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Citrus root weevils of the genus Pachnaeus in Florida

(COLEOPTERA: CURCULIONIDAE)[1]

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INTRODUCTION: In previous circulars (#5, 30, 77, 112, 117, 202, 207, 225), I have treated most of the weevils found on Florida citrus. Probably the most important native pests among these are 2 species of Pachnaeus, commonly known as citrus root weevils.

DESCRIPTION: (fig. 1-4). Adults are large (8 to 14mm), blue-green to gray weevils with relatively short, broad snouts. Rostrum not separated from frons in lateral view. Humeri and scutellum well-developed. Elytra lacking erect scales or setae. Rostrum without well-defined nasal plate. Front legs not distinctly stouter or longer than other legs. Antennal scape and funiculus with short fine setae or narrow scales. Metepisternal suture visible and complete (or nearly so). Tibia 3 not greatly expanded at apex, its greatest width less than greatest width of femur 3; claws free; corbel closed, lacking ascending comb of spines.

The larvae are illustrated, described, and distinguished by Beavers and Woodruff (1971).

TAXONOMY: Schwarz and Barber (1922) were the first to point out the differences between P. opalus (Olivier) and P. litus (Germar) and also that most previous literature was in error. Horn (1876) recognized that 2 species were present in the U.S., but he applied the name opalus Oliv. to the wrong one and described the other as the new species distans. Schwarz and Barber pointed out that P. litus appeared to be the same in south Florida and Cuba. They also indicated that the P. opalus of most authors (except Olivier) was the P. litus Germar. P. citri Marshall is similar in color to P. litus, but the sinuation between pronotum and elytra is more like P. opalus. The weevils found on Florida citrus were distinguished in a key (Woodruff 1979).

The 2 U.S. species of Pachnaeus can be separated by using the following key:

1. Elytra produced forward at basal center, appearing bisinuate (fig. 3, 4); humeral angle also projecting forward. Color usually bright blue-green or aqua. Found only in southern half of Florida (fig. 5).....litus (Germ.)

1'. Elytra not noticeably produced forward, the juncture between elytra and pronotum slightly irregular, but not appearing sinuate (fig. 1, 2); humeral angle rounded, not projecting. Color more variable; most often pale gray-green, but occasionally bright aqua. Found in northern half of Florida (fig. 5).....opalus (Oliv.)

BIOLOGY: No specific life cycle studies have been conducted on either species. Wolfenbarger (1952) mentioned great variability in annual populations of P. litus. Because of some confusion of names among the 3 common species (P. litus, citri, and opalus) the literature records are also questionable. Most biology data have been presented on P. litus in Cuba (Bruner 1934, Cook and Horne 1908) and on P. citri in Jamaica (van Whervin 1968).

The following generalized biology is taken from the above references. Eggs are laid in groups between 2 leaves or in folds of a single leaf (av. for citri: 1453;

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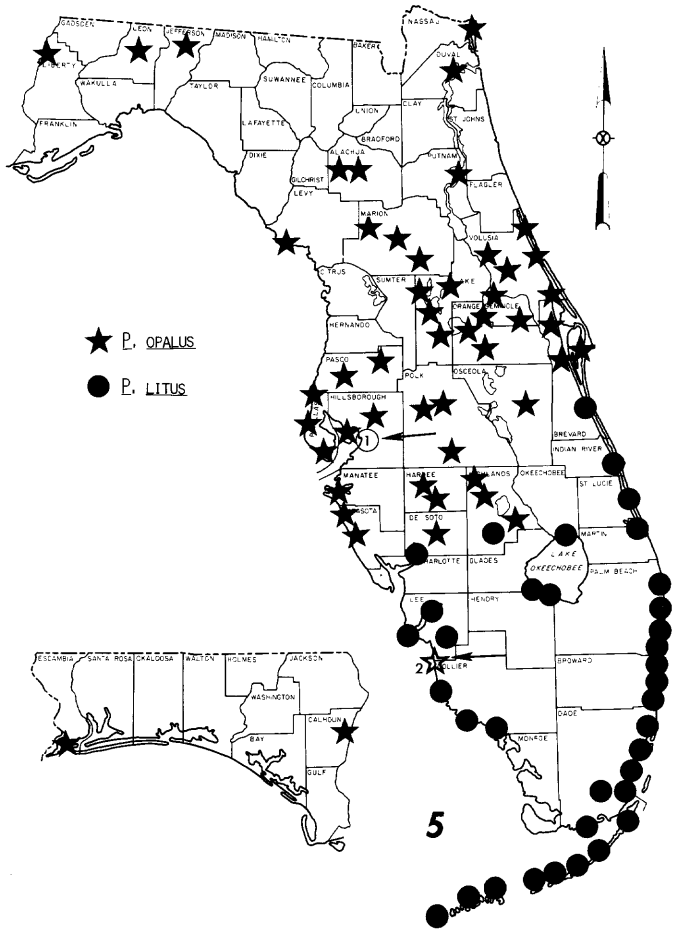
min. 175, max. 4246). They hatch in about a week (av. days for eclosion of P. citri: 6.1). They drop to the ground and burrow through the soil to suitable plant roots. Several instars are involved, and the mature larva pupates in the soil. The amount of time in the larval stage has not been determined but is probably from several months to a year, depending partly on climate and food supply. Large roots are sometimes girdled and small ones often totally consumed. Adult beetles of both Florida species have been found every month of the year. Length of adult life is unknown (av. for P. citri: male, 101.2 days; female, 121.3 days). Adults feign death when disturbed and can be collected easily by shaking foliage.

DISTRIBUTION: (fig. 5) Pachnaeus opalus: ALACHUA: Archer, Gainesville, BREVARD: Cocoa, Courtenay, Merritt Island, Mims, Rockledge, Scottsmoor, Titusville; CALHOUN: Blountstown; DESOTO: Arcadia, Nocatee; DUVAL: