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Additions to the Orthoptera (*sens. lat.*) of the Canary Islands

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Abstract

A new subspecies of Pamphagidae (*Purpuraria erna lanzarotensis*) is provided, and additional distributions, and nomenclature changes of Orthoptera (*sens. lat.* to include Blattaria, Mantodea and Phasmida) of the Canary Islands. A significant inter-island difference in body size of the acridid *Calliptamus plebeius* is discussed.

Key words

Orthoptera, Canary Islands, Acrididae, Pamphagidae, Gryllidae, Blattaria, Mantodea, morphology, distribution.

Introduction

Since the publication of the most recent annotated list of Orthoptera (*sens. lat.*) of the Canary Islands (Bland *et al.* 1996), new species and subspecies, and changes in distributions and nomenclature have occurred, as well as the need to make several additions and corrections to the list. In addition, it was discovered that often the body size of the endemic acridid *Calliptamus plebeius* (Walker) varied significantly among the five islands on which the specimens were collected. These subjects are addressed to update the annotated list.

New taxa and distributions

Island abbreviations in Table 1 and Fig. 7 are as follows: F, Fuerteventura; C, Gran Canaria; G, La Gomera; H, El Hierro; L, Lanzarote; P, La Palma; T, Tenerife. Species collecting record abbreviations in Table 1 refer to the following: B, Bland & Gangwere (1998); D, Dambach & Beck (1990); G, García (1999); GO, García & Oromí (1999); GR, Grunshaw (1991); GV, Gorochov (1993); K, Kruseman (Zoölogisch Museum Amsterdam, Nederland); M, Morales collection; MIO, Martín *et al.* (1999); P, Paul collection; W, Wiemers (1993).

Wernerella rugosa Bland (Acrididae, Oedipodinae) is a new species collected on Fuerteventura and Lanzarote (Bland & Gangwere 1998). It was originally referred to as sp. 2 in Bland *et al.* (1996). Species 1 in Bland *et al.* (1996) was subsequently identified as *Sphingonotus sublaevis* (Bolívar) (Bland & Gangwere 1998). *Wernerella pachecoi* (Bolívar), collected at Maspalomas, Gran Canaria, in August 1992 by

Morales Martín, was inadvertently omitted for this island by Bland *et al.* (1996).

A single female designated as *Purpuraria* sp. (Pamphagidae, Pamphaginae) was collected at Yaiza, Lanzarote, in 1977 by M. C. and G. Kruseman. Until then the only *Purpuraria* species recorded in the Canary Islands was the endemic *P. erna* Enderlein on Fuerteventura (Bland *et al.* 1996). Comparison of the specimen with *P. erna* showed it to be similar but with a few obvious differences. Since no males or additional females have been collected on Lanzarote for further study, the female specimen is designated only as a new subspecies of *P. erna*.

Purpuraria erna lanzarotensis new subspecies

Type. — Holotype♀. Canary Islands (Spain), Lanzarote, Yaiza, 3 & 8 - III- 1977, collectors M. C. and G. Kruseman. Zoölogisch Museum Amsterdam, Nederland.

Diagnosis. — Figs 1B-6B. Lateral margins of fastigium slightly incurved (dorsal view) in middle third; prozona of pronotum tumid in anterior view due to convex sides, dorsum of prozona 2.5 mm above vertex of head; metanotum and first two abdominal terga with tuberculate and strongly elevated median ridge in lateral view; broadly triangular median lobe of subgenital plate about 1.5X wider at base than long; dorsal ovipositor valves with deeply incurved proximal margin, paired inner lobes at proximal margin midpoint, lateral margins narrowly black and weakly lobed, apical notch between valves extends about 1/3 distance to midpoint of proximal margin.

