

## Distribution and Host Relationships of *Cyrtorhinus* (Hemiptera: Miridae)

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As the genus *Cyrtorhinus* Fieber seems destined to play an increasingly important role in the biological control of Delphacid leafhoppers it is of interest to examine its distribution and host relationships. Present records suggest that the group may eventually prove to be cosmopolitan, the paucity of records from Central and South America, Australia, and Africa very possibly being due to the fragmentary state of our knowledge of the Mirid fauna of these regions.

Although known from Europe since 1807 (*caricis* Fallen) and from the East Indies since 1884 (*lividipennis* Reuter) no member of the genus was recorded from North America until 1916 (*caricis* var. *vagus* Knight) while the predatory habits of the group were not discovered until 1920. At this time Muir's discovery that *Cyrtorhinus mundulus* (Breddin) lives exclusively on the eggs of the Sugar-cane Leafhopper, *Perkinsiella saccharicida* Kirkaldy, led to one of the most outstanding successes in the field of biological control of injurious insects.

Delphacids imbed their eggs in rows either along the stems or midribs of the leaves of their preferred hosts. The eggs are inserted in a slit and directed obliquely with one end at the surface of the plant tissue. *Cyrtorhinus*, although belonging to a predominantly phytophagous subfamily, Orthotylinae, of the great plant feeding family Miridae, has evidently turned to an exclusively predatory life, piercing the eggs of these leafhoppers and sucking out their juices. Even when apparently inserting the beak into unbroken plant surfaces I have always found that a leafhopper egg was the objective, perhaps having been laid from the opposite side of the leaf. I have shown<sup>1</sup> that the change, even from plant feeding to sucking the blood of human beings is not so fundamental as it might at first appear and Esaki<sup>2</sup> actually records facultative blood-sucking in *Cyrtorhinus lividipennis* Reuter.

In recent years field records would indicate that these bugs, although showing a marked preference for a particular plant and its associated Delphacid eggs, may turn to related plants and leafhoppers in the vicinity as occasion or opportunity affords. Thus I

<sup>1</sup>Usinger, R. L. Bloodsucking among phytophagous Hemiptera. Can. Ent., 66: 97-100, 1934.

<sup>2</sup>Esaki, T. A case of the facultative "blood-sucking" in *Cyrtorhinus lividipennis* Reuter with notes on the same habit in some Typhlocybinae. Mushi, 7: 97-100, 1934.

found *mundulus* nymphs and adults occasionally on corn and Swezey and Fullaway found this same species on taro in the Hawaiian Islands while *lividipennis* was observed on sugar cane on Guam but only when the cane was growing near or in between plantings of corn. This characteristic adds greatly to the value of *Cyrtorhinus* bugs in biological control for it enables them to survive after completely wiping out their preferred host in a given area. It is encouraging that *mundulus* has shown no tendency as yet to invade the native forest in Hawaii where a rich endemic population of Delphacids flourishes.

An apparent structural anomaly in *Cyrtorhinus* which has not been given sufficient attention is the absence, in certain species, of arolia between the claws. In such cases two very fine, small, parallel setae are the only structures to be seen between the claws. The presence or absence and form of the arolia is usually a very reliable guide to relationships in the Miridae, having been used by both Reuter and Knight in defining major groups within the family. Poppius first pointed out the absence of these structures in his two Formosa species and in *mundulus*. They also appear to be lacking in *riveti*.

Mr. D. T. Fullaway has recently sent for identification, through Mr. O. H. Swezey, specimens of *Cyrtorhinus fulvus* Knight, a species which has been introduced into Hawaii during the past year in an effort to control the Taro Leafhopper, *Megamelas proserpina* Kirkaldy. As much as two years ago, after carefully observing its habits and rearing a number of specimens on Guam and in the Philippines, I suggested that *lividipennis* be considered for introduction into the Hawaiian Islands to control the Corn Leafhopper, *Peregrinus maidis* (Ashmead). There is some indication that this may actually be done in the near future.

