Zootaxa 5723 (3): 401–412
https://www.mapress.com/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5723.3.5
http://zoobank.org/urn:lsid:zoobank.org:pub:64FA46E5-D8D3-44C5-894C-7E0F4835C372

Rhacocleis parnassica sp.nov. a new cryptic bush-cricket (katydid) species from Greece (Orthoptera: Tettigoniidae: Tettigoniinae)

LUC WILLEMSE[1], BAUDEWIJN ODÉ[2] & APOSTOLIS STEFANIDIS[3]
[1]*Naturalis, P.O.Box 9517, 2300 RA Leiden, the Netherlands*
luc.willemse@naturalis.nl; https://orcid.org/0000-0003-0517-9778
[2]*Riethorsterweg 12, 6586 AC Plasmolen, the Netherlands*
baudewijnode@gmail.com; https://orcid.org/0000-0002-8929-2737
[3]*Biodiversity Conservation Lab, Department of Biological Applications and Technology, Metavatiko Building, 1rst floor, University of Ioannina 45110, Ioannina, Greece*
stefapostolis@gmail.com; https://orcid.org/0009-0000-7481-6449

Abstract

A new species of *Rhacocleis, R. parnassica* sp.nov. is described. We discovered the species on scree slopes at 1450 m on Mt. Parnassos, central Greece. This bush-cricket is morphologically distinct from all congeners, particularly in male cercal and titillator structures, and differs bioacoustically from closely related taxa. Although superficially resembling the scree-dwelling *R. crypta* and *R. lithoscirtetes*, it shows greater morphological affinity with *R. distinguenda* and *R. werneri*, and acoustic similarity with *R. germanica* and R. *annulata*. The species is currently known only from its type locality within the Natura 2000 site GR2450005. Its restricted range and potential exposure to wildfire and human disturbance highlight the need for further ecological research and conservation assessments. This discovery increases the number of *Rhacocleis* species in Greece to 17, underscoring the country's exceptional Orthoptera diversity and the potential for additional undescribed taxa in poorly explored environments.

Key words: Katydid, new species, bioacoustics, systematics

Introduction

Rhacocleis is a genus of slender, short-winged, rather dull, dark colored bush-crickets. It includes 33 species (Cigliano *et al.*, 2025) predominantly found in the Mediterranean region, excluding the Iberian Peninsula. The highest number of *Rhacocleis* species are found in the eastern part of the Mediterranean region for instance in Turkey with 5 species (Ünal, 2018) but especially in Greece with an astonishing 16 species. Since the first record of a *Rhacocleis* species for Greece by Brunner von Wattenwyl in 1882 (*R. germanica*) the number of species steadily increased to 9 by the description of new species by Ramme in 1928 (*R. insularis*) and 1939 (*R. silvestrii* and *R. uvarovi*), Werner in 1933 (*R. anatolica*), 1934 (*R. distinguenda*) and 1937 (*R. agiostratica*), Uvarov in 1942 (*R. graeca*) and La Greca & Messina in 1974 (*R. trilobata*). The status of *R. agiostratica* remains still unclear, being described after some juveniles, very much resembling *R. distinguenda* (Willemse, 1982).Two more species (*R. edentata* and *R. werneri*) were added in the first overview of *Rhacocleis* for Greece by Willemse in 1982. Since then again 5 more species have been added for Greece, all of which with rather restricted distribution areas; *R. derrai* Harz, 1983 from Crete, *R. ferdinandi* L.Willemse & Tilmans, 1987 from the Gulf of Amvrakikos, *R. crypta* F.Willemse & L.Willemse, 2005 and *R. lithoscirtetes* F.Willemse & L.Willemse, 2005 from the Pindos mountains and *R. andikithirensis* Tilmans *et al.*, 2016 from Andikithira and some of the Kikladhes islands).

Overall *Rhacocleis*, like most Ensifera, are predominantly active during the night, when the male calling song can be heard. During the day they hide, and males are silent. Most species occupy semiwet to dry habitats consisting of shrubby vegetation mixed with herbs and grasses from sea level to high altitudes. Two of the more recently described Greek species, *R. crypta* and *R. lithoscirtetes*, discovered in 2003–2004, are exclusively found in a rather deviant type of habitat: scree slopes (F. Willemse & L. Willemse, 2005a). Because of their circadian

Accepted by D. Rentz: 22 Oct. 2025; published: 26 Nov. 2025

rhythm, often small distribution area and in case of species found on scree slopes hardly explored habitat, it is not entirely unexpected that new species are still being discovered in *Rhacocleis*. In this respect *Rhacocleis* resembles *Eupholidoptera* another bush-cricket genus where new species are also still being discovered in Greece up to now (Alexiou, 2024, Willemse *et al.* 2023).

In August 2021 a team from the Biodiversity Conservation Lab from the University of Ioannina conducted fieldwork on Mt. Parnassos as part of a research project on endemic and threatened montane Orthoptera species. At a sampling site, located at 1450 m a.s.l., above the village of Arachova, three *Rhacocleis* specimens were collected on a scree slope. Their color pattern, habitat and elusive behavior, hiding among loose rocks, closely resembled those of *R. crypta* and *R. lithoscirtetes*. Closer examination revealed the specimen did neither belong to one of these two species nor to any of the other species of *Rhacocleis* from Greece or elsewhere but instead represented an undescribed species.

Material and methods

After collecting, specimens were kept alive, to take some field images and make sound recordings. Material has been deposited in Naturalis Biodiversity Center, Leiden, the Netherlands (RMNH).

Photography. For stacked images, a Zeiss SteREO Discovery V20 stereomicroscope was used, combined with a Zeiss AxioCam MRc5 microscope camera. The habitus photographs were taken with a NIKON D5600 with a sigma 105 mm macrolens and a Canon EOS 5D digital camera using a Canon zoom lens EF 28–90 mm F 4–5.6 with three combined Hama Close-Up lenses 1, 2 + 4×.

The calling song of two individual males, the holotype (RMNH.INS1452570) and paratype (RMNH.INS1452574) were recorded and are available in Xeno-canto (resp. https://xeno-canto.org/1043809, https://xeno-canto.org/1043811). During recording, animals were kept in a metal gauze casing within an anechoic chamber. Temperature during recordings was about 20 °C. Recordings have been performed with a Sound Devices MixPre-3 II audio recorder (192 kHz at 32bits) with Avisoft CM16/CMPA-P48 microphone (about 10 cm away from the animal), yielding a frequency response up to about 95kHz.

For each specimen ten echemes have been analysed to describe the song.

Terminology. Calling song: song produced by an isolated male. Syllable: the sound produced by one complete opening and closing movement of the tegmina. Echeme: a first-order assemblage of syllables.

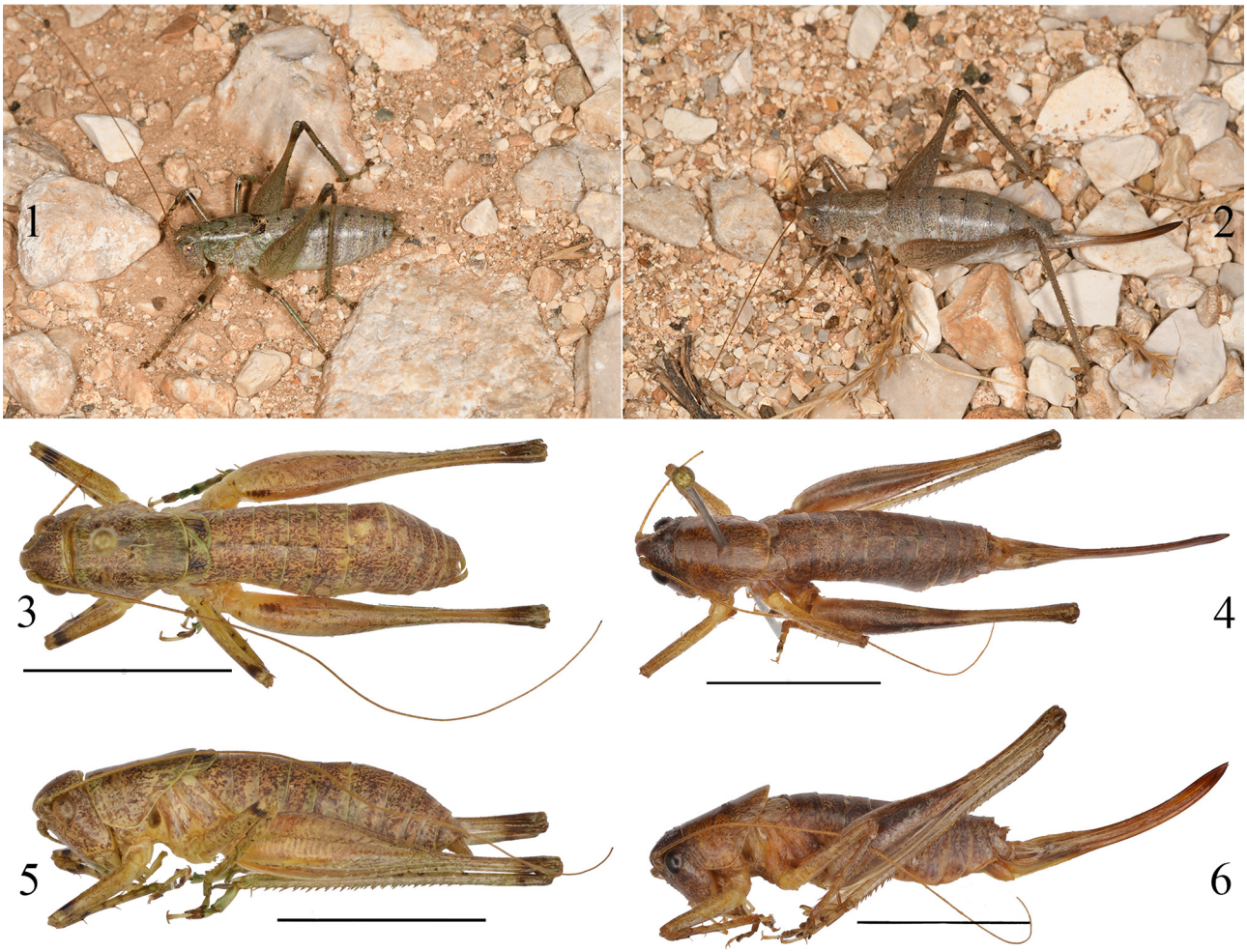
Rhacocleis parnassica Willemse, Odé & Stefanidis sp.nov.

urn:lsid:zoobank.org:act:F61E4F14-212D-42ED-A1A0-6C43D22DFEF5
Figs 1–21, 24

Material examined (2♂, 1♀): Holotype ♂ (RMNH.INS1452570) 1♀ allotype (RMNH INS1452563), 1♂ paratype (RMNH.INS1452574): Greece (Phokis) Mt. Parnassos, southern slopes ab. Arachova; in scree; N 38.5030°, E 22.6200°; 1450 m; leg. L. Willemse & A. Stefanidis.

Generic Placement

Based on traditional characters (e.g. Brunner von Wattenwyl 1882, 1893, Caudell 1908, Harz 1969) the new species keys out to *Rhacocleis* Fieber 1853: prosternum with pair of spines, fore tibia with upper outer margin presenting an apical spur, hind tibia with a single pair of large ventral apical spurs (outer spurs), pronotum with no median keel, meso- and metasternum not spined and free, plantulae of hind tarsus relatively long. With 1–2 spurs on the upper inner margin of the fore tibia, in addition to the absence of inner spurs at the ventral tip of the hind tibia, the new species fits *Rhacocleis* rather than *Pterolepis* (see also the checklist of recognized taxa of *Rhacocleis* and *Pterolepis* in F. Willemse & L. Willemse, 2005b).



FIGURES 1–6. *Rhacocleis parnassica* sp. nov. 1–2. field images 1.male, 2. female 3–6. habitus images 3. male holotype RMNH.INS1452570 dorsal, 4. female allotype RMNH.INS1452563 dorsal, 5. male holotype RMNH.INS1452570 lateral, 6. female allotype RMNH.INS1452563 lateral. Scale bars: 5 mm.

