

Halacarid mites of the genus *Agauopsis* (Acari: Halacaridae) from West Coast of Antalya, Turkey

Batı Antalya (Türkiye) sahilinden *Agauopsis* (Acari: Halacaridae) cinsine ait halacaridler

Furkan Durucan^{1*}  • Yunus Ömer Boyacı² 

¹ Işıklar Caddesi No 16,17 TR-07100 Antalya, Turkey

² Süleyman Demirel University, Eğirdir Fisheries Faculty, Isparta, Turkey

* Corresponding author: f_durucan@hotmail.com

Received date: 02.08.2017

Accepted date: 10.01.2018

How to cite this paper:

Durucan, F. & Boyacı, Y.Ö. (2018). Halacarid mites of the genus *Agauopsis* (Acari: Halacaridae) from West Coast of Antalya, Turkey. *Ege Journal of Fisheries and Aquatic Sciences*, 35(1): 49-53. doi:10.12714/egejfas.2018.35.1.09

Abstract: Five *Agauopsis* species were determined at 8 sampling stations, various depths and habitats in the West Mediterranean Sea Coast of Antalya, Turkey. Among them *Agauopsis nonornata* is new for the Mediterranean Sea, *Agauopsis brevipalpus*, *Agauopsis conjuncta*, *Agauopsis ibssi* and *Agauopsis pteropes* are new for the Eastern Mediterranean Sea. Each species is illustrated, briefly described here with their worldwide geographical distributions and habitat informations.

Keywords: Acari, Halacaridae, *Agauopsis*, Turkey, Antalya

Öz: Bu çalışmada, Antalya'nın Batı Akdeniz kıyılarındaki 8 istasyonda çeşitli derinlik ve habitatlardan 5 *Agauopsis* türü tespit edilmiştir. Bu türlerden *Agauopsis nonornata*, Akdeniz için, *Agauopsis brevipalpus*, *Agauopsis conjuncta*, *Agauopsis ibssi* ve *Agauopsis pteropes* Doğu Akdeniz kıyıları için yenidir. Her bir türün illüstrasyonları yapılmış, kısa tanımları, habitat bilgileri ve dünyadaki dağılımları verilmiştir.

Anahtar kelimeler: Acari, Halacaridae, *Agauopsis*, Türkiye, Antalya

INTRODUCTION

Halacaridae is a family of aquatic (freshwater, brackish and marine) ecosystems, meiobenthic and covered by chitinous cuticle. To date, about 1120 species of halacarids have been reported worldwide, from habitats including macroalgae, sponge colonies, hydrozoans, bryozoans, barnacles, mussels, polychaetes, mud, and sandy habitats (Bartsch, 2006). They live in sediments from the littoral zone to the deep sea (Bartsch, 1989). The family are distributed on 64 genera. Of them *Agauopsis* Viets is the one of the richest in genera which has more than 80 species (WoRMS, 2017).

MATERIALS AND METHODS

Sandy deposits (detritus-riched, fine to coarse), various macroalgae, marine phanerogams (*Cymodosa nodosa* and *Posidonia oceanica*), bivalves (*Mytilus galloprovincialis* and *Ostrea* sp.) samples were collected by hand intertidally or various depths (0-30 m) usually using SCUBA or snorkelling diving at localities along the West Coast of Antalya. Immediately after collection, mites were extracted by washing

the substrates. The meiofauna retained in the set of sieves (63 µm, 500 µm, 1 mm) was sorted under binocular microscope (Nikon SMZ 10A). In the laboratory, mite specimens were cleared in lactic acid and mounted in glycerine jelly. Figures were drawn with the aid of a camera lucida (Nikon Eclipse E400). The specimens were kept in the first author's personal collection in Antalya.

The following abbreviations used in the text and figure legends: AD, anterior dorsal plate; AE, anterior epimeral plate; dp-1 to dp-4, dorsal gland pores numbered from anterior to posterior; ds-1 to ds-6, dorsal setae (excluding those on posterior epimeral plate) numbered in sequence from anterior to posterior; GA, genitoanal plate; GO, genital opening; OC, ocular plate; PD, posterior dorsal plate; PE, posterior epimeral plate; P-2 to P-4, second to fourth palpal segments; I-IV, leg I to leg IV.

RESULTS

A total of 152 *Agauopsis* specimens belonging to five species were found along the West Mediterranean Sea Coast

of Antalya, Turkey: *Agauopsis brevipalpus* (137 indiv.), *Agauopsis conjuncta* (8 indiv.), *Agauopsis ibssi* (2 indiv.), *Agauopsis nonornata* (2 indiv.) and *Agauopsis pteropes* (3 indiv.). The descriptions of the species that will be presented as follows:

Systematics

Class	ARACHNIDA	Cuvier,	1812
Subclass	ACARI	Leach,	1817
Family	HALACARIDAE	Murray,	1877

Genus AGAUOPSIS, Viets, 1927

Agauopsis brevipalpus (Trouessart, 1889) Figs. 1,2,11,12

Material examined: Ten females, five males among *Corallina officinalis* (2m depth), *Jania rubens* (3m) at Örnekköy Beach (36°50'49"N; 30°48'18"E); twenty females, seventeen males, four deutonymphs and two protonymphs among *Amphiora rigida* (3m), *C. officinalis* and *J. rubens* (1m), *Laurencia viscida* (6m) at Yakamoz Beach (36°50'44"N; 30°47'57"E); two females, two males from fine sand (5m) at Bilem Beach (36°51'17"N;30°44'38"E); twelve females from *Cystoseria barbata*, *Ostrea* sp., *Mytilus galloprovincialis* (5m) at Kemer (36°35'56"N; 30°34'29"E); six females, four males, two deutonymphs from *C. officinalis* (3m), *C. barbata*, (7m) at Faselis (36°31'30"N; 30°33'8"E); eleven females, six males from *Galaxura oblongata* (2m), *J. rubens* (5m) at Finike (36°16'44"N; 30° 8'25"E); twelve males from *Mesophyllum expansum* (10m) at Kaş (36° 9'25"N; 29°37'42"E); twenty two females from *Bryopsis plumosa*, *Cladophora* sp. (1m), *Padina pavonica* (3m) at Kalkan (36°15'43"N; 29°24'41.54"E).

Short description: Length of females 330-525 µm, of males 300-400 µm. Length of deutonymphs 350-390 µm, protonymphs 280-290 µm long. Idiosoma wide and heavily armed in adults. AD and PD with slightly raised longitudinal costae; costae with canaliculi. AD with small frontal process and with distinctly raised H-like costa. Gland pores small. ds-2, ds-3 and ds-4 are small and their position on integument of idiosoma. ds-5 on PD. AD of female 175 µm long, 150 µm wide and has one pair of gland pores. Pair of ds-1 level with gland pore on AD. OC of female 95 µm long, 90 µm wide, with two cornea. OC with rounded angles. PD of female 200 µm long, 175 µm wide. AE of female 200 µm long, 370 µm wide. PE of female 200 µm long, 75 µm wide. GA of female 150 µm long, 175 µm wide. Female GA with 3 pairs of perigenital setae. Gnathosoma 200 µm long, 112 µm wide, slender. Total palp length is 125 µm. Rostrum about as long as gnathosomal base. Leg I much wider and longer than adjoining segments. Telofemur I, 2.5 times longer than high, with two ventral spines (Figs. 1, 2, 11 & 12).

Distribution: *A. brevipalpus* is one of the most encountered species in the genus of *Agauopsis*. It has been commonly found on the coast of North Atlantic and its adjacent basins (Mediterranean Sea, Black Sea) (Bartsch, 2009). It was recorded first time from Turkey, (Black Sea-Sinop) by Bartsch

(2004). In this study, we recorded it from Antalya, Turkey. This is the second record from Turkey.

Remarks: With regard to the external morphological characters, the specimens are correspond with Black Sea (Sevastopol) (Bartsch, 1996) and Mediterranean Sea (Croatia) (Viets, 1940) specimens.

Agauopsis conjuncta Viets, 1940 Figs. 3,4,13,14

Material examined: Four females, four males from *Cymodocea nodosa* (15 m) at Kaş (36°09'25"N, 29°37'42"E).

