

Key words: Diptera, *Sarcophaga*, *Heteronychia*, new records, Turkey

1. Introduction

Heteronychia was described by Brauer and Bergenstamm (1889) to accommodate their new species *H. chaetoneura*. It is the most species-rich subgenus of *Sarcophaga* Meigen, 1826 and currently contains 89 valid species distributed mainly in the Palearctic (Whitmore, 2010).

The biology of these species is still poorly known, but several have been recorded as predators of terrestrial snails (Whitmore, 2009). Possible true parasitoids of snails also exist among these flies, for example *S. (H.) filia* Rondani, *S. (H.) villeneuveana* (Enderlein), and *S. (H.) javita* (Peris et al.) (Whitmore, 2010).

Until now, 19 species of the subgenus *Heteronychia* were reported from Turkey (Kara and Pape, 2002; Hayat et al., 2008). The aim of this study was to contribute new records and distributional data to the Turkish flesh fly fauna.

2. Materials and methods

In total, 16 species of *Sarcophaga* (*Heteronychia*) were identified during this study. The specimens were collected using insect sweep nets from Bayburt, Erzincan, and Erzurum provinces of Turkey in 2008–2010. All material was obtained by the first author (G Pekbey) by sweeping from meadow and pasture lands containing a variety of flowering plants. They were deposited in the Entomology Museum, Erzurum, Turkey (EMET). The species were identified by Mr René Richet (France) and Dr Daniel Whitmore (Denmark).

The classification and nomenclature used by Pape (1996) and Whitmore (2011) were followed in this paper. The general distributions of the species were taken from Pape and Beuk (2011) and Whitmore (2010, 2011).

3. Results

Sarcophaga (*Heteronychia*) *anatolica* Whitmore, 2011

Material examined: Erzurum: ♂ (İspir, Madenköprübaşı, 40°26'14"N, 040°49'41"E, 1292 m, 30.VII.2010), ♂ (Oltu, 40°25'04"N, 041°56'57"E, 1455 m, 17.VII.2010).

Distribution: Turkey (Whitmore, 2011).

Turkish records: Ankara, Nevşehir (Whitmore, 2011).

Sarcophaga (*Heteronychia*) *armeniaca* (Rohdendorf, 1937)

Material examined: Erzurum: ♂ (İlca, Toprakkale, 40°14'28"N, 040°59'03"E, 2157 m, 30.VII.2010), ♂ (İspir, Yukarıözbağ, 40°28'02"N, 040°58'26"E, 1175 m, 30.VII.2010).

Distribution: Armenia, Azerbaijan, and Ukraine.

Note: New record for the Turkish fauna.

Sarcophaga (*Heteronychia*) *boettcheri* Villeneuve, 1912

Material examined: Erzincan: ♂ (Kargın, 39°40'45"N, 040°11'23"E, 1370 m, 10.VI.2010), ♂ (Tercan, 39°46'01"N, 040°22'08"E, 1397 m, 25.VII.2010), ♀ (Üzümlü, 39°39'54"N, 039°43'34"E, 1190 m, 09.IX.2009). Erzurum: ♀ (İspir, 40°29'27"N, 041°00'42"E, 1259 m, 30.VII.2010), 3♂♂ (Oltu, Ayvalı, 40°45'13"N, 041°52'50"E, 755 m,

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16.VI.2010), ♀ (Çamlıbel, 40°29'06"N, 041°45'47"E, 1735 m, 21.VII.2010), 2♀♀, ♂ (Kaledibi, 40°44'32"N, 042°11'10"E, 1074 m, 17.VII.2010), 4♂♂, 2♀♀ (40°35'13"N, 042°06'52"E, 1229 m, 04.VIII.2009), ♀ (40°25'04"N, 041°56'57"E, 1455 m, 17.VII.2010), ♀ (Tekeli, 40°41'45"N, 042°09'36"E, 1185 m, 09.VI.2009), ♂ (40°41'46"N, 042°09'91"E, 1079 m, 20.VII.2009), ♂ (Yolboyu, 40°39'41"N, 042°08'87"E, 1125 m, 16.VII.2008), 2♀♀, ♂ (40°38'55"N, 042°08'50"E, 1135 m, 31.VII.2010), ♀ (Olur, Ormanağzı, 40°46'14"N, 042°06'17"E, 969 m, 09.VI.2009), ♂ (Taşlıköy, 40°45'56"N, 041°58'10"E, 885 m, 20.VII.2009), ♀ (40°45'56"N, 041°58'10"E, 885 m, 05.VIII.2009), 2♂♂ (Şenkaya, Paşalı, 40°39'58"N, 042°15'06"E, 1173 m, 31.VII.2010), ♂ (Taht, 40°38'29"N, 042°20'03"E, 1232 m, 17.VII.2010), 2♂♂ (Tortum, Aksu, 40°25'59"N, 041°35'30"E, 1950 m, 05.VIII.2010), ♀ (Arılı, 40°22'18"N, 041°28'07"E, 1593 m, 05.VIII.2010), ♀ (Derekapı, 40°24'43"N, 041°29'21"E, 1258 m, 05.VIII.2010), ♀ (Yukarısivri, 40°14'34"N, 041°31'47"E, 1539 m, 21.VII.2010), ♀ (Uzundere, Balıklı, 40°37'18"N, 041°37'74"E, 1039 m, 15.VII.2008).

Distribution: Austria, Azerbaijan, Croatia, Cyprus, Greece, Hungary, Iran, Israel, Romania, Serbia, Turkey, Ukraine.

Other Turkish records: Amasya, Mersin, Samsun, and Tokat (Whitmore, 2011).

Sarcophaga (Heteronychia) bulgarica (Enderlein, 1936)

Material examined: Bayburt: ♀ (Center, 40°06'36"N, 040°25'36"E, 1781 m, 12.VIII.2009), ♂ (Kop Mountain, Şehitlik, 40°01'95"N, 040°30'96"E, 2400 m, 21.VIII.2008), ♂ (Tomruk, 40°17'85"N, 040°00'32"E, 1923 m, 12.VIII.2009). Erzurum: ♀ (Güngörmez, 40°09'60"N, 041°21'82"E, 2100 m, 19.VIII.2009), ♂ (Aşkale, 39°51'06"N, 040°34'59"E, 1750 m, 12.VIII.2009), ♂ (Çat, Çatköy, 39°36'03"N, 040°58'20"E, 1894 m, 29.VI.2009), ♂ (İspir, 40°29'27"N, 041°00'42"E, 1300 m, 07.VIII.2009), ♂ (Çapans, 40°28'58"N, 040°59'45"E, 1360 m, 20.VIII.2009), ♂ (Oltu, 40°36'13"N, 042°06'52"E, 1229 m, 04.VIII.2009), ♂ (Yolboyu, 40°38'51"N, 042°08'41"E, 1180 m, 09.VI.2009), ♂ (40°38'55"N, 042°08'50"E, 1135 m, 31.VII.2010), ♀ (Tortum, Arılı, 40°22'18"N, 041°28'07"E, 1593 m, 05.VIII.2010).

Distribution: Armenia, Azerbaijan, Austria, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, France, Georgia, Germany, Hungary, Italy, Moldova, Norway, Poland, Romania, Russia (Central European territory, South European territory), Slovakia, Spain, Sweden, Switzerland, Ukraine, (former) Yugoslavia.

Note: New record for the Turkish fauna.

Sarcophaga (Heteronychia) clarahenae (Lehrer, 1999)

Material examined: Erzurum: ♂ (Köprükoy, Örentaş, 40°05'08"N, 041°51'42"E, 2038 m, 29.VII.2010), ♂ (Oltu, Kaledibi, 40°44'32"N, 042°11'10"E, 1074 m, 17.VII.2010),

♂ (Şenkaya, Sındıran, 40°37'20"N, 042°21'34"E, 1409 m, 17.VII.2010).

Distribution: Azerbaijan and Israel.

Note: New record for the Turkish fauna.

Sarcophaga (Heteronychia) cucullans (Pandellé, 1896)

Material examined: Erzincan: 2♀♀ (Çayırılı, Harmantepe, 39°50'16"N, 040°05'06"E, 1487 m, 10.VI.2010), Erzurum: ♀ (İspir, 40°29'27"N, 041°00'42"E, 1259 m, 30.VII.2010), ♀ (Oltu, 40°35'13"N, 042°06'52"E, 1229 m, 20.VII.2009), ♂ (Yolboyu, 40°38'55"N, 042°08'50"E, 1135 m, 31.VII.2010), 2♂♂ (Olur, Taşlıköy, 40°45'56"N, 041°58'10"E, 885 m, 20.VII.2009; 05.VIII.2009), ♂ (Yeşilbağlar, 40°46'59"N, 042°07'27"E, 989 m, 16.VI.2010), ♀ (Uzundere, Yayla Pass, 40°26'36"N, 041°37'28"E, 2300 m, 21.VII.2010).

Distribution: Armenia, Austria, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, France, Georgia, Germany, Greece, Hungary, Israel, Italy, Russia (South European territory), Serbia, Slovakia, Spain, Switzerland, Turkey, Ukraine.

Turkish records: No locality data in Kara and Pape (2002).

Sarcophaga (Heteronychia) filia Rondani, 1860

Material examined: Bayburt: ♀ (Demirözü, 40°13'27"N, 040°03'75"E, 1660 m, 17.VI.2010), 3♀♀ (Aydıntepe, 40°23'22"N, 040°09'46"E, 1614 m, 23.VI.2009), ♀ (Aydıntepe, Aşağıkırzı, 40°22'17"N, 040°09'13"E, 1546 m, 22.VI.2009), ♀ (Yeşilyurt, 40°12'35"N, 040°16'23"E, 1569 m, 22.VI.2009), ♀, ♂ (40°06'36"N, 040°25'36"E, 1781 m, 12.VIII.2009), ♂ (Tomruk, 40°17'85"N, 040°00'32"E, 1923 m, 12.VIII.2009). Erzincan: ♂ (Altınbaşak, 39°42'85"N, 039°42'80"E, 1518 m, 10.VI.2010), ♂ (Tercan, 39°46'58"N, 040°23'38"E, 1300 m, 08.IX.2009), 2♀♀, ♂ (Üzümlü, 39°40'38"N, 039°40'41"E, 1073 m, 02.VI.2009), ♀, ♂ (39°39'54"N, 039°43'34"E, 1190 m, 09.IX.2009; ♂, 1157 m, 10.VI.2010). Erzurum: ♀ (Güzelyayla, 40°07'23"N, 041°24'51"E, 2000 m, 19.VIII.2009), ♀, ♂ (Aşkale, Kandilli, 39°54'19"N, 040°50'55"E, 1737 m, 01.VIII.2010), 3♀♀ (Horasan, Çiftlik, 40°04'22"N, 042°14'59"E, 1612 m, 16.VI.2009; ♀ 40°00'53"N, 041°59'06"E, 1588 m, 02.VII.2010), ♀ (İlca, Demirgeçit, 39°57'11"N, 041°02'05"E, 1760 m, 19.VI.2009), ♀ (Eskipolat, 40°04'14"N, 040°56'11"E, 1857 m, 30.VII.2010), 2♀♀, ♂ (Toprakkale, 40°14'28"N, 040°59'03"E, 2157 m, 30.VII.2010), 2♀♀ (İspir, Madenköprübaşı, 40°26'14"N, 040°49'41"E, 1292 m, 30.VII.2010), 4♀♀ (40°29'27"N, 041°00'42"E, 1300 m, 07.VIII.2009), ♂, ♀ (Narman, Dikmetaş, 40°18'38"N, 041°53'26"E, 1665 m, 17.VII.2010, 40°20'26"N, 041°54'33"E, 1565 m, 21.VII.2010), ♀ (Ünlükaya, 40°25'85"N, 041°58'19"E, 1460 m, 16.VII.2008), ♀, ♂ (Oltu, Kaledibi, 40°44'32"N, 042°11'10"E, 1074 m, 17.VII.2010), 2♀♀ (Yolboyu, 40°39'41"N, 042°41'05"E, 1125 m, 16.VII.2008; 40°38'51"N, 042°08'41"E, 1180

m, 09.VI.2009) 2♀♀ (Olur, Köprübaşı, 40°46'38"N, 042°08'35"E, 1063 m, 09.VI.2009), ♀ (Pazaryolu, 40°25'12"N, 040°46'13"E, 1453 m, 30.VII.2010), ♀ (Şenkaya, Sındıran, 40°37'20"N, 042°21'34"E, 1409 m, 17.VII.2010), 7♀♀, 2♂♂ (Tortum, Aksu, 40°23'20"N, 041°31'22"E, 1475 m, 05.VIII.2010), 2♀♀, 5♂♂ (Aksu, 40°25'59"N, 041°35'30"E, 1950 m, 05.VIII.2010), ♀, ♂ (Arılı, 40°22'18"N, 041°28'07"E, 1593 m, 05.VIII.2010), ♀, 2♂♂ (Derakapı, 40°27'31"N, 041°30'24"E, 1199 m, 26.VI.2009; 40°23'66"N, 041°34'30"E, 1540 m, 15.VI.2010; 40°24'43"N, 041°29'21"E, 1258 m, 05.VIII.2010), ♂ (İncedere, 40°20'51"N, 041°39'26"E, 1987 m, 21.VII.2010), ♂ (40°18'35"N, 041°31'33"E, 1518 m, 31.VII.2010), 2♀♀, ♂ (Yukarısivri, 40°14'34"N, 041°31'47"E, 1539 m, 21.VII.2010), 4♂♂ (Uzundere, Yayla Pass, 40°26'36"N, 041°37'28"E, 2300 m, 21.VII.2010).

Distribution: Albania, Austria, Belgium, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Israel, Italy, Macedonia, Malta, Moldova, Morocco, the Netherlands, Poland, Romania, Russia (Central European territory, South European territory), Serbia, Slovakia, Spain, Switzerland, Tunisia, Turkey, Ukraine, and United Kingdom.

Other Turkish records: Amasya, Antalya, Tokat, Samsun (Kara and Pape, 2002); Kayseri, Trabzon (Hayat et al., 2008); Eskişehir (Aslan and Çalışkan, 2009); and Antalya (Whitmore, 2011).

Sarcophaga (Heteronychia) haemorrhoides Böttcher, 1913

Material examined: Erzincan: ♂ (Çağlayan, 39°43'10"N, 039°29'75"E, 1153 m, 11.VI.2010), ♂ (Çukurkuyu, 39°46'52"N, 039°25'01"E, 1486 m, 11.VI.2010), ♂ (Üzümlü, 39°41'06"N, 039°39'43"E, 1158 m, 25.VII.2010). Erzurum: ♂ (Güzelova, 40°26'16"N, 042°45'08"E, 1898 m, 23.VII.2009), ♂ (Palandöken Mountain, 39°51'59"N, 041°16'20"E, 2112 m, 01.VIII.2010), ♂ (Aşkale, Çayköy, 39°56'50"N, 040°47'49"E, 1691 m, 01.VIII.2010), ♂ (Çiftlik, 39°51'16"N, 040°34'58"E, 1525 m, 03.VI.2010), 2♂♂ (Ilca, Toprakkale, 40°14'28"N, 040°59'03"E, 2157 m, 30.VII.2010), ♂ (Oltu, Çamlıbel, 40°29'06"N, 041°45'47"E, 1735 m, 21.VII.2010), 5♂♂ (Kaledibi, 40°44'32"N, 042°11'10"E, 1074 m, 17.VII.2010), 2♀♀, ♂ (Şenkaya, Sındıran, 40°37'20"N, 042°21'34"E, 1409 m, 17.VII.2010), ♂ (Tortum, Aksu, 40°25'59"N, 041°35'30"E, 1950 m, 05.VIII.2010), 2♂♂ (Arılı, 40°22'39"N, 041°29'27"E, 1345 m, 05.VIII.2010), ♂ (Derakapı, 40°23'66"N, 041°34'30"E, 1540 m, 15.VI.2010), ♀ (İncedere, 40°20'51"N, 041°39'26"E, 1987 m, 21.VII.2010).