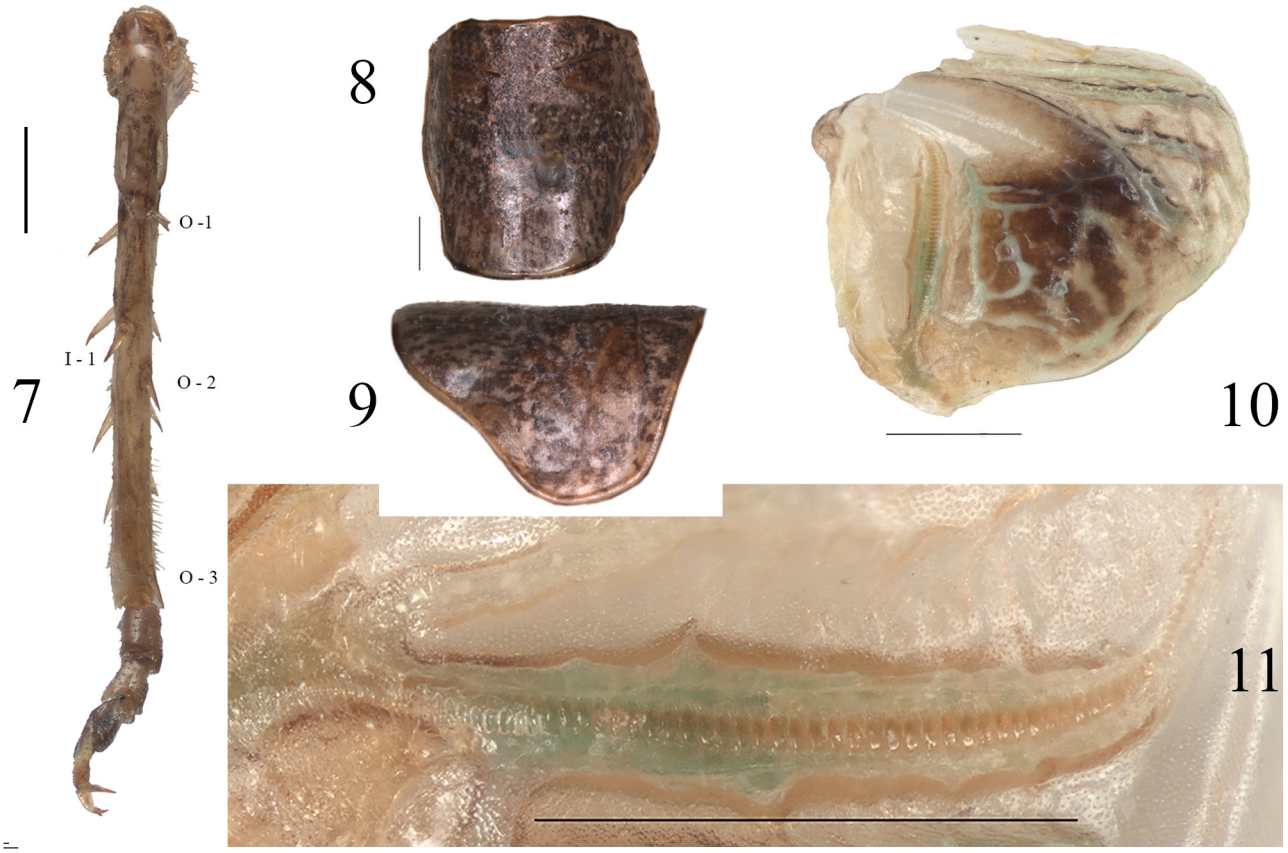
Description

Male (figs 1, 3, 5). Medium size. Integument silky glossy, smooth.

Head. Fastigium of vertex parallel sided, convex, slightly wider than scapus.

Pronotum (figs 8–9). Pronotum subcylindrical, edges rimmed, in profile straight lightly undulating, metazona relatively short, dorsum very slightly convex without median keel, roundly merging with lateral lobe, hind margin weakly convexly rounded, humeral excision weak, impressed; lateral lobes slightly laterally spread, along fore and lower edges impressed. Prosternum on either side with a tiny spine, mesosternum with low triangular projections, similar projections of metasternum wider but less extending. Thoracic tympanum widely open, strongly elongate.

Fore wing. Tegmina reaching hind margin of 1st tergite; left forewing (fig. 10) about as wide as long; for edge weakly convex, apex broadly obtuse; hind edge with distinct cubital sinus; Sc, R and M veins well raised; SC and R reaching edge, subparallel, proximally slightly diverging, apically slightly converging; M almost reaching the edge. Stridulatory file (fig. 11) as seen from below short, shortest distance between proximal and distal end, ca. 3 mm, at the proximal and distal end curved, remainder straight, apical half slightly more raised; total number of teeth about 60, of which ca. 35 are strongly sclerotized; widest spacing between teeth about halfway 8 teeth per 0.5 mm, distance between middle of two successive teeth is 0.06 mm; greatest width of middle teeth 0.13 mm.



FIGURES 7–11. *Rhacocleis parnassica* sp.nov. male paratype RMNH.INS1452574. 7. fore tibia, dorsal view 8. Pronotum, dorsal 9. Pronotum, lateral 10. Left forewing, ventral 11. stridulatory file, ventral. Scale bars: 1 mm.s

Legs. Hind femur not very slender, 4.9 times longer than wide about three times as long as pronotum, fore femur shorter than pronotum. Tibial tympanum slit-like. Plantulae of hind tarsus three quarters as long as first tarsal segment. Fore femur with 2–3 tiny spines in apical half of inner margin, mid femur unarmed or with a single tiny spine along outer margin, hind femur with 3–4 and 5–6 tiny spines along the mid part of the lower outer and inner margin respectively; inner and outer genicular lobes of fore and mid femora with 2 in hind femora with 1 tiny spines; upper inner (=anterior) margin of fore and mid tibia (fig. 7) with 1–2 spurs (in the fore tibia, a proximal one at the distal end of the tympanal opening, that may be absent, and one in the mid third of the tibia); upper outer (=posterior) margin of fore and mid tibia with 3 spurs (in the fore tibia, a proximal one at the distal end of the tympanal opening, one halfway the tibia and an apical one); both lower margins of fore and mid tibia with 6 spurs; tip of hind tibia with a pair of ventral outer apical spurs without a pair of pits in between them.

Abdomen (figs 12–17). Abdominal tergites scarcely folded along midline, no true median keel. Last tergite (fig. 12) slightly hairy along the middle as distal tergites; hind margin rimmed, forming two small triangular acute lobes pointing distally with wide V-shaped median excision. Cercus (figs 14–15) hairy, robust, conical, gradually, and weakly inward bent terminating in an acute tip, pointing downward and inward; inner side at a quarter of the length with a strong compact side tooth with inner margin concave and tip pointing forward. Paraprocts small, knoblike structures not elongated. Subgenital plate (fig. 13) rather compact, as long as basal width, tapering with an indistinct median keel, hind margin wide U-shaped emarginated; styli slender, cylindrical, pointing distad. Titillator (figs 16–17) slender, thin, well sclerotised, basal fusion of right and left titillator membranous, basal part ca. twice as long as apical part, pointing in same vertical direction, widened, slightly twisted; apical part towards the tip flattened and slightly curved, tip hook-shaped, surface smooth.

FIGURES 12–17. *Rhacocleis parnassica* sp.nov. 12–16. paratype male RMNH.INS1452574. 12. anal tergite dorsal 13. subgenital plate, ventral 14. left cercus dorsal 15. left cercus lateral 16. titillator lateral 17. holotype male RMNH.INS1452570 titillator dorsal. Scale bars: 1 mm.