Description. — **Female:** general morphology as in nominate species (Enderlein 1929, *cf.* Dirsh 1965 for illustration of entire female, Báez 1984). Comparison of head, thorax, abdomen, and ovipositor between female nominate species and subspecies shown in Figs 1-6. Body length (apex of fastigium to apex of ovipositor) 43 mm; antennae 10 segmented (apical 1-2 segments missing), segments 3, 4 and 5 are 3.8, 2.6 and 2.25 mm long respectively, size relationships of segments 3-5 similar to illustration by Dirsh (1965, Fig. 71) but not as illustrated by Báez (1984, Plate 1, Fig. 2)

Table 1. New species and distributions of Orthoptera (*sens. lat.*) of the Canary Islands. Asterisks indicate endemic species.

	F	Islands L	C	T	P
Orthoptera					
Acrididae					
Eyprepocnemidinae					
<i>Heteracris littoralis</i> (Rambur)	P		GR		
Oedipodinae					
<i>Wernerella pachecoi</i> (Bolívar)			M		
<i>Wernerella rugosa</i> Bland*	B	B			
Pamphagidae					
Pamphaginae					
<i>Purpuraria erna lanzarotensis</i> Bland		K			
Gryllidae					
Mogoplistinae					
<i>Cycloptiloides canariensis</i> Bolívar*			D		
Oecanthinae					
<i>Oecanthus dulcisonans</i> Gorochov				GV	
Blattaria					
Blattellidae					
Pseudomopinae					
<i>Blattella germanica</i> (Linnaeus)					G
<i>Loboptera chioensis</i> Martín and Izquierdo*				MIO	
<i>Loboptera lagunensis</i> Martín and Izquierdo*				MIO	
<i>Loboptera penirobusta</i> Martín and Izquierdo*				MIO	
<i>Loboptera teneguia</i> Izquierdo and Martín*					MIO
<i>Loboptera tenoensis</i> Izquierdo and Martín*				MIO	
Euthyrrhaphidae					
Tiviinae					
<i>Zetha simonyi</i> (Krauss)					G
Mantodea					
Mantidae					
Amelinae					
<i>Ameles gracilis</i> (Brullé)*					GO
<i>Ameles limbata</i> (Brullé)*					GO
<i>Pseudoyersinia betancuriae</i> Wiemers*	W				

or by Enderlein (1930, Fig. 2) where segments 3 and 4 are equal in length and segment 5 is longest.