Short description: Length of females 355-360 µm, of males 325-330 µm. Ds-1 on AD, ds-2 on OC, ds-3,4 on PD. AD of female 130 µm long, 95 µm wide. Its shape like "horse shoe". OC of female 100 µm long, 50 µm wide, each with 2 cornea and eyespot. PD of female 125 µm long, 100 µm wide, two-three rosette pores wide in most of their length. AE of female 112 µm long, 212 µm wide. GA of female 162 µm long, 112 µm wide. PE of female 162 µm long, 63 µm wide. Gnathosoma 88 µm long, 50 µm wide. Total palp length of females 63 µm. Telofemur I ventrally with one spine seta (25 µm long), dorsally with 3 spine setae (Figs. 3, 4, 13 & 14).

Distribution: This species was described by Viets (1940) for the first time from Adriatic Sea (Croatia-Rovinj and Split). Later on, it recorded from Tyrrhenian Sea (Livorno) by Morselli and Mari (1985). After 32 years, this is the third record of this species from the world.

Remarks: *A. conjuncta* was originally described by Viets (1940) from the various habitats which was collected from the Adriatic Sea (Croatia-Rovinj and Split). When compared with the original description, our specimens are exhibit all the characters of the type species.

Agauopsis ibssi Bartsch, 1996 Figs. 5,6,15,16

Material examined: One female, one male from fine sand (12 m) at Kaş (36°09'25"N, 29°37'42"E).

Short description: Length of female 415 µm, of male 350 µm. Dorsal plates are punctate and slender. Each rosette pore with wide and shallow, pit-like ostium and, in deeper integumental layers, 6-10 canaliculi. Gland pores inconspicuous. AD of female 150 µm long, 175 µm wide, very weakly developed H-like costa. OC of female 95 µm long, 85 µm wide. PD of female 262 µm long, 187 µm wide. AE of female 162 µm long, 300 µm wide. GA of female 162 µm long, 150 µm wide. PE of female 162 µm long, 85 µm wide. Gnathosoma 162 µm long, 75 µm wide. Palps slender, total palp length of female 87 µm (Figs. 5, 6, 15 & 16).

Distribution: Records of this species are presented only from Black Sea (Crimea, Sevastopol) (Bartsch, 2004).

Remarks: *A. ibssi* is distinguished from the *A. brevipalpus* by the following characters: PD is uniformly porose, tarsus I and the spines of leg I are longer than *A. brevipalpus*. The two species also differ in their habitats, *A. brevipalpus* lives

amongst dense scrubs of algae whereas *A. ibssi* is psammophilous (Bartsch, 1996).

***Agauopsis nonornata* Bartsch, 1999** Figs. 7,8,17,18

Material examined: Two females from detritus riched sediment with *Posidonia oceanica* (12 m) at Bilem Beach (36°51'17"N, 30°44'38"E).

Short description: Length of females 350-385 µm. AD of female 145 µm long, 110 µm wide with a small dome shaped areola posterior to frontal spine on AD. Costae on AD and PD with polygons, each polygon with alveolus, about 3 µm wide. OC of female 85 µm long, 25 µm wide, each with 2 corneae, posterior portion with small cauda. PD of female 195 µm long, 135 µm wide. AE of female 125 µm long, 212 µm wide, garland-like areolae on AE. GA of female 137 µm long, 112 µm wide. PE of female 125 µm long, 37 µm wide. Gnathosoma 100 µm long, 63 µm wide. Palps 4-segmented, total palp length is 45 µm. Leg I stout and longer than following legs. Basifemur I with prominent distoventral lamella. Teloferum I ventrally with proximal and middle lamellar protuberances equipped with spine (Figs. 7, 8, 17 & 18).

Distribution: *A. nonornata* had been known only from Galapagos Islands since 1977. In this study, the species is recorded for the first time from Turkey.

Remarks: *A. nonornata* belongs to the *ornata* group. This species can be easily distinguished from other *Agauopsis* species by the presence garland-like arranged porose polygons (garland-like areolae) on AE and the presence distoventral lamella on basifemur I.