Colouration (figs 1,3,5). Predominantly unicolorous, in live specimen pearl grey to pale buff, some parts with a greenish haze, distinctly mottled with dark brown. Antennae with flagellum unicolorous brown, scape and pedicel sometimes with darker markings.

Head of general colour, commonly marbled with brown, labrum and lower half clypeus and genae pale, not mottled. Pronotum of general colour, marbled with brown, the center of the pronotal dorsum with a symmetrical black W-shaped blackish patch, lateral lobe uniformly coloured, with a unmottled stroke along hind margin below humeral excision. Fore wing black, small apical part between R and M and some veinlets yellowish, fore margin transparent with greenish haze. Legs of general colour, variegated with dark brown, insertion of spurs commonly black, spurs brown. All femora of general colour mottled with dark brown, except for black pre-genicular incomplete ring, in mid and fore femora apically bordered by white dorsal ring, lacking any other black markings, or hind femur near the base with small black dorsal patch. Tibiae predominantly pale, except for the insertion of the spurs, tympanal area of the fore tibia , apical part of the hind tibia with a greenish haze. Plantulae dark, tarsi pale cream or greenish with dark patches. Abdominal tergites of general colour, hind margins tergites with a tiny median black dot. Pro-, meso-, metanotum, sternites and subgenital plate all unicolorous pale grey white. Male cercus pale, the apical half with a greenish hue.

Female (figs 2,4,6). Head, thorax and legs as in male. Micropterous, tegmina lateral, almost completely covered by pronotum, oval, not reaching front margin of first tergite. Fore femur only slightly shorter than pronotum. Abdominal sternites, including the seventh not modified. Cerci conical, hairy, evenly narrowing to a pointed apex. Ovipositor (fig. 19) ensiform, relatively long and slender, 0.9 as long as the hind femur, in the apical third weakly curved upward, margins smooth. Subgenital plate (fig 18) along entire length with strongly developed median keel, with bristle like hairs, widening from the base, widest in the middle; the basal half on each side of the keel with a wide rounded ridge which runs from the proximal margin parallel and close to the keel, at one third of the length deflecting to the side, forming a deep, large laterally opening pit; apical half narrowing, trapezoid, depressed besides

the keel, sides with bristle like hairs, lateral margins near the apex bend inward forming inward pointed, rectangular lobes separated by wide V-shaped excision. Gonangulum elongate, simple.

FIGURES 18–19. *Rhacocleis parnassica* sp.nov. female allotype RMNH.INS1452563 18. subgenital plate ventral 19. ovipositor lateral. Scale bars: 1 mm.

Colouration (fig. 2, 4, 6) as male but paler. Tegmina unicolorous pale. Head, thorax and legs unicolorous. Abdomen unicolorous except for hind margins of the tergites with a tiny median black dot.

Bioacoustics

The calling song consists of echemes repeated at relatively slow tempo, about every 10s. Echemes last about 500ms (460–560ms) and consist of nine syllables (8–10), the first one (or sometimes two) last somewhat longer than the following ones. Both opening and closing hemisyllables are visible. The interval between the first and second hemisyllable is substantially longer than those of the following syllables. Syllables (except first one) last 50ms (46–54ms) being repeated at the rate of 18–19/s. The frequency spectrum of the song is between about 18–80kHz, with a maximum around 30kHz.

Measurements (length in mm) and ratios

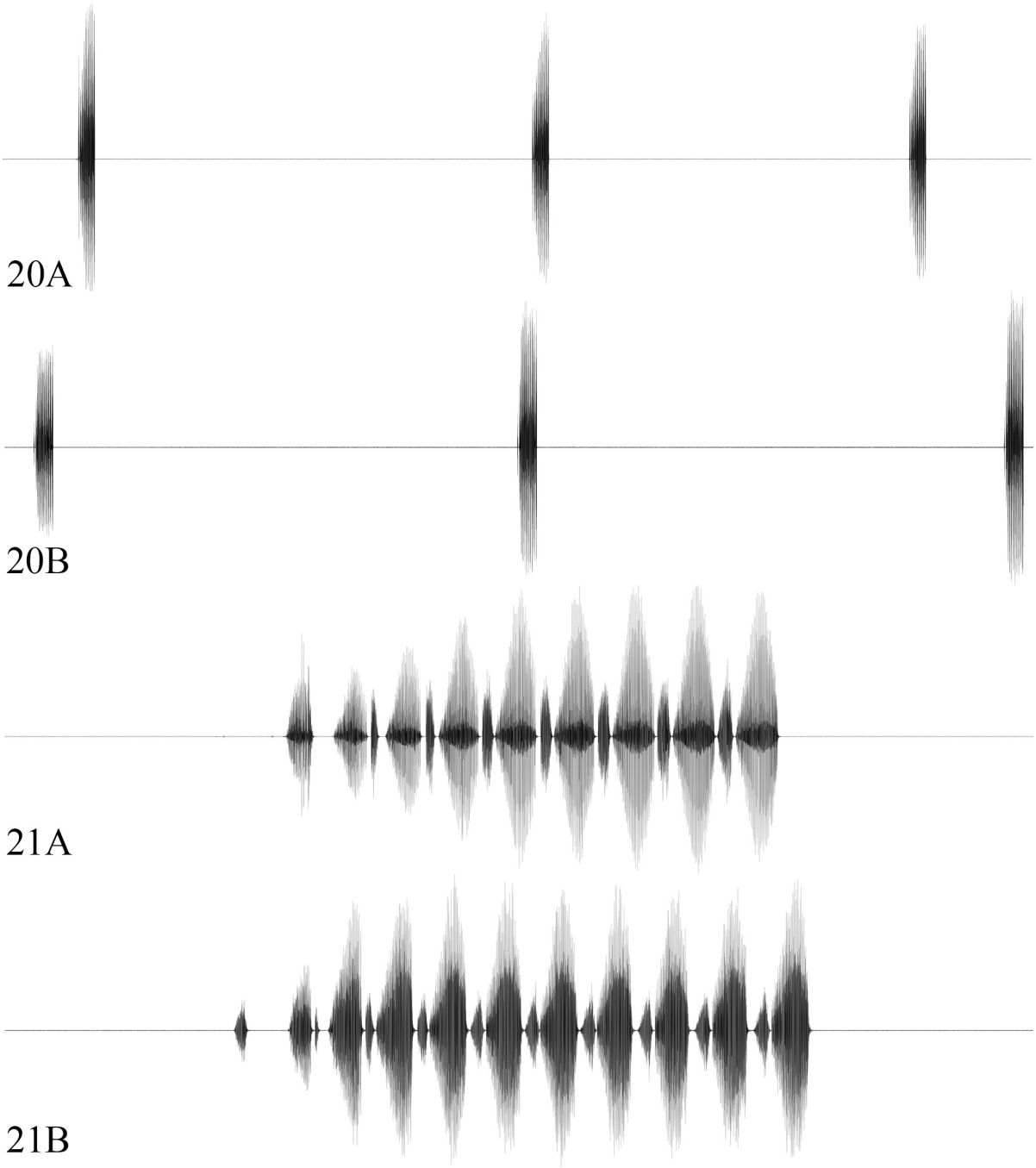
Body ♂ 20.0–21.2, ♀ 21.7; pronotum ♂ 4.8–5.4, ♀ 5.6; elytron ♂ 1.1–1.7, ♀ 0.0; hind femur ♂ 15.2–16.0, ♀ 17.6; ovipositor 15.0. Ratio hind femur/pronotum ♂ 3.0–3.2, ♀ 3.1; ovipositor/pronotum 2.7; hind femur/ovipositor 1.2.