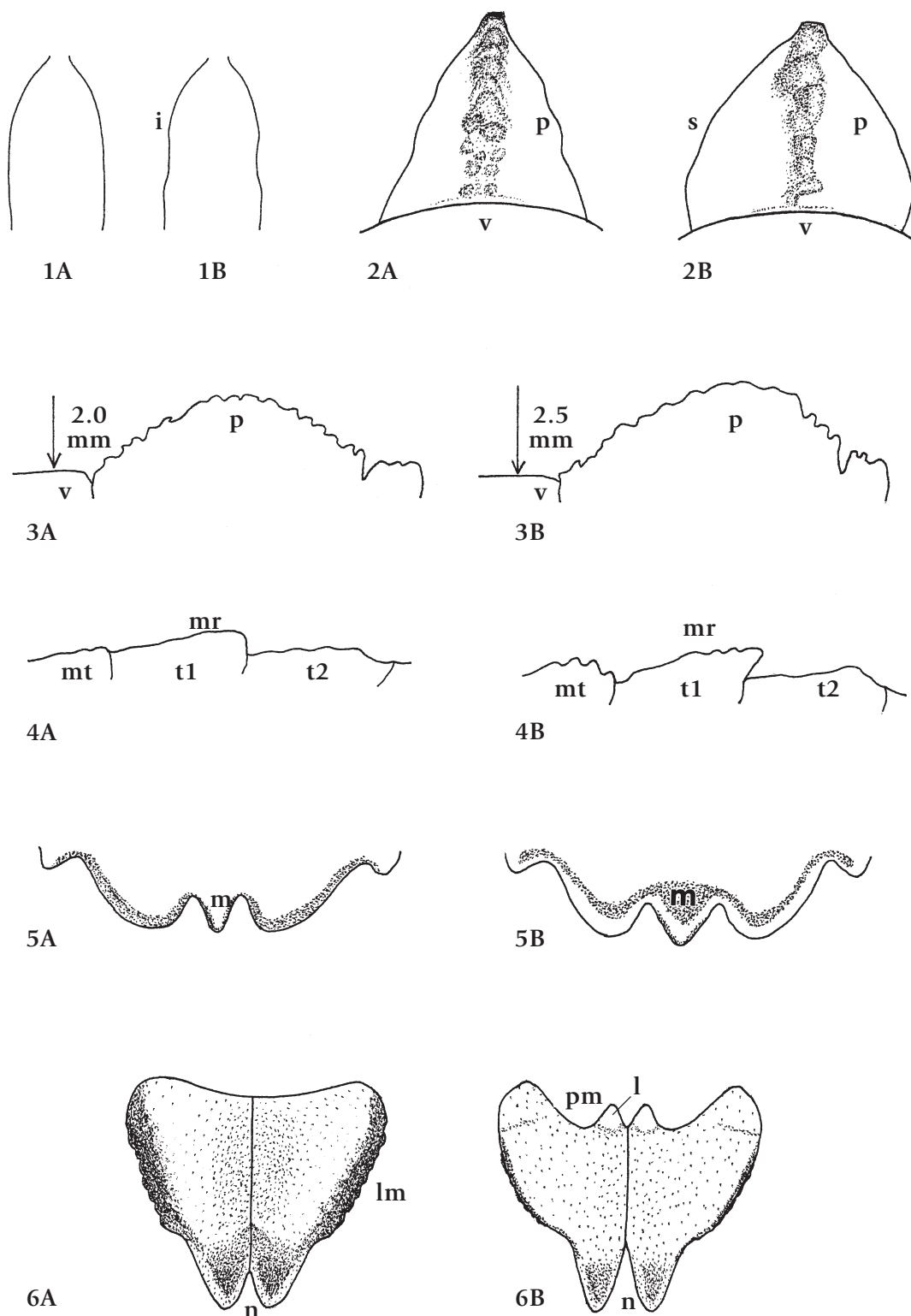
Heteracris littoralis (Rambur)
(Acrididae, Eyprepocnemidinae)

Color.— As in nominate species.

Etymology.— The subspecies name refers to Lanzarote, the island on which it was collected.

Depository.— Zoölogisch Museum Amsterdam, Netherlands.

This species was overlooked by Bland *et al.* (1996). Grunshaw (1991) listed specimens collected at Maspalomas, Gran Canaria, by Guichard in 1966 and Kruseman in 1986. J. Paul (pers. comm.) also collected specimens at Caleta de Fuste on Fuerteventura in December, 1995. This species is apparently what Holzapfel (1970) erroneously referred to as *Eyprepocnemis cinerea* (Blanchard), although specimens under that name in the Natural History Museum (United Kingdom) could not be located and the species was listed as undocumented for the Canary Islands by Bland *et al.* (1996). The specimens of *H. littoralis* collected by Guichard in 1966



Figs. 1-6. External structures separating female *Purpuraria erna* (Figs 1A-6A) from female *P. erna lanzarotensis* (Figs 1B-6B). 1. Dorsal view of fastigium; 2. Anterior view of prozona of pronotum; 3. Lateral view of pronotum; 4. Lateral view of metanotum and abdominal tergites 1 and 2; 5. Ventral view of subgenital plate; 6. Dorsal view of dorsal valves of ovipositor. i, incurved margin; l, lobe; lm, lateral margin; m, medial lobe; mr, median ridge; mt, metanotum; n, notch; p, prozona; pm, proximal margin; s, swollen side; t1, 1st abdominal tergite; t2, 2nd abdominal tergite; v, vertex of head.

