

ON THE ORTHOPTERA OF BERMUDA.

BY JAMES A. G. REHN.

In the spring of 1909 the Academy received from Mr. Frank M. Jones a collection of Bermudan Orthoptera which had been secured by him during a residence of some months in the islands. This sending was supplemented later by several others, the whole series, while not large, being of considerable interest, as Mr. Jones endeavored to secure every species seen during his stay, which lasted from December, 1908, to the latter part of April, 1909. The examination of the literature on Bermudan Orthoptera demonstrated how imperfect and unsatisfactory was the last summary of the Bermudan representatives of the order, that of Verrill. In consequence the published records were gathered together, the determinations of necessity being given as recorded unless the synonymy was well known and established, the results of the material on hand and the published records being incorporated into the paper here presented.

Twenty-eight species are here recorded, of which two taken from previous authors have only generic reference. A tabulation of the species according to their distribution (omitting the two without specific identification) gives the following results:

Peculiar to Bermuda.....	2
Tropical and subtropical America.....	2
South America, Antilles and Bermuda.....	1
North America and Bermuda.....	5
Circumtropical.....	3
North America, West Indies and Bermuda.....	3
Cosmopolitan.....	5
All America.....	2
North America, Bahamas and Bermuda.....	1
North America, Mexico, Cuba, Bahamas and Bermuda.....	1
North America, Mexico and Bermuda.....	1

From this it would appear that the greater portion of the Orthopterous fauna of the region is closer related to that of the mainland than to that of the Antilles, excluding, of course, from consideration the cosmopolitan and circumtropical forms, which probably have been introduced by commerce.

The author wishes to express his indebtedness to Mr. Jones for his interest and energy which brought to light the most remarkable of the two known endemic species.

DERMAPTERA.

LABIDURIDÆ.

Labidura bidens (Olivier).

Five adult males, one immature male and three adult females from Paget West, taken December 9 to March 24, have been examined and compared with Georgian and Cuban material of the species. This species has been recorded (as *L. riparia*) by Uhler, Dahl, Scudder and Verrill. The latter states (p. 827) that it is "not uncommon, occurring among débris along the shores, and also in storehouses," Uhler (p. 156) has suggested the probability of its introduction by commerce.

Anisolabis maritima (Bon.).

According to Verrill (p. 827) this species is common under decaying débris and stones at high-tide mark. No Bermudan specimens have been seen by us, and no other author has recorded the species from the islands.

Anisolabis annulipes (H. Lucas).

This widely distributed species is represented by a male and four female individuals taken in Paget West, December 9 to March 30. One female, taken March 30, 1909, has the femoral annuli practically absent. Kirby¹ has described the Bermudan insect as distinct, but Caudell had shown it is not separable from the typical form of this almost cosmopolitan species.

ORTHOPTERA s. s.

BLATTIDÆ.

Blattella germanica (Linnæus).

Verrill (p. 826) recorded this species on local authority, but no specimens had been seen by him.

Ceratinoptera diaphana (Fabricius).

Scudder recorded this species from the collection made by J. M. Jones, while the present series contains three adult males, three adult females and five immature individuals taken in Paget West, January 2 to May 17. The collector's notes are to the effect that the specimens

¹ *Anisolabis antennata*, Journ. Linn. Soc. London, XXIII, p. 517, 1891.

were beaten from cedar trees and the species was found rarely under stones in woods.

The species is widely distributed in the West Indies.

Blatta orientalis Linnæus.

Included on the authority of Verrill, who states (p. 825) that it is mostly confined to dwellings and ships.

Periplaneta americana (Linnæus).

This widely distributed species has been recorded by J. M. Jones, Uhler, Dahl, Hurdis and Verrill, and is represented in the series in hand by a single male from Paget West. It is stated to be extremely abundant during the hot summer months, particularly in old houses surrounded by trees, and Verrill (p. 824) entertains the possibility of its being indigenous. F. M. Jones' note, "Not often seen, perhaps more abundant indoors," may be explained by the season when collecting was done not being the hot summer months, although the suggestion of greater abundance indoors is probably the more potent explanation.

Periplaneta australasiæ (Fabricius).

Scudder and Verrill have both recorded this species, the latter author considering it common in the fields, under stones and in buildings. An adult male from Paget West and one nymph from the same locality, taken May 8, are before us. The collector's notes are to the effect that the species is very abundant under stones out of doors.

Leucophæa maderæ (Fabricius).

This widely distributed species has been recorded from Bermuda by J. M. Jones, Uhler, Hurdis and Verrill. The latter author states that it is very common in storehouses, while Jones and Hurdis agree in considering it less abundant than *P. americana*. The former of these two last mentioned authors states (p. 110) that it is rarely seen except in cellars and other dark places, and that it is known locally as the "knocker," from a habit of making a noise like a person gently tapping on a box or board. The present collection contains one female from Paget West, the notes accompanying which are the same as those on *Periplaneta americana*, and which can probably be explained in similar fashion.

Pyrenoscetus surinamensis (Linnæus).

This species has been recorded by Scudder, Dahl and Verrill, and is represented in the present series by two adult females and five immature specimens, taken in Paget West, December 11 to January 24. It is found under stones and considered common.

MANTIDÆ.**Stagmomantis** sp.

Verrill (p. 823) records on Henshaw's authority a species of this genus in Bickmore's collection from Bermuda. Mr. F. M. Jones (in litt.) comments as follows on this record: "The mantis recorded was perhaps a stray specimen, otherwise I should have seen at least the egg-masses before this."

PHASMIDÆ.**Anisomorpha buprestoides.**

On Henshaw's authority Verrill (p. 823) also records this species as taken in Bermuda many years ago (about 1861) by A. S. Bickmore. The fact that both this and the preceding species have been unnoticed by other collectors, in spite of their conspicuousness wherever found, leads one to suspect the possibility of erroneous labelling.

ACRIDIDÆ.**Orphulella pelidna** (Burmeister).

Uhler (p. 152) has recorded this species as *Stenobothrus maculipennis*, one of its synonyms. Probably *O. olivacea* is the species to which the reference should belong.

Orphulella olivacea (Morse).

Scudder (p. 43) has recorded this species, and a series of two males and five females taken in Warwick Parish, December 11 to April 18, are now before us. Probably Dahl's record of a species of *Orphula* and J. M. Jones' "small yellowish-brown colored grasshopper" belong to this species. The latter author says (p. 111) the species is "common on open tracts, particularly where the sandy waste is relieved by tufts of grass." The notes with the specimens in hand are to the effect that it is not rare and found on the south shore of Warwick Parish.

Orphulella speciosa Scudder.

This species was recorded by J. M. Jones in 1876 on Scudder's determination, the record being published as *Stenobothrus bilineatus*, one of the synonymic names of the species. It appears probable to the author that the record really refers to *O. olivacea*, a species unrecognized at that date.

Dissosteira carolina (Linnæus).

This species has been recorded by Jones and Verrill, and three females from Paget West, December 16-27, 1908, and summer of 1909 are in the present series. The two December specimens were the only ones seen by the collector during his stay, the summer individual having been sent him by a friend. These specimens have the median

carina of the pronotum lower and more uniform in elevation than in the majority of specimens from the United States.

Scuistoceroa americana (Drury).

Caudell (p. 330) has recorded this species from Bermuda.

Paroxya bermudensis Rehn.

1909. *Paroxya bermudensis* Rehn, Ent. News, XX, p. 343. [Warwick Parish, Bermuda.]

The full data for this most interesting species are given in the original description. It is apparently a form which matures late in the fall and in early winter, as search in March, April and May in the section where the types were taken on January 15 revealed only immature individuals.

TETTIGONIDÆ.

Neoconocephalus triops (Linnaeus).

Verrill (p. 821) has recorded this species as *Conocephalus dissimilis* on Henshaw's authority.

Neoconocephalus maxillosus (Fabricius).

This Antillean species is represented in the present series by a single male and two females taken in Paget West, December-January and summer of 1909, and at Walsingham, February 16.

These specimens are smaller than Redtenbacher's measurements of the species, but otherwise no differences exist. The male Paget West individual measures as follows:

Length of body.....	24.0 mm.
Length of fastigium.....	1.2 "
Length of pronotum.....	7.5 "
Length of tegmen.....	30.5 "
Length of caudal femur.....	18.0 "

This is the first record of the species from Bermuda.

Neoconocephalus fusco-striatus (Redtenbacher).

Scudder (p. 43) has recorded this species, and a pair taken in Paget West, December to January, are before us. According to the accompanying notes the species is not common at that season.

Orchelimum vulgare Harris.

Uhler (p. 158) has recorded this species on the basis of a badly broken female individual.

Conocephalus fasciatus (DeGeer). (*Xiphidium fasciatum* Auct.)

One male and three females of this species taken in Paget West are in the present series. This is the first record of the species from Bermuda, where it is said to be locally abundant.

GRYLLIDÆ.

Gryllus bermudensis Caudell.

This form, recently described on the basis of a single specimen, is represented in the present collection by an interesting series of forty-one individuals taken in Warwick Parish, in Paget West and on St. George Island, on a number of dates in December, January, April and May. The majority of the specimens are accompanied by habitat data, and the whole series presents some light on the extent of variability in size, proportions and coloration in material of this genus from a circumscribed locality.

The striking coloration of the type is hardly equalled in the series before us, although closely approached, but in no case is the extent of ochraceous on the head as great as originally described. Mr. Caudell, while in Philadelphia, kindly looked over some of the material treated in this connection and, as far as memory served him, he considered the specimens to belong to his species. It is apparent that the majority of specimens are darker and less contrastingly colored than the type, and it is as evident that a considerable amount of color variation is present in the species. From a type with the head and pronotum blackish, marked on the genæ, shoulders of pronotum, borders of the lateral lobes, cephalic edge of pronotal disk and around the eyes with ochraceous, and having the tegmina and limbs rufo-testaceous, the series can be laid in a graduated transition to a nearly uniform blackish type. The specimens from the south shore of Warwick Parish exhibit a constant type of coloration for the habitat, four males and two females from this section, all taken in April and May, having the head and pronotum shining black, with little or no ochraceous and comparatively pale tegmina and limbs. A depauperate pair from the meadows of Paget West, all seen from the locality, are blackish brown without any pale color, except on the angle of the tegmina where there is a touch of testaceous. The other series are either of a uniform type, blackish brown with a limited and variable amount of ochraceous on the genæ and pronotum, or each locality has several different shades of coloration.