Distribution: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Estonia, France, Germany, Georgia, Greece, Hungary, Iran, Israel, Italy, Macedonia, Malta, Moldova, Poland, Romania, Russia (Central European territory, South

European territory, West Siberia), Serbia, Slovakia, Spain, Switzerland, Turkey, Ukraine.

Other Turkish records: Amasya and Tokat (Whitmore, 2010).

Sarcophaga (Heteronychia) helenae (Trofimov, 1948)

Material examined: Erzurum: ♀ (Aşkale, Çayköy, 39°37'11"N, 040°59'33"E, 1600 m, 03.VI.2010), ♀ (39°56'50"N, 040°47'49"E, 1691 m, 01.VIII.2010), ♂ (Oltu, Ayvalı, 40°45'13"N, 041°52'50"E, 755 m, 16.VI.2010), 9♂♂ (Şenkaya, Sındıran, 40°37'20"N, 042°21'34"E, 1409 m, 17.VII.2010), ♂ (Taht, 40°38'29"N, 042°20'03"E, 1232 m, 17.VII.2010), ♀ (Turnalı, 40°35'15"N, 042°12'46"E, 1700 m, 31.VII.2010).

Distribution: Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Israel, Turkey, and Turkmenistan.

Other Turkish records: İzmir (Whitmore, 2011).

Sarcophaga (Heteronychia) lacrymans Villeneuve, 1912

Material examined: Erzincan: ♂ (Davarlı, 39°49'99"N, 039°20'77"E, 1487 m, 11.VI.2010), 4♂♂ (Tercan, 39°46'58"N, 040°23'38"E, 1408 m, 10.VI.2010). Erzurum: ♂ (Aşkale, Kandilli, 39°54'19"N, 040°50'55"E, 1737 m, 01.VIII.2010), ♂ (Narman, Kireçli Pass, 40°21'07"N, 041°41'41"E, 2400 m, 31.VII.2010).

Distribution: Austria, Bulgaria, Czech Republic, Hungary, Georgia, Iraq, Israel, Romania, Russia (South European territory), Slovakia, Syria, Turkey, and Ukraine.

Other Turkish records: Afyonkarahisar (Kara and Pape, 2002).

Sarcophaga (Heteronychia) monspellensia Böttcher, 1913

Material examined: Erzurum: 2♀♀ (Narman, Kireçli Pass, 40°21'07"N, 041°41'41"E, 2400 m, 31.VII.2010).

Distribution: France, Greece, Italy, Malta, Spain, Tunisia.

Note: New record for the Turkish fauna.

Sarcophaga (Heteronychia) recta (Rohdendorf, 1937)

Material examined: Bayburt: 2♂♂ (Kop Mountain, Şehitlik, 40°01'95"N, 040°30'96"E, 2400 m, 21.VIII.2008; 40°02'04"N, 040°31'02"E, 2358 m, 17.VI.2010). Erzurum: ♀ (Karayazı, Yukarısöylemez, 39°36'46"N, 041°50'20"E, 1896 m, 02.VII.2010), ♂ (Tekman, Körsu, 39°32'10"N, 041°43'45"E, 1940 m, 02.VII.2010), ♀ (Tortum, Arılı, 40°22'18"N, 041°28'07"E, 1593 m, 05.VIII.2010).

Distribution: Armenia, Azerbaijan, Georgia, Russia (South European territory).

Note: New record for the Turkish fauna.