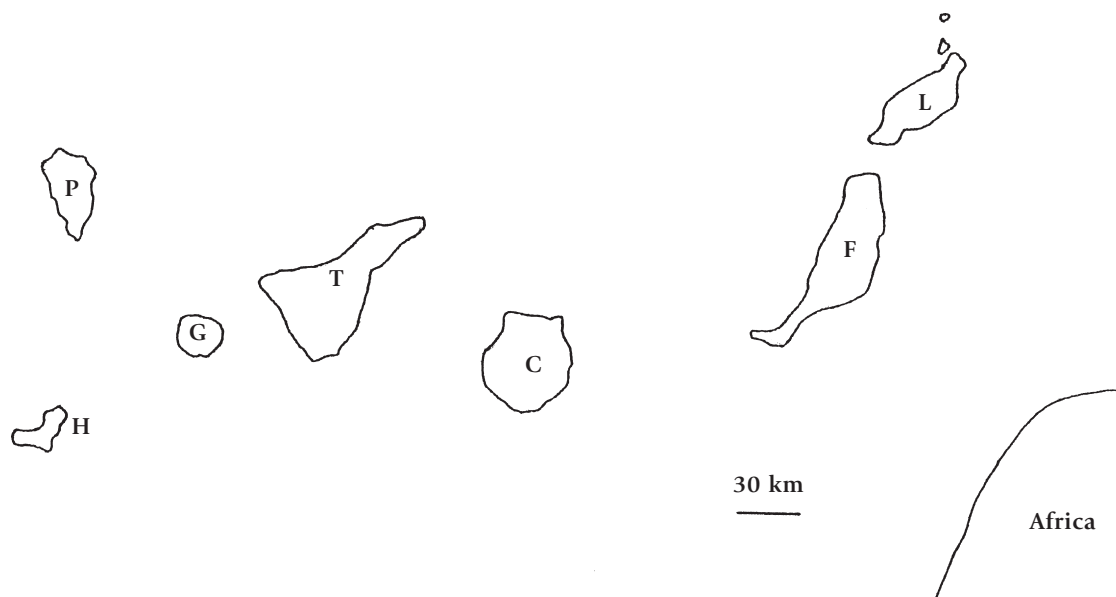


Fig. 7. Relative positions of the Canary Islands.

have the same locality, date of collection, and repository as "*E. cinerea*." *Heteracris littoralis* inhabits sparse vegetation on volcanic gravel behind beaches in the Canaries and ranges from the Cape Verde Islands through northern Africa, Mediterranean islands, and the Middle East to northern India.

Cycloptiloides canariensis Bolívar
(Gryllidae, Mogoplistinae)

Previously known only from Tenerife, this was collected from Gran Canaria (no locality cited) and a culture maintained for use in behavioral studies (Dambach & Beck 1990). Paul (pers. comm.) collected a male *Pseudomogoplistes* sp. at Playa de Hermigua on Gomera that is unlike *P. squamiger* (Fischer) found on several other Canary islands. There is some evidence that the *P. squamiger* records for the Canary Islands may be erroneous based on the known distribution of this species.

Oecanthus dulcisonans Gorochov
(Gryllidae, Oecanthinae)

This is a new cricket species described from museum specimens by Gorochov (1993). The holotype was collected on Tenerife (without date or locality) and the distribution of known specimens, disjunct so far, includes Saudi Arabia, Oman, Palestine, and Cyprus.

Loboptera Brunner

Martín *et al.* (1999) have described five new Canarian species of hypogean *Loboptera* cockroaches along with a new diagnosis of the genus, a redescription of *L. fortunata* Krauss,

and a revision and distribution of all of the Canarian *Loboptera* species. The new species and their distributions are listed in Table 1. Their local distribution ranges from only a single lava tube cave to multiple caves in a general region of an island. Of the 30 species of *Loboptera* now known from the greater Mediterranean region and the Canary Islands, 12 occur in the Canaries and all but one (*L. canariensis* Chopard) are endemic. Eight occur on Tenerife, two on La Palma, and one on El Hierro. The revised description of *L. fortunata* places the record of this species on Gran Canaria (Bland *et al.* 1996) in question. Martín *et al.* (1999) provide references to studies that include *Loboptera* specimens collected on the Canary Islands by other investigators. Not included are data from a cave on Tenerife (Arechavaleta *et al.* 1999) and caves on La Palma (García 1997 in which the *Loboptera* sp. listed was identified subsequently as *L. teneguia* Izquierdo & Martín (García pers. comm., García & González 1997). Two cockroach species have been recorded as new to La Palma, *i.e.*, the cosmopolitan *Blattella germanica* (Linnaeus) and the small, 8 mm long, *Zetha symonyi* (Krauss) (García 1999).