Differential diagnosis

R. parnassica sp.nov. is well defined and clearly differs from most other Greek species of *Rhacocleis* by the relatively compact cercus in the male with a strong inner side tooth at one quarter of the length. The male cercus resembles those found in *R. anatolica*, *R. Sylvestri* and *R. werneri* but in these three species the cercus is slimmer, and the side tooth placed closer to the base. Differences with *R. distinguenda* are more subtle, the cercus in *R. distinguenda* being more robust and the side tooth being less well defined. Besides, the two species differ in the acute lobes along the hind margin of the last tergite which are more pronounced in *R. parnassica* sp.nov. and the titillator in ventral view is gradually narrowing along most of its length in *R. distinguenda* instead of suddenly narrowing in the apical third in *R. parnassica* sp.nov.. Female *R. parnassica* sp.nov. can be easily distinguished from congenerics by the shape of the female 7th sternite and subgenital plate. With the 7th sternite being flattened, unmodified and not raised, *R. parnassica* sp.nov. clearly differs from species in which this sternite is modified e.g. *R. werneri*, *R. silvestrii*,

R. distinguenda, *R. anatolica* and *R. turcica*. The overall shape, especially the presence of a central keel and short outward bend ridges in the proximal half forming deep pits in female *R. parnassica* sp.nov. resembles those found in *R. werneri*, *R. turcica* and *R. anatolica* but differs in the overall shape and the rather deeply excised apical part.

Bioacoustics. In many species of *Rhacocleis*, the main structure of the song is very much like *R. parnassica* sp.nov. Differences between species especially reside in the number of syllables per echeme, although several species show overlap in this respect. The song of *R. parnassica* sp.nov. in the number of syllables resembles the songs of several species, including *R. germanica*, *R. annulata*, *R. buchichii*, *R. insularis* and *R. distinguenda*. As far as we know only *R. germanica* occurs in the same area as *R. parnassica* sp.nov. As both species seem to produce identical songs, this suggests there are other barriers to keep the species separate. The phenomenon of similar songs but differences in the morphology, particularly the male genitalia, has also been reported for *Eupholidoptera* (Çiplak *et al.* 2009).



FIGURES 20–21. *Rhacocleis parnassica* sp.nov. oscillograms 20. 30s series of echemes of A. holotype (RMNH.INS1452570) B. paratype (RMNH.INS1452574) 21. 1s oscillogram of one echeme of A. holotype (RMNH.INS1452570) B. paratype (RMNH.INS1452574).

Habitat

The habitat in which the species was recorded is a slope with a southeast exposure and an inclination of about 30° (figs 22–23). The main plants recorded at the sampling point (100 x 100 m), are *Picnomon acarna, Lactuca viminea, Scrophularia cf. auriculata, Bromus sp.* and *Sedum amplexicaule*. The average height of the herbaceous vegetation inside the sampling point was 55 cm, while the maximum height reached 124 cm. Also, in terms of ground coverage, the stones/rocks cover was predominant (65%), while the herb cover was extended to a smaller part (35%) (the assessment of coverage was made qualitatively by the researchers). Regarding the plant species of the wider area, *Abies cephalonica, Morinia persica, Euphorbia myrsinites, Cerastium brachypetalum* and *Echinophora spinosa* prevailed.

FIGURES 22–23. Habitat *Rhacocleis parnassica* sp.nov. 20. overview 21. close-up of the scree.

The species is generally found in the spruce zone, which mostly shows *Abies cephalonica* spruce sessions.

Distribution

Rhacocleis parnassica sp.nov. is only known from its type locality, the southern slopes of Mt. Parnassos where it occurs on slopes with scree at 1450 m. Mt Parnassos belongs to the Natura 2000 European network of protected areas (code: GR2450005) and has been declared a national park since 1938. Figure 24 illustrates the known distribution of all three *Rhacocleis* species, exclusively found on scree slopes in Greek mountains, *R. crypta*, *R. lithoscirtetes* and *R. parnassica sp.nov.* The locations for *R. crypta* include, beside the type locality Mt. Gavrogo, also Mt. Prof. Ilias to its south where the species was discovered in 2025. Locations for *R. lithoscirtetes* include, besides the localities mentioned in the description, also Mt. Kaliakouda and Mt. Kokkinia where the species was found in 2021 (D. Chobanov, pers. comm.)

Figure 24 Distribution of *Rhacocleis parnassica sp. nov*. (red), *R. lithoscirtetes* (blue), and *R. crypta* (yellow) in central Greece. Inset maps show the broader area within Greece and Europe and the Natura 2000 area of Mt Parnassos (GR2450005).

Etymology

The species is named after the mountain on which it has been discovered: Mt. Parnassos.