Sarcophaga (Heteronychia) rondaniana (Rohdendorf, 1937)

Material examined: Bayburt: ♀, 2♂♂ (Aydintepe, Arpalı, 40°20'54"N, 040°07'27"E, 1526 m, 17.VI.2010), ♂ (Çalidere, 40°10'28"N, 040°24'44"E, 1650 m, 17.VI.2010), ♂ (Gezköyü, 40°08'17"N, 040°36'00"E, 2400 m, 12.VIII.2009). Erzincan: ♂ (39°50'20"N,

039°42'83"E, 1140 m, 09.IX.2009); ♂ (Refahiye, Ulucak, 39°53'54"N, 038°50'49"E, 1639 m, 22.IX.2010), ♂ (Tercan, 39°46'58"N, 040°23'38"E, 1408 m, 10.VI.2010). Erzurum: 2♀♀ (Aşkale, 39°56'41"N, 040°41'47"E, 1750 m, 15.VII.2009; 12.VIII.2009), 8♀♀, 10♂♂ (İspir, 40°29'27"N, 041°00'42"E, 1300 m, 07.VIII.2009), 2♀♀, 3♂♂ (İspir, Çapans, 40°28'58"N, 040°59'45"E, 1360 m, 20.VIII.2009), ♀, ♂ (Madenköprübaşı, 40°26'14"N, 040°49'41"E, 1300 m, 20.VIII.2009), ♂ (Oltu, 40°35'13"N, 042°06'52"E, 1229 m, 20.VII.2009), ♂ (Tekeli, 40°41'46"N, 042°09'36"E, 1079 m, 05.VIII.2009), ♂ (Tortum, Aksu, 40°23'20"N, 041°31'22"E, 1475 m, 05.VIII.2010), ♀ (Tortum, 40°18'23"N, 041°31'48"E, 1573 m, 21.VII.2010), 2♂♂ (Yukarısivri, 40°14'34"N, 041°31'47"E, 1539 m, 21.VII.2010), ♂ (Uzundere, Yayla Pass, 40°26'36"N, 041°37'28"E, 2300 m, 21.VII.2010).

Distribution: Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Macedonia, the Netherlands, Romania, Serbia, Slovakia, Spain, Turkey, Ukraine.

Turkish Records: Amasya (Kara and Pape, 2002) and Kayseri (Hayat et al., 2008).

Sarcophaga (Heteronychia) schineri Bezzi, 1891

Material examined: Bayburt: ♂ (Gezköyü, 40°08'17"N, 040°36'00"E, 2400 m, 12.VIII.2009).

Distribution: Albania, Austria, Azerbaijan, Bulgaria, Croatia, Czech Republic, France, Germany, Georgia, Greece, Hungary, Italy (including Sicily), Poland, Romania, Russia (South European territory), Serbia, Slovakia, Switzerland, Turkey, Ukraine.

Other Turkish records: Amasya and Tokat (Kara and Pape, 2002).

Sarcophaga (Heteronychia) setinervis Rondani, 1860

Material examined: Erzurum: ♂ (Oltu, 40°35'13"N, 042°06'52"E, 1229 m, 20.VII.2009), ♂ (İspir, 40°29'27"N, 041°00'42"E, 1300 m, 07.VIII.2009).

Distribution: Armenia, Austria, Azerbaijan, Bulgaria, Cyprus, Egypt, France, Georgia, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Kyrgyzstan, Macedonia, Romania, Russia (South European territory), Serbia, Tajikistan, Turkey, Turkmenistan, Uzbekistan.

Other Turkish records: No locality record in Kara and Pape (2002); Kayseri (Hayat et al. 2008); Gaziantep, Hatay, Mersin, and Tokat (Whitmore, 2010).

Sarcophaga (Heteronychia) siciliensis Böttcher, 1913

Material examined: Erzurum: ♂ (İlica, Toprakkale, 40°14'28"N, 040°59'03"E, 2157 m, 30.VII.2010).

Distribution: Bulgaria, Cyprus, Egypt, Greece, Israel, Italy (Sicily), Romania, Spain, Turkey, Ukraine.

Other Turkish records: Antalya and Konya (Kara and Pape, 2002).

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