Pseudoyersinia Kirby

New data on the 5 Canarian mantid species in the genus *Pseudoyersinia* Kirby were provided by García & Oromí (1999). They included a key to the Canarian species, locality information, and a first description of the male of *P. canariensis* Chopard. The fifth species, which was not listed in Bland *et al.* (1996), is *P. betancuriae* Wiemers. It was first described by Wiemers (1993) and is endemic to Fuerteventura. In addition, the distribution of two mantid species, *Ameles limbata* (Brullé) and *A. gracilis* (Brullé), is extended to La Palma (García and Oromí 1999).

Table 2. Size variation of male and female *Calliptamus plebeius* on five Canary Islands. Body length is the distance from the frons to the apices of the folded tegmina following the method of Jago (1963) whose data, primarily from Gran Canaria, are also included below. Means followed by the same letter are not significantly different ($p < 0.05$ level; ANOVA).

	Body length (mm)								Cercus length (mm)		
	Male				Female				Male		
	Mean	N	Range	SD	Mean	N	Range	SD	Mean	Range	SD
Gran Canaria Jago	22.6	8	17.8-24.1	---	31.3	4	29.2-34.8	---	---	---	---
Gran Canaria	20.7	30	15.5-23.0	1.84	32.4	14	31.0-34.5	1.19	3.3	3.0-3.5	0.21
La Gomera	18.4a	27	17.0-20.0	1.04	28.6a	31	25.5-31.0	1.10	3.1a	2.8-3.3	0.13
Tenerife	17.1bc	24	12.5-20.0	1.78	27.5a	20	20.0-32.0	2.61	3.1a	2.7-3.3	0.15
El Hierro	17.5abc	19	15.0-20.5	1.36	25.7b	31	21.5-29.0	1.96	2.9a	2.7-3.3	0.20
La Palma	16.4b	23	15.0-17.5	0.73	25.0b	42	23.0-30.0	2.01	3.1a	2.9-3.7	0.23

Miscellaneous references

Haes (1979) recorded a variety of orthopterans from Gran Canaria. Hochkirch (1997) described the habitats and local distribution of nine species of Orthoptera from valleys near the southern coast of La Gomera. The complete citation for the Phasmida record on Tenerife (Báez 1996) is now listed in the reference section.

Nomenclature changes

Jago (1996a) indicated that the genus *Leva* (I. Bolívar) was incorrectly synonymized with *Stenohippus* (Uvarov) by Jago (1971). *Leva* (*Stenohippus*) *bonneti* (Bolívar), a species listed in Bland *et al.* (1996), was determined to be a synonym of *Stenohippus mundus* (Walker) (Jago 1996a).

The subfamily Truxalinae has been synonymized by Jago (1996b) under the subfamily Acridinae. With this change, *Truxalis nasuta* (Linnaeus), found on Gran Canaria and Tenerife, is transferred from Truxalinae to Acridinae.

The synonymy of *Grylloides sigillatus* (Walker) under *G. supplicans* (Walker) was originally recognized by Kevan (1980) and not by Kevan & Hsiung (1992) as written in Bland *et al.* (1996). Vickery (pers. comm.) notes that his work (unpublished), with macropterous and brachypterous crickets from the same field population in Baja California, showed that the genitalia of individuals of both forms were identical. These results agree with those of Ghouri & McFarlane (1958) and Toms (1993) and support the assertion by Kevan & Kevan (1995) and Vickery (1996) that *G. sigillatus* is a junior synonym of *G. supplicans*.