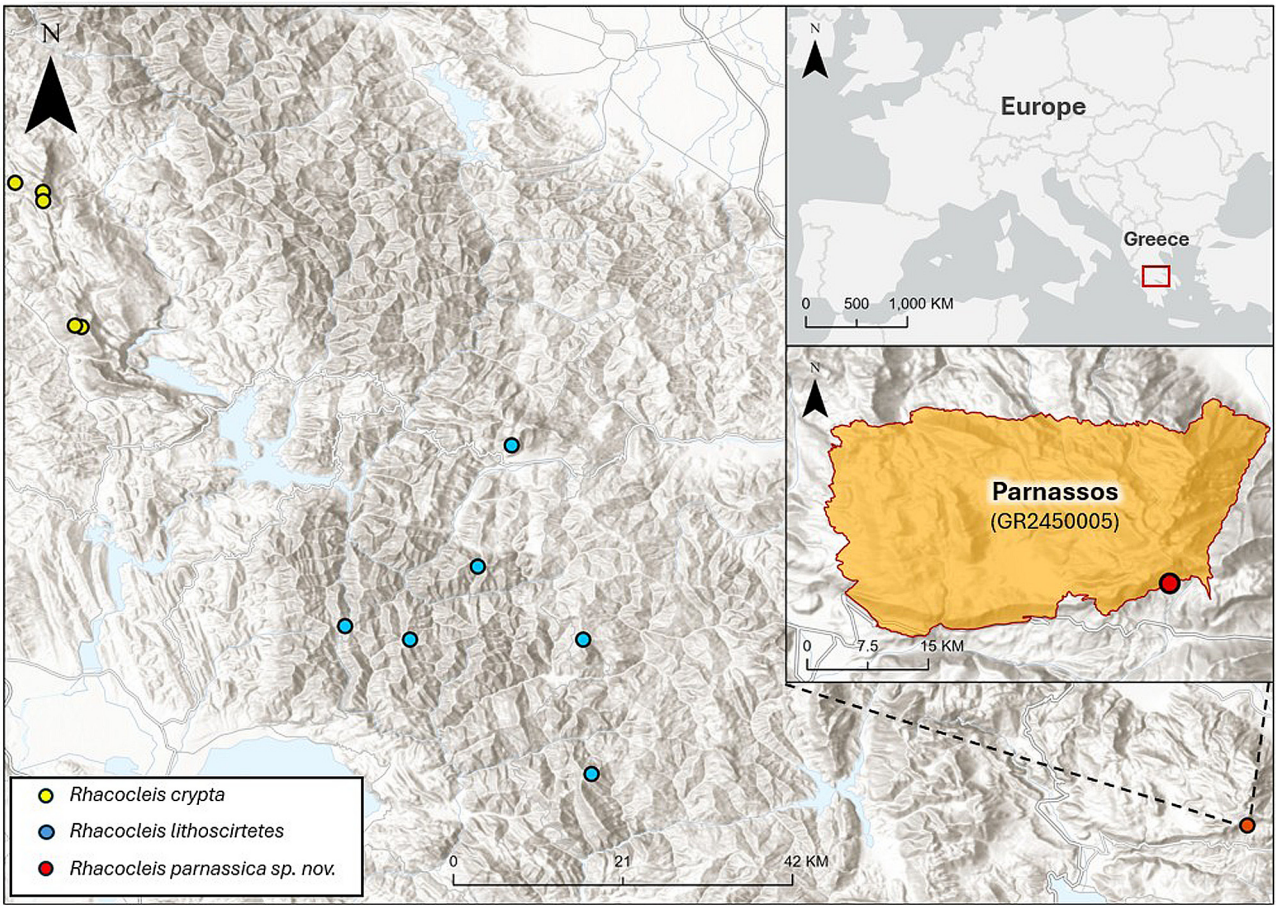


FIGURE 24. Distribution of *Rhacocleis parnassica sp. nov*. (red), *R. lithoscirtetes* (blue), and *R. crypta* (yellow) in central Greece. Inset maps show the broader area within Greece and Europe and the Natura 2000 area of Mt Parnassos (GR2450005).

IUCN Red List Status

With only a single record available, there is insufficient evidence to directly or indirectly assess the species' extinction risk based on its distribution or population status. We therefore classify it as Data Deficient (DD) under IUCN criteria (IUCN, 2025). Based on the collection site and presumed ecological preferences, we hypothesise that it may occur on additional scree slopes of Mt. Parnassos, particularly along the steep southern and eastern flanks that drop sharply to the lowlands and the sea. Its presence is likely more restricted along the western and northern slopes, which descend gradually to plateaus at 1,000–1,300 m. The species may also occur on neighbouring mountains such as Mt. Elikonas or Mt. Giona, though this remains speculative and requires confirmation through targeted surveys. Mt. Parnassos is a major year-round tourist destination, attracting hikers and hosting Greece's oldest and largest ski resort (Kapetanakis *et al.*, 2022). The ski facilities are located above 1,700 m, which may lie outside the species' current altitudinal range. Nonetheless, to determine whether its distribution overlaps with these high-altitude areas more research is required. Should this be the case, habitat loss and disturbance associated with expansion of ski infrastructure (e.g., buildings, roads, and parking areas) could represent a threat, as observed for other endemic and threatened taxa of the mountain (Stefanidis *et al.*, 2025). The most immediate and plausible threat, however, is wildfire. Given the species' apparently restricted range, it could lose its entire population due to a single catastrophic event. This is of particular concern considering the increasing frequency and extent of megafires in Greece in recent years (Troumbis *et al.* 2023; Papavasileiou and Giannaros 2022). Overall, these represent only some of the potential threats facing Orthoptera on Mt. Parnassos (Stefanidis *et al.*, 2025), and their specific impacts on the study species remain unknown. Only after comprehensive research on its ecology, distribution, and population size an assessment under IUCN Red List criteria is possible.

Discussion

With the description of *R. parnassica* sp. nov., a total of 17 species of *Rhacocleis* are now recorded from Greece. Among these, two species (*R. germanica* and *R. graeca)* are widely distributed across larger parts of the country, ten are entirely or largely confined to islands, and five are restricted to the mainland and the Peloponnese. Of the latter group, *R. ferdinandi* and *R. trilobata* occur in lowlands up to 1000 m, while three others, including *R. parnassica* sp. nov., are confined to higher altitudes.

In general, the genus *Rhacocleis* is well represented in Greece, although it is outnumbered by the bush-cricket genera *Poecilimon* and *Eupholidoptera*. For both these genera, recent studies have investigated events and factors that led to speciation, providing possible explanations for the dispersal patterns observed. Speciation in *Eupholidoptera* has been triggered by palaeogeological events in the Tortonian (11–9 Ma), and the Messinian (7–5,5 Ma) followed by the regression of the Aegean area in the Pliocene (ca. 4.5 Ma) and sea level changes in the Pleistocene (Çiplak *et al.*, 2009, 2010). Also, in *Poecilimon*, the origin and dispersal patterns are clearly connected with paleogeographic and paleo climatic events reflected in behavioural, physiological and morphological specializations (Borissov *et al.*, 2023). Similar factors have likely shaped speciation in *Rhacocleis*, although this has not yet been investigated. It is therefore of interest to compare speciation processes in *Rhacocleis*, particularly in the three high-altitude species, with those documented in *Eupholidoptera* and *Poecilimon*, as well as with the speciation histories of the mountain genera *Parnassiana* and *Oropodisma*.