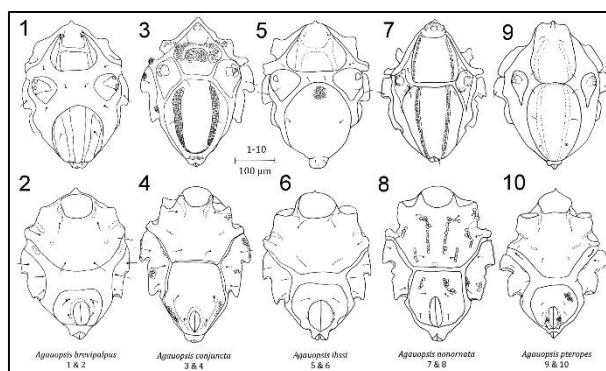
***Agauopsis pteropes* Bartsch, 1986** Figs. 9,10,19,20

Material examined: Three females from detritus-riched sediment with *P. oceanica* (12 m) at Bilem Beach (36°51'17"N, 30°44'38"E).

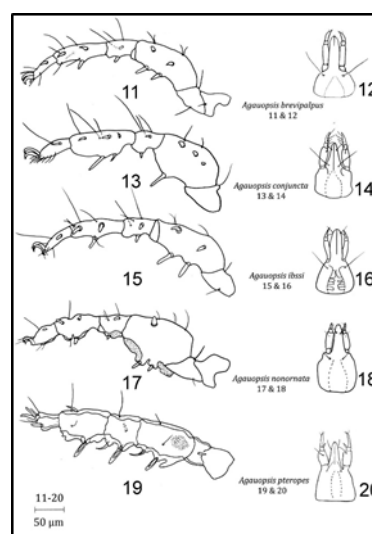
Short description: Length of females 350-385 µm. AD of female 145 µm long, 110 µm wide, anterior margin of AD with frontal process which is not sharply. OC of female 85 µm long, 25 µm wide with a pair of cornea. PD of female 195 µm long, 135 µm wide. AE of female 175 µm long, 250 µm wide. GA of female 125 µm long, 125 µm wide. PE of female 150 µm long, 62 µm wide. Gnathosoma 100 µm long, 75 µm wide. Total palp length is 63 µm. Leg I stout and longer than following legs.

Distribution: This species was found first time from Gulf of Lion (France-Mediterranean Sea). This is the second record for the Mediterranean Sea.

Remarks: This species can be easily distinguished from other *Agauopsis* species by having fin like cuticular lamellae on telofemura III, IV and tibia III, IV.



Figures 1-10. Dorsal and ventral views of five female *Agauopsis* species



Figures 11-20. Shape of leg I (lateral view) and gnathosoma (ventral view)

DISCUSSION

So far, only eight species of *Agauopsis* have been recorded from the Mediterranean Sea. These are: *Agauopsis brevipalpus*, *Agauopsis conjuncta*, *Agauopsis ibssi*, *Agauopsis marinovi*, *Agauopsis microhyncha*, *Agauopsis pteropes*, *Agauopsis spinipes* and *Agauopsis tricuspis* (Trouessart, 1889; Police, 1909; Viets, 1940; Petrova, 1976; Bartsch, 1986; 1996 and 1999). Only two records of *Agauopsis* have been recorded from the Turkish waters up to date. These are: *A. brevipalpus* and *A. microhyncha*. First one reported from Sinop (Black Sea) by Bartsch (2004). The latter reported from Antalya (Mediterranean Sea) by Durucan & Boyacı (2016). Their distribution and habitats are outlined (Table 1).

The present records of *A. nonornata* brings the total number of known species in the genus *Agauopsis* from Mediterranean Sea 8 to 9. With the present study, the number of *Agauopsis* species in Turkey has raised from 2 to 6.

Table 1. List of all Mediterranean *Agauopsis* species with additional information *This study