In size we have an interesting case of depauperation in five specimens from Paget West and Warwick Parish Meadows and Warwick Parish without further data, all the other material being of what might be considered more normal size.

Careful tabulation of the proportions of the ovipositor and caudal femora reveals a variable disparity between the two, and while the correlation with the habitat is barren of results of a positive character, the suggestions are rather significant. The proportions of the females are as follows:

	Caudal femora.	Ovipositor.
Meadow: Warwick Parish.....	9.3 mm.	9.0 mm.
“ “ “	10.3 “	10.5 “
“ Paget West.....	10.0 “	9.2 “
South shore: Warwick Parish.....	12.0 “	16.5 “
“ “ “	11.5 “	16.0 “
Inland: Paget West.....	12.8 “	18.0 “
“ “ “	10.2 “	12.0 “
“ “ “	10.8 “	11.8 “
“ Warwick Parish.....	11.5 “	13.0 “
“ “ “	10.8 “	10.5 “
“ “ “	11.3 “	12.5 “
“ “ “	11.5 “	11.8 “
“ “ “	11.3 “	12.5 “
“ “ “	12.8 “	13.0 “
No habitat given: Paget West.....	11.5 “	11.5 “
“ “ “	12.8 “	16.5 “
“ “ “	11.0 “	13.8 “
“ “ “	11.8 “	13.0 “
“ Warwick Parish.....	10.0 “	9.5 “
“ “ “	12.0 “	15.0 “
St. George Island.....	11.2 “	13.5 “

Retabulating the same specimens for the excess of one of these proportions over the other we have the following:

	Caudal femora exceeding ovipositor.	Ovipositor exceeding caudal femora.
Meadow: Warwick Parish.....	3 mm.	— mm.
“ “ “	— “	.2 “
“ Paget West.....	8 “	— “
South shore: Warwick Parish.....	— “	4.5 “
“ “ “	— “	4.5 “
Inland: Paget West.....	— “	5.2 “
“ “ “	— “	1.8 “
“ “ “	— “	1.0 “
“ Warwick Parish.....	— “	1.5 “
“ “ “	3 “	— “
“ “ “	— “	1.2 “
“ “ “	— “	.3 “
“ “ “	— “	1.2 “
“ “ “	— “	.2 “
No habitat given: Paget West.....	0 “	.0 “
“ “ “	— “	3.7 “
“ “ “	— “	2.8 “
“ “ “	— “	1.2 “
“ Warwick Parish.....	— “	.5 “
“ “ “	— “	3.0 “
St. George Island.....	— “	2.3 “

The series is divided as follows on wing length:

	Short-winged.		Long-winged.	
	♂	♀	♂	♀
Meadows: Warwick Parish.....	2	—	1	2
“ Paget West.....	—	—	1	1
South shore: Warwick Parish.....	2	2	—	—
Inland: Paget West.....	1	1	3	2
“ Warwick Parish.....	2	2	—	5
No habitat given: Paget West.....	2	3	3	1
“ Warwick Parish.....	—	1	—	1
St. George Island.....	—	—	—	1

It is interesting to note that the depauperate individuals are all long-winged.

At the present time it does not appear desirable to attempt to make any statement on the systematic relationship of this species. To regard it as an entity worthy of a name, whether specific or subspecific, appears to us to be a necessary course, but what its possible origin was or nearest affinities are can only be determined by careful quantitative work on not only this, but also the closely related North American and West Indian species of the genus. Mr. Jones' notes are to the effect that the species is very abundant under stones.

Gryllus luctuosus Serville.

This species has been recorded by Uhler and Verrill, and also as the synonymous *abbreviatus* by the latter author. It is quite probable that these references really belong to the preceding species, *G. bermudensis*.

Gryllus assimilis Fabricius.

Dahl has credited this species, but no doubt the reference really belongs to *G. bermudensis*.

Liphoplus krugii Saussure.

Four females of this species, taken January 6 and 18 in Paget West, are in the collection. When compared with Cuban specimens they are found to be inseparable. The collector's notes are to the effect that the species is not frequent and that the specimens were beaten from cedar trees.

This is the first record of the species from the Bermudas.

Cylindrogryllus sp.

Dahl has recorded an undetermined species of this South American genus as living in numbers on a gray-leafed shrub growing in moist places. A strong suspicion exists in the author's mind that the well-

known *Liphoplus krugii* may have been erroneously determined as a *Cylindrogryllus* by Dahl.

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