Morphological variation in *Calliptamus* Serville

While looking at a series of specimens of the endemic grasshopper *Calliptamus plebeius* (Walker), it was apparent that the length of the body of males and females and cerci of males varied by island. Jago (1963) revised the genus and included measurements of body length from Gran Canaria, El Hierro, and Tenerife. However, all but two of the 69 specimens were from Gran Canaria and, thus, he made no comment on the size of specimens from other islands.

Using ANOVA and Tukey's pairwise comparisons ($p < 0.05$) of specimens from the five islands on which the species occurs, I determined that the body length of males and females from Gran Canaria was significantly longer than that from all other islands (Table 2). The next longest were males and females from La Gomera; males from here were significantly longer than males from Tenerife and La Palma and females significantly longer than those from El Hierro and La Palma. Grasshoppers from Tenerife and El Hierro were intermediate in size and females (but not males) from Tenerife were significantly longer than those from El Hierro. Males and females from La Palma had the shortest mean length, although they were not significantly shorter than those from El Hierro. The length of cerci of males from Gran Canaria was significantly longer than that of males from all other islands, but differences in mean cercal length among specimens from other islands were not significant.

Gran Canaria is ca 226 km west of the northwestern coast of Africa (Fig. 7) and closer than the other islands inhabited by *C. plebeius*, suggesting that if colonizing individuals arrived from this mainland, they may have survived first on Gran Canaria. The two more arid islands between Gran Canaria and the mainland, Lanzarote and Fuerteventura, do not support populations of the grasshopper. Canarian acridids also have Iberian-Mediterranean affinities. The relatively close Iberian Peninsula is particularly important because the Canarian current sweeps past the western coast

of the Peninsula (as well as the northwestern coast of Africa) before reaching the Canaries (Holzapfel 1970).

The large body size of males and females from Gran Canaria also may indicate that this is the oldest population. Smaller specimens are more likely to have been transported successfully by prevailing winds (from the northeast most of the year) and water currents moving past Gran Canaria to the more westerly, remote islands. La Gomera, with the second largest specimen size, is relatively close to Gran Canaria (*ca* 125 km W), as is Tenerife (*ca* 60 km NW) with its intermediate sizes. La Palma and El Hierro are the most distant (both *ca* 207 km NW and SW, respectively) and La Palma has the smallest specimens. The intermediate rather than small size of El Hierro individuals is unexplained in this scenario. However, El Hierro is directly in line with Gran Canaria whereas La Gomera and Tenerife are between Gran Canaria and La Palma (Fig. 7). The two islands may have had a blocking or filtering effect on the colonization of La Palma by wind and/or water that resulted in smaller individuals arriving at a later date.

Gran Canaria is the second largest island (1523 km²) of the five on which *C. plebeius* occurs. Tenerife is the largest (2058 km²); much smaller are La Palma (728 km²), La Gomera (378 km²) and El Hierro (277 km²) (Oromí & Izquierdo 1994). The two largest islands may have provided a diversity of habitats for optimal colonization that helped maintain a relatively diverse gene pool characterized, in part, by the relatively large body size typical of the genus. The smaller islands do not have landscapes identical to the largest islands and it is unlikely that all of the islands have changed over time in the same manner. In effect, ecological similarity decreases with distance and small islands provide limited ecological opportunities that may eventually produce a shift in some gene frequencies (Grant 1998). Evidence of this in *C. plebeius* may be its smaller body size in the smaller, more remote, islands.