Species	Distribution	Habitats	References
<i>Agauopsis brevipalpus</i>	Northeastern Atlantic: Le Croisic (France), UK, Ireland, Spain, Azores, Canary Islands Mediterranean and Black Sea: Tunisia; Algeria; Sozopol, Burgas, Anchialo, Mesembria (Bulgaria); Rovinj, Split (Croatia); Livorno, Salento (Italy); Vama Veche, Costinesti, Agigea, Mamaia (Romania); Caucasian Coast (Russia); Odessa, Crimea, Sevastopol (Ukraine); Sinop, Antalya* (Turkey)	bryozoan colonies, phanerogamae, sand, various algae, <i>Aplysina aerophoba</i> , <i>Arca noae</i> , <i>Geodia</i> sp., <i>Ostrea</i> sp.	Trouessart, 1889; Morselli and Mari, 1982;1985; Bartsch, 2004
<i>Agauopsis conjuncta</i>	Mediterranean Sea: Rovinj, Split (Croatia); Livorno (Italy); Antalya*(Turkey)	sand, various algae, <i>Arca noae</i> , <i>Geodia</i> sp., <i>Cymodusa nodosa</i> (15 m), <i>Zostera</i> sp.	Viets, 1940; Morselli and Mari, 1985
<i>Agauopsis ibssi</i>	Mediterranean and Black Sea: Crimea, Sevastopol (Ukraine); Antalya* (Turkey)	coarse sand (5-12m), fine sand (12m)	Bartsch, 1996
<i>Agauopsis marinovi</i>	Northeastern Atlantic: Île-Grande (France) Mediterranean Sea: Italy Black Sea: Crimea, Sevastopol (Ukraine); Cap Galata (Bulgaria)	coarse sand (45-55 cm)	Bartsch, 1984; 1996; 2004
<i>Agauopsis microrhyncha</i>	Northeastern Atlantic: Manche Channel (France); Spain Mediterranean Sea: Rovinj, Split (Croatia); Monaco; Italy; Antalya* (Turkey)	algae, sponge and bryozoan habitat (58m), fine sand (12m)	Trouessart, 1889 Viets, 1940; André, 1946; Durucan and Boyaci, 2016
<i>Agauopsis nonornata</i>	Northwestern Atlantic and Caribbean Sea: Caribbean Sea; Pacific: Galapagos Islands; Mediterranean Sea: Antalya* (Turkey)	intertidal and upper sublittoral habitats, <i>P. oceanica</i> (12m)	Bartsch, 1977;1999
<i>Agauopsis pteropes</i>	Northeastern Atlantic: Canary Islands Mediterranean Sea: Gulf of Lion (France), Antalya* (Turkey)	sediment with detritus (37m,45 m), <i>P.oceanica</i> (12m)	Bartsch, 1986
<i>Agauopsis spinipes</i>	Mediterranean Sea: Naples, (Italy)	algae (3m)	Police, 1909
<i>Agauopsis tricuspis</i>	Northeastern Atlantic: Spain to UK and Ireland Mediterranean Sea: Adriatic Sea (near Venice)	algae, barnacles, mussels	Benard, 1962; Green and MacQuitty, 1987

ACKNOWLEDGEMENTS

We are grateful to Dr. Ilse Bartsch (Forschungsinstitut Senckenberg DESY) who kindly gave it to some articles to the first author of the manuscript, correction of *Agauopsis ibssi*, taxonomic identification of *A. pteropes* and critical reviewing for the manuscript. Special thanks are due to Dr. Matteo Dal Zotto (Università degli Studi di Modena e Reggio Emilia, Department

of Life Sciences, Modena, Italy), Dr. Mohamed W. Negm (Department of Plant Protection, College of Agriculture, Assiut University, Assiut-Egypt) and Enes Hasan (Middle East Technical University, Department of Physics, Ankara, Turkey) who kindly sent copies of some articles. This study was financially supported by the Süleyman Demirel University, SDÜ-BAP3973-D2-14 project.

REFERENCES

- André, M., (1946). Halacariens marins. Faune de France, 46, 152 pp. France.
- Bartsch, I., (1977). Interstitielle Fauna von Galapagos. XX. Halacaridae (Acari). Mikrofauna des Meeresbodens, 65: 1–108.
- Bartsch, I., (1984). Ergänzungen zur Halacariden-Fauna der Bretagne-Küste und Beschreibung einer neuen Art (Halacaridae, Acari). Cahiers de Biologie Marine, 25: 113–122.
- Bartsch, I., (1986). New species of the genus *Rhombognathus* (Acari, Halacaridae), and a key to Mediterranean *Rhombognathus*. Mesogée, 46: 3-7.
- Bartsch, I., (1989). Marine mites (Halacaroidea: Acari): a geographical and ecological survey. Hydrobiologia 178: 21-42. doi: [10.1007/BF00006111](https://doi.org/10.1007/BF00006111)
- Bartsch, I., (1996). *Agauopsis* (Acari, Halacaridae) of the Sevastopol area; supplementary notes on taxonomy and ecology. Revue de Suisse Zoologie, 103: 697–712. doi: [10.5962/bhl.part.79969](https://doi.org/10.5962/bhl.part.79969)