With the addition of *R. parnassica sp. nov.,* three *Rhacocleis* species are now known from scree slopes on the Greek mainland. Whereas *R. crypta* and *R. lithoscirtetes* appear closely related both morphologically and bioacoustically, *R. parnassica* sp. nov. is clearly distinct. Morphologically, it shows greater resemblance to *R. distinguenda* and *R. werneri*, while its acoustic traits are more like those of *R. germanica* and *R. annulata*.

The Orthoptera fauna of Greece has been systematically studied for over 50 years. The first comprehensive overview reported 313 species (F. Willemse, 1984), while the more recent field guide listed 378 species (L. Willemse *et al.*, 2018). The increase includes 51 species described as new to science between 1985 and 2018, along with additional faunistic records. Since 2018, a further 21 species have been described in Greece (Allegrucci *et al.*, 2021; Di Russo *et al.*, 2018; Lemonnier-Darcemont & Darcemont, 2020; Stalling *et al.*, 2020; Willemse *et al.*, 2022; Willemse *et al.*, 2023; Lemonnier-Darcemont & Darcemont, 2023; Alexiou, 2024; Alexiou *et al.* 2024; Trillo & Ortega, 2025). This continual growth reflects the complex geological history of Greece, its extensive archipelago, mountainous landscapes, and numerous cave systems. Limited dispersal abilities in short-winged taxa have further contributed to the high proportion of species with restricted ranges confined to islands, mountain systems, or caves. Despite the ongoing exploration of Greece there are quite a few white spot areas in Greece including islands, caves and mountain areas that still must be visited for the first time and thus more new findings may still be expected. Moreover, the discovery of *R. parnassica* sp. nov. shows that the possibility of finding new taxa is not only restricted to unexplored areas of Greece but may even take place in rather well-known areas like Mt. Parnassos. Mt. Parnassos was extensively visited by Theobald J. Krüper between 1859–1889 resulting in the description of *Ovaliptila krueperi* (Pantel, 1890), *Oropodisma parnassica* (Scudder, 1897) and *Parnassiana parnassica* (Ramme, 1926). The first author and his father, Fer Willemse, together or separately, visited Mt. Parnassos in 10 different years between 1971 and 2020 without observing the *Rhacocleis* species described in this paper. Since scree slopes are common in mountains throughout Greece, there may still be additional, undetected *Rhacocleis* populations and potentially new taxa awaiting discovery. Targeted surveys on scree habitats in neighboring mountains, such as Giona, Vardousia, and Oiti, as well as in the Peloponnese, may therefore provide further discoveries.

Acknowledgements

We are grateful for the extension of the permit 182579/114 issued 17 May 2019 by the Greek Ministry of Environment and Energy for the period 15/05/2021–30/09 2021. The sampling was part of the project "PARNO-Improving the knowledge of Parnassos' endemic and threatened entomofauna" funded by the Natural Environment & Climate Change Agency (NECCA) of Greece, with scientific coordinator Prof. Vassiliki Kati. We are grateful to Assoc. Prof. George Fotiadis for identifying the plant species and to Dr. Olga Tzortzakaki for her support during fieldwork. We thank Prof. V. Kati and Roy Kleukers for the field images they made of live specimens, and Jos Tilmans for assisting in the differential diagnosis. Finally, to Yvonne van Dam for making the stacking images.

References

Alexiou, S. (2024) *Eupholidoptera kekrops* sp. nov. (Orthoptera, Tettigoniidae), new bush-cricket from Greece. *Journal of Orthoptera Research*, 33 (1), 67–70. https://doi.org/10.3897/jor.33.103790

Alexiou, S., Bakolitsas, K., Di Russo, C. & Rampini, M. (2024) Four new *Dolichopoda* species from Greece, one *Troglophilus* new to Greece and new locality records (Orthoptera, Rhaphidophoridae). *Contributions to Entomology*, 74 (1), 103–111. https://doi.org/10.3897/contrib.entomol.74.e121614

Allegrucci, G., Rampini, M., Chimenti, C., Alexiou, S. & Di Russo, C. (2021) Dolichopoda cave crickets from Peloponnese (Orthoptera, Rhaphidophoridae): molecular and morphological investigations reveal four new species for Greece. *The European Zoological Journal*, 88 (1), 505–524. https://doi.org/10.1080/24750263.2021.1902005

Brunner von Wattenwyl, C. (1882) *Prodromus der europäischen Orthopteren*. Wilhelm Engelmann Verlag, Leipzig, 466 pp.

Brunner von Wattenwyl, C. (1893) Révision du système des orthoptères et descriptions des espèces rapportées par M. Leonardo Fea de Birmanie. *Annali del Museo Civico di Storia Naturale 'Giacomo Doria' Genova*, 33, 1–230. https://doi.org/10.5962/bhl.title.5121

Caudell, A.N. (1908) Orthoptera Fam. Locustidae Subfam. Decticinae. *In*: Wytsman, P. (Ed.), *Genera Insectorum*. Verteneuil & Desmet, Bruxelles, 42 pp.

Cigliano, M.M., Braun, H., Eades, D.C. & Otte, D. (n.d.) Orthoptera Species File. Available from: http://orthoptera.speciesfile.org/ (accessed 15 September 2025)

Çiplak, B., Heller, K.-G. & Willemse, F. (2009) Review of the genus Eupholidoptera (Orthoptera, Tettigoniidae): different genitalia, uniform song. *Zootaxa*, 2156 (1), 1–77. https://doi.org/10.11646/zootaxa.2156.1.1

Di Russo, C., Rampini, M., Chimenti, C. & Alexiou, S. (2018) New species of *Dolichopoda* Bolívar, 1880 (Orthoptera, Rhaphidophoridae) from the Aegean Islands of Andros, Paros and Kinaros (Greece). *Zoosystema*, 40 (20), 469–479. https://doi.org/10.5252/zoosystema2018v40a20

Harz, K. (1969) *Die Orthoptera Europas 1. Series entomologica 5*. Junk, The Hague, 749 pp. https://doi.org/10.1007/978-94-017-2511-8_1

Harz, K. (1983) Eine neue Rhacocleis-Art auf Kreta (Orth., Decticinae). *Articulata*, 2 (2), 13–14.

IUCN (2025) The IUCN Red List of Threatened Species. Version 2025-1. Available from: https://www.iucnredlist.org (accessed 19 September 2025)

Kapetanakis, D., Georgopoulou, E., Mirasgedis, S. & Sarafidis, Y. (2022) Weather Preferences for Ski Tourism: An Empirical Study on the Largest Ski Resort in Greece. *Atmosphere*, 13 (10), 1569. https://doi.org/10.3390/atmos13101569

Kotitsa, N., Chobanov, D., Trichas, A. & Mylonas, M. (2025) New and noteworthy records of Orthoptera (Insecta) from Crete (Greece) and its satellite islets. *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"*, 68 (1), 143–217. [https://travaux.pensoft.net/article/151701]

La Greca, M. & Messina, A. (1974) Le Rhacocleis di Grecia e descrizione di una nuova specie (Orthoptera, Decticinae). *Animalia*, 1 (1/3), 175–183.