The western Canaries have not been joined together to the mainland (Carracedo 1979) and it is likely that any *C. plebeius* colonization sequence would have occurred in a westward direction from old to younger islands. Gran Canaria, Tenerife, and La Gomera are the oldest (16, 15 and 12 MA, respectively), and western La Palma and El Hierro are much younger (1.6 and 0.8 MA, respectively) (Oromí & Izquierdo 1994). For example, statistical analysis and molecular affinities of a Canarian lizard species with differences that included body dimensions among islands, showed that it arose on the oldest islands and colonized younger islands to the west (Thorpe & Malhotra 1998). *Drosophila* fruit fly colonization in the Hawaiian Islands occurred repeatedly from older to younger islands (Hollocher & references therein 1998). A founder event and selection for smaller size in *C. plebeius* may have evolved from a smaller-bodied single pair or single, fertilized female colonizer. The colonizing population has fewer genes than the entire mother population and this would lead to changed gene frequencies on the younger islands such as La Palma and El Hierro.

Larger populations of *C. plebeius* need to be studied to determine if one or more combinations of environmental

conditions such as habitat, food shortage or sub-optimal food, and climate have caused the significant size differences on specific islands. Further character analysis is needed to substantiate subspecies status for one or more of the populations. DNA analysis and interbreeding studies would help determine if these differences are evidence of speciation in progress.

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References

- Arechavaleta M., Sala L.L., Oromí P. 1999. La fauna invertebrada de la Cueva de Felipe Reventón (Icod de los Vinos, Tenerife, Islas Canarias). *Vieraea* 27: 229-244.
- Báez M. 1996. Nuevas citas de insectos en las Islas Canarias (Phasmatodea, Lepidoptera, Embioptera). *Boletín Asociación Española de Entomología* 20: 252-253.
- Báez M. 1984. Los panfagidos de las Islas Canarias, con la descripción de una nueva especie: *Acrostira tamarani* n. sp. (Orthop., Pamphagidae). Toma homenaje al Dr. Antonio González González. Serie Homenajes, Universidad de La Laguna, Tenerife. Pp. 37-45.
- Bland R.G., Gangwere S.K. 1998. A new species of *Wernerella* Karny (Orthoptera: Acrididae: Oedipodinae) from the Canary Islands, Spain. *Journal of Orthoptera Research* 7: 23-28.
- Bland R.G., Gangwere S.K., Morales Martín M. 1996. An annotated list of the Orthoptera (*sens. lat.*) of the Canary Islands. *Journal of Orthoptera Research* 5: 159-173.
- Carracedo J.R. 1979. Paleomagnetismo e historia volcánica de Tenerife. Aula de Cultura de Tenerife, Santa Cruz de Tenerife.
- Dambach M., Beck U. 1990. Mating in the scaley cricket *Cycloptiloides canariensis* (Orthoptera: Gryllidae: Mogoplistinae). *Ethology* 85: 289-301.
- Dirsh V.M. 1965. The African genera of Acridoidea. Cambridge University Press, London.
- Enderlein G. 1930. *Entomologica Canaria*. VII. *Zoologischer Anzeiger* 92: 41-56.
- Enderlein G. 1929. *Entomologica Canaria* IV. *Wiener Entomologische Zeitung* 46: 95-109.
- García R. 1999. Nuestras vecinas las cucarachas. *Biosfera naturaleza y sociedad* (La Palma) 3 (February): 12-13.
- García R. 1997. La fauna de la cueva de La Machacadora (La Palma, Islas Canarias). *Vulcania* 1: 49-56.
- García R., González J.A. 1997. Estudio faunístico de la cueva del Llano de Los Caños (La Palma, Islas Canarias). *Vieraea* 26: 113-119.
- García R., Oromí P. 1999. Nuevos datos sobre el género *Pseudoyersinia* Kirby en las islas Canarias (Mantodea, Mantidae). *Vieraea* 27: 97-104.
- Ghoury A.K.S., McFarlane J.E. 1958. Occurrence of a macropterous form of *Grylloides sigillatus* (Walker) (Orthoptera: Gryllidae) in laboratory culture. *Canadian Journal Zoology* 36: 837-839.
- Gorochoff A.V. 1993. Grylloidea (Orthoptera) of Saudi Arabia and adjacent countries. *Fauna of Saudi Arabia* 13: 79-97.
- Grant P.R. 1998. Speciation. Pp. 83-101. In: Grant P.R. (Ed.)

- Evolution on Islands. Oxford University Press, Oxford.
- Grunshaw J.P. 1991. A revision of the grasshopper genus *Heteracris* (Orthoptera: Acrididae: Eyprepocnemidinae). Natural Resources Institute Bull. 38.
- Haes E.C.M. 1979. September in Gran Canaria. Country-side 23 (new series): 532-536.
- Hochkirch A. 1997. Notizen zur Heuschreckenfauna von La Gomera (Kanarische Inseln, Spanien). Articulata 12: 187-200.
- Hollocher H. 1998. Island hopping in *Drosophila*: genetic patterns and speciation mechanisms. Pp. 124-141. In: Grant P.R. (Ed.) Evolution on Islands. Oxford University Press, Oxford.
- Holzäpfel C.M. 1970. Zoogeography of the Acridoidea (Insecta: Orthoptera) in the Canary Islands. Ph.D. dissertation, University of Michigan, Ann Arbor, Michigan.
- Jago N.D. 1996a. Review of western and eastern African genera of the *Dnopherula* complex (Orthoptera, Acridoidea, Gomphocerinae) with description of new genera and species. Journal of Orthoptera Research 5: 69-124.
- Jago N.D. 1996b. Song, sex and synonymy: the palaearctic genus *Acrida* Linnaeus (Orthoptera, Acrididae, Acridinae) and synonymy of the subfamily Truxalinae under the subfamily Acridinae. Journal of Orthoptera Research 5: 125-129.
- Jago N.D. 1971. A review of the Gomphocerinae of the world with a key to the genera (Orthoptera, Acrididae). Proceedings Academy Natural Sciences Philadelphia 123: 205-343.
- Jago N.D. 1963. A revision of the genus *Calliptamus* Serville (Orthoptera: Acrididae). Bulletin British Museum (Natural History) Entomology 13: 289-350.
- Kevan D.K.McE. 1980. The Orthopteroid insects of the Bermudas. Memoir Lyman Entomological Museum 8: 1-182.
- Kevan D.K.McE., Hsiung C.-C. 1992. A summary of the orthopteroid insects known from Lanzarote, Canary Islands, with description of a new cricket species of the genus *Hymenoptila* Chopard, 1943 (Grylloptera; Grylloidea; Gryllidae). Vieraia 21: 77-100.
- Kevan D.K.McE., Kevan P.G. 1995. A preliminary record of orthopteroid insects of the Maldive Islands. Journal of Orthoptera Research 4: 223-236.
- Martín J.L., Izquierdo I., Oromí P. 1999. El género *Loboptera* en Canarias; descripción de cinco nuevas especies hipogeas (Blattaria: Blattellidae). Vieraia 27: 255-286.
- Oromí P., Izquierdo I. 1994. Canary Islands. Pp. 631-639. In: Juberthie P, Decu V. (Eds) Encyclopaedia Biospeologica. V. 1. Faune Souterraine. Flore Souterraine (l'ère partie). Histoire de la Biospeologie: Amérique, Europe. Société de Biospeologie and C.N.R.S., Moulis, France, and Academie Roumaine, Bucarest, România.
- Thorpe R.S., Malhotra A. 1998. Molecular and morphological evolution within small islands. Pp. 67-82. In: Grant P.R. (Ed.) Evolution on Islands. Oxford University Press, Oxford.
- Toms R.B. 1993. More winged females of the cricket *Gryllodes supplicans* (Walker). Suid-Afrikaanse Tydskrif Dierkunde 28: 122-124.
- Vickery V.R. 1996. A response to Dan Otte's "nomenclatural tail." Metaleptea 16: 6.
- Wiemers M. 1993. Eine neue Gottesanbeterin der Gattung *Pseudoyersinia* von den Kanarischen Inseln (Mantodea, Mantidae). Nachrichten Entomologischen Vereins Apollo, Frankfurt/Main, N.F. 14: 261-269.