- Bartsch, I., (1999). Wiederbeschreibung zweier Arten der *Agauopsis ornata*-Gruppe (Acari, Halacaridae). Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg, 13: 37–48.
- Bartsch, I., (2004). The Black Sea halacarid fauna (Halacaridae, Acari): faunal comparison with the Mediterranean, eastern North Atlantic, North Sea, and Baltic and reflection on its origin. Museum für Naturkunde in Berlin, *Zoologische Reihe* 80, 2: 143-158.
- Bartsch, I., (2006). Halacaroida (Acari): A Guide to Marine Genera, Organisms Diversity & Evolution, Electronic Supplement, 6: 1-104p. doi: [10.1007/978-3-662-55958-1_5](https://doi.org/10.1007/978-3-662-55958-1_5)
- Bartsch, I., (2009). Checklist of marine and freshwater halacarid mite genera and species (Halacaridae: Acari) with notes on synonyms, habitats, distribution and descriptions of the taxa, *Zootaxa*, 1998: 1-170p.
- Benard, F., (1962). Sur une nouvelle espèce d'Acariens marin, *Agauopsis tricuspis* (superfamille des Prostigmata, famille des Halacaridae). *Acarologia*, 4: 215–229.
- Durucan, F. & Boyaci, Y.Ö., (2016). First record of *Agauopsis microrhyncha* (Trouessart, 1889) (Acari: Halacaridae) from the Levantine Sea, Antalya. In: Mytilineou, Ch., Akel, N., Babali, N., Balistreri, P., Bariche, M., Boyaci, Y.Ö., Cilenti, C., Constantinou, C., Crocetta, F., Çelik, M., Dereli, H., Dounas, F., Durucan, F., Garrido, A., Gerovasilleiou, V., Kapisir, K., Kebapçioğlu, T., Kleitou, A., Krystalas, L., Lipej, L., Maina, P., Marakis, B., Mavric, B., Moussa, R., PeñaRivas, L., Poursanidis, D., Renda, W., Rizkalla, S.I., Rosso, A., Scirocco, T., Sciuto, F., Servello, G., Tiralongo, F., Yapici, S., Zenetos, A. (Eds). *Mediterranean Marine Science* 17/3, 811-812. Mediterranean Biodiversity Records (November 2016).
- Green, J. & MacQuitty, M., (1987). Halacarid Mites (Arachnida: Acari) Keys and notes for the identification of the species, Synopses of the British Fauna, ed: Kermak, D.M. and Barnes, R.S.K. No:36, *The Linnean Society*, London, 178p.
- Morselli, I. & Mari, M., (1982). Alacaridi (Acari, Prostigmata) di fondi sabbiosi della Costa Ionica del Salento. Atti della Società Toscana di Scienze Naturali, *Memorie*, Serie B, 88, 229-247.
- Morselli, I. & Mari, M., (1985). Ricerche sugli alacaridi delle coste Livornesi. IV. - Osservazioni su alcune specie raccolte su fondi sabbiosi della zona di Piombino. Atti della Società Toscana di Scienze Naturali, *Memorie*, Serie B, 91, 201–220.
- Police, G., (1909). Alcune nuove specie di Halacaridae del Golfo di Napoli. *Archivio Zoologico*, Napoli, 3, 409-443.
- Petrova, A. (1976). Une nouvelle espèce d'Agauopsis (Prostigmata, Halacaridae) du littoral de la Mer Noire. *Chidrobiologija*, Sofiya, 4, 67–70
- Trouessart, E.L., (1889). Revue synoptique de la famille des Halacaridae. Bulletin Scientifiques de la France et de la Belgique, *Série* 3, 20, 225-251. doi: [10.5962/bhl.part.28995](https://doi.org/10.5962/bhl.part.28995)
- Viets, K., (1940). Meeresmilben aus der Adria (Halacaridae und Hydrachnellae, Acari). *Archiv für Naturgeschichte*, (Neue Folge) 9, 1-135p.
- WoRMS Editorial Board 2017. *World Register of Marine Species*. Available from <http://www.marinespecies.org> at VLIZ. Accessed 2017-11-25. doi:[10.14284/170](https://doi.org/10.14284/170)