DISTRIBUTION OF CYRRTORHINUS SPECIES ACCORDING TO ZOOGEOGRAPHICAL REGIONS

PALAEARCTIC	NEARCTIC	NEOTROPICAL
<i>caricis</i> Fallen	<i>alboornatus</i> Knight	<i>costae</i> Stål
<i>flaveolus</i> Reuter	<i>balli</i> Knight	<i>pellucius</i> Uhler
<i>geminus</i> Flor	<i>caricis</i> Fallen	
<i>parviceps</i> Reuter	var. <i>vagus</i> Knight	AFRICAN
<i>pygmaeus</i> Zett.	<i>insperatus</i> Knight	<i>melanops</i> Reuter
var. <i>insignis</i> D. & S.	<i>pubescens</i> Knight	
	<i>pygmaeus</i> Zett.	
ORIENTAL	AUSTRALIAN	PACIFIC
<i>annulicollis</i> Poppius	<i>mundulus</i> Breddin	<i>fulvus</i> Knight
<i>chinensis</i> Stål		<i>lividipennis</i> Reuter
<i>elongatus</i> Poppius		<i>mundulus</i> Breddin
<i>fulvus</i> Knight		<i>riveti</i> Cheesman
<i>lividipennis</i> Reuter		
<i>mundulus</i> Breddin		

DISTRIBUTION OF PACIFIC ISLAND SPECIES<sup>3</sup>

<i>fulvus</i>	<i>lividipennis</i>	<i>mundulus</i>	<i>riveti</i>
*Philippine I.	Great Nicobars	Australia	Tahiti
Samoa	Formosa	Java	Samoa
*Java	Java	Philippine I.	*Guam
Hawaii (1937)	Ceylon	Fiji I.	
	Burma	Hawaii (1920)	
	Sumatra		
	Japan		
	*Guam		
	*Philippine I.		
	*China		

PLANT AND LEAFHOPPER HOST RECORDS FOR PACIFIC SPECIES<sup>3</sup>

<i>mundulus</i>	<i>lividipennis</i>
<i>Perkinsiella saccharicida</i> Kirk. on Sugar Cane (preferred host).	* <i>Peregrinus maidis</i> (Ashmead) on Corn (preferred host) (Guam and Luzon, P. I.).
* <i>Peregrinus maidis</i> (Ashmead) on Corn (Hawaii).	On <i>Sporobolus</i> grass (Samoa, Swezey and Wilder).
<i>Megamelas proserpina</i> Kirk. on Taro (Hawaii).	<i>Nilaparvata lugens</i> (Stål) on Rice (Guam, Swezey).
<i>fulvus</i>	<i>riveti</i>
* <i>Megamelas proserpina</i> Kirk. on Taro (preferred host) (Philippines, Fullaway).	* <i>Sogata ochrias</i> (Kirk.) on <i>Sporobolus virginicus</i> (Guam, Swezey and Usinger).
On Taro (Samoa, Swezey & Wilder).	On Bermuda grass (Samoa, Swezey and Wilder).
	<i>Tradescantia</i> (Tahiti, Cheesman).
	* <i>Nilaparvata lugens</i> (Stål) on Rice (Guam, Swezey).

## KEY TO PACIFIC ISLAND SPECIES OF CYRTORHINUS

1. A pair of distinct diverging and then converging arolia between the claws. Head with a more or less distinct pattern formed by broad pale areas contiguous to inner margins of eyes on either side and sometimes meeting at center, always joined along posterior elevated margin before neck ..... 2
- Two very fine, small, parallel setae between the claws. Head with a more or less distinct pale spot on either side of vertex contiguous with inner margins of eyes ..... 3
2. Length to tip of membrane three times the greatest width across hemelytra. Pale areas of upper surface fulvous and limited largely to the vertex, pronotum occasionally obscurely on the callosities and at middle of posterior margin, scutellum on either side of median black stripe, and hemelytra ..... *fulvus* Knight
- Length less than three times the greatest width across hemelytra. General color much paler, ochraceous to green, with fuscous or black marks limited mainly to anterior portion of head, sides of posterior lobe of pronotum, and middle of scutellum ..... *lividipennis* Reuter
3. Body form long and slender. Size large, the length 3.08 to 3.42 mm. and width 1.05-1.12 mm. Hemelytra pale only laterally. First antennal segment fulvous ..... *mundulus* Breddin
- Body form relatively short and oval. Size smaller, the length 1.87 to 2.33 mm. and width 0.73 to 0.94 mm. Hemelytra often pale fuscous or lighter throughout. First antennal segment black ... *riveti* Cheesman

<sup>3</sup> New records marked with an asterisk\*.