Lemonnier-Darcemont, M. & Darcemont, C. (2020) Presence of *Poecilimon pechevi* Andreeva, 1978 (Orthoptera, Phaneropterinae) on Orvilos Mountain, Greece. *Articulata*, 35, 87–91.

Lemonnier-Darcemont, M. & Darcemont, C. (2023) New data on the distribution of the genus *Roeseliana* Zeuner, 1941 (Orthoptera, Tettigoniidae, Tettigoniinae) in the southwestern Balkans, with description of *R. epirotica* n. sp. *Zoosystema*, 45 (14), 445–450. https://doi.org/10.5252/zoosystema2023v45a14

Papavasileiou, G. & Giannaros, T.M. (2022) The Catastrophic (2021) Wildfires in Greece: An Outbreak of Pyroconvective Events. *Environmental Sciences Proceedings*, 17 (1), 7. https://doi.org/10.3390/environsciproc2022017007

Ramme, W. (1928) Neue balkanische Decticini (Orth. Tettigon.). *Deutsche Entomologische Zeitschrift*, 1928, 302–304. https://doi.org/10.1002/mmnd.192819280405

Ramme, W. (1939) Beiträge zur Kenntnis der palaearktischen Orthopterenfauna (Tettig. et Acrid.). III. *Mitteilungen aus dem Zoologischen Museum, Berlin*, 24, 41–149, pls. 2–3.

Stalling, T., Chobanov, D.P. & Iorgu, I.S. (2020) The ant cricket Myrmecophilus orientalis on the Dodecanese Islands, Greece (Orthoptera: Myrmecophilidae). *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"*, 63 (1), 63–67. https://doi.org/10.3897/travaux.63.e49546

Stefanidis, A., Kougioumoutzis, K., Zografou, K., Fotiadis, G., Tzortzakaki, O., Willemse, L. & Kati, V. (2025) Mitigating the extinction risk of globally threatened and endemic mountainous Orthoptera species: Parnassiana parnassica and Oropodisma parnassica. *Insect Conservation and Diversity*, 18 (1), 54–68. https://doi.org/10.1111/icad.12784

Tilmans, J., Odé, B. & Willemse, L. (2016) *Rhacocleis andikithirensis* a new bush-cricket from Greece (Orthoptera: Tettigoniidae: Tettigoniinae). *Journal of Orthoptera Research*, 25 (1), 25–38.

https://doi.org/10.1665/034.025.0105
Trillo, M. & Ortego, J. (2025) Geometric morphometric characterization of the Balkan alpine grasshopper genus Oropodisma Uvarov, 1942 (Orthoptera, Acrididae, Melanoplinae), with description of two new species. *ZooKeys*, 1240, 195–217. https://doi.org/10.3897/zookeys.1240.150223
Troumbis, A.Y., Gaganis, C.M. & Sideropoulos, H. (2023) Probabilistic Wildfire Risk Assessment and Modernization Transitions: The Case of Greece. *Fire*, 6 (4), 158. https://doi.org/10.3390/fire6040158
Ünal, M. (2018) Tettigoniinae (Orthoptera: Tettigoniidae) from Turkey with key to genera and descriptions of six new species. *Zootaxa*, 4432 (1), 1–66. https://doi.org/10.11646/zootaxa.4432.1.1
Uvarov, B. (1942) New and less known southern Palaearctic Orthoptera. *Transactions of the American Entomological Society*, 67, 303–361, pls. 25–29. [1941]
Werner, F. (1933) Ergebnisse einer zoologischen Studien- und Sammelreise nach den Inseln des Ägäischen Meeres II. Orthopteren. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften zu Wien, Mathematisch-Naturwissenschaftliche Klasse, Abteilung I*, 142 (5–7), 185–204.
Werner, F. (1934) Dritter Beitrag zur Kenntnis der Tierwelt der Ägäischen Inseln. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften zu Wien, Mathematisch-Naturwissenschaftliche Klasse*, Abteilung I, 143 (8–10), 313–337.
Werner, F. (1937) Ergebnisse der vierten zoologischen Forschungsreise in die Ägäis (1936). *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften zu Wien, Mathematisch-Naturwissenschaftliche Klasse, Abteilung I*, 146 (1–2), 89–118.
Willemse, F. (1982) A survey of the Greek species of Rhacocleis Fieber (Orthoptera, Ensifera, Decticinae). *Annales Musei Goulandris*, 5, 195–213.
Willemse, F. (1984) *Catalogue of the Orthoptera of Greece. Fauna Graeciae I*. Hellenic Zoological Society, Athens, XII + 275 pp.
Willemse, F. & Willemse, L. (2005a) Two new cryptic aberrant species of *Rhacocleis* Fieber, 1853, living under stones in the mountains of Greece (Orthoptera: Tettigoniidae). *Journal of Orthoptera Research*, 14 (2), 161–172. https://doi.org/10.1665/1082-6467(2005)14[161:TNCASO]2.0.CO;2
Willemse, F. & Willemse, L. (2005b) Rhacocleis Fieber 1853 and Pterolepis Rambur 1838, distinct species groups or not ? *Journal of Orthoptera Research*, 14 (2), 261–269. https://doi.org/10.1665/1082-6467(2005)14[261:RFAPRD]2.0.CO;2
Willemse, L. & Tilmans, J. (1987) Rhacocleis ferdinandi, a new species from the Greek mainland (Orthoptera: Tettigoniidae). *Entomologische Berichten, Amsterdam*, 47 (1), 9–11.
Willemse, L., Kleukers, R. & Odé, B. (2018) *The grasshoppers of Greece*. EIS Kenniscentrum Insecten & Naturalis Biodiversity Center, Leiden, 440 pp.
Willemse, L., Tilmans, J., Kotitsa, N., Trichas, A., Heller, K.-G., Chobanov, D. & Odé, B. (2023) A review of *Eupholidoptera* (Orthoptera: Tettigoniidae) from Crete, Gavdos, Gavdopoula and Andikithira. *Zookeys*, 1151, 67–158. https://doi.org/10.3897/zookeys.1151.97514
Willemse, L., Tilmans, J. & Odé, B. (2022) *Leptophyes axeli* sp.nov. a new bush-cricket from Crete, Greece (Orthoptera: Tettigoniidae: Phaneropterinae). *Zootaxa*, 5125 (5), 536–546. https://doi.org/10.11646/zootaxa.5125.5.4