Notes on Two *Rhizoecus* Species New to the Hawaiian Islands, With a Revised Key to Hawaiian Hypogaeic Mealybugs (Homoptera: Pseudococcidae: Rhizoecinae)

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In an earlier paper (Beardsley 1966) I treated 3 species of hypogaeic mealybugs (Rhizoecinae) known to be present in the Hawaiian Islands. Since then, 1 of these, *Rhizoecus advenus* Beardsley, was shown to be a junior synonym of a widespread south Asian and Pacific species, *R. amorphophalli* Betrem (Hambleton 1979), and 2 additional species, *R. caladii* Green (Beardsley 1982) and *R. saintpauliae* Williams (Beardsley 1992), have been reported established. I report here 2 additional immigrant *Rhizoecus* species that appear to be established, and offer a revised key to the hypogaeic mealybugs of Hawaii.

Rhizoecus cacticans (Hambleton)
Ripersiella cacticans Hambleton, 1946: 64. Type locality: Ecuador.
Rhizoecus cacticans: Ferris, 1953: 342.

This is a widespread species found throughout tropical America, north to Florida and California. It occurs also in Australia, Canary Islands, and under glass in Europe (Ben-Dov 1994). The Hawaiian record is based on 9 specimens on 3 slides labeled: OAHU, Mililani, 31.I.1994, ex strawberry roots (W. Kobayashi 94–054). Specimens in the collection of Hawaii State Department of Agriculture, Honolulu (HDOA), and in the author's collection (JWB).

Rhizoecus hibisci Kawai & Takagi
Rhizoecus hibisci Kawai & Takagi, 1971: 181. Type locality: Japan

In addition to the type locality, this species has been reported from Puerto Rico (Williams & Granara de Willink 1992). I have seen specimens from the following Hawaiian collections: OAHU, Manoa Valley, 27.I.1992, on roots of Bermuda grass in lawn (S. Hino); OAHU, Waimanalo, 30.III.1993, ex Tifdwarf roots, Kaneohe Coop. Ext., 93–158; CALIFORNIA, in quarantine from Hilo, Hawaii, 26.V.1993, on roots of kentia palm; same data except on roots of Phoenix palm; and on roots of *Raphis* palm. Specimens in collections of HDOA; California Department of Food and Agriculture, Sacramento; and in JWB.

Key to Hypogaeic Mealybugs of the Hawaiian Islands (Adult females)

1. Anal lobes protuberant, strongly sclerotized, each bearing large sclerotized spine at apex; pair of smaller spines dorsally at apex of abdomen between anal lobes; pair of similar spines on dorsum of head ..... ***Geococcus coffeae*** Green
— Anal lobes not noticeably protuberant or sclerotized; without such large sclerotized spines..... **2**

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2. Multilocular disc pores absent; with 1 circulus and tritubular ducts; antenna 6-segmented..... **3**

— Multilocular disc pores present; with 0–2 circuli and bitubular or tritubular ducts; antenna 5 or 6-segmented **4**

3. Size relatively small (1.0–1.5 mm long); anal ring less than 50µ wide; 3rd segment of antenna distinctly less than 2 X as long as 4th..... ..... ***Rhizoecus hawaiiensis*** (Hambleton)

— Size larger (1.8–2.5 mm long); anal ring more than 50µ wide; 3rd antennal segment about 2 X as long as 4th..... ***Rhizoecus cacticans*** (Hambleton)

4. With bitubular ducts; antenna 5-segmented; multilocular disc pores present on dorsum and venter **5**

— With tritubular ducts; antenna 6-segmented; multilocular disc pores confined to venter **6**

5. With 2 well-developed circuli; multilocular disc pores more numerous, 30–60 on dorsum of thorax ..... ***Rhizoecus saintpauliae*** Williams

— With 1 circulus or none; multilocular disc pores less numerous, 8–20 on dorsum of thorax ..... ***Rhizoecus hibisci*** Kawai & Takagi

6. Multilocular disc pores confined to posterior abdominal segments; dorsal tritubular ducts numerous, around 40 or more total; circulus present..... ..... ***Rhizoecus amorphophalli*** Betrem

— Multilocular disc pores present on anterior abdominal segments and thorax; dorsal tritubular ducts less numerous, around 15–20 total; circulus absent..... ..... ***Rhizoecus caladii*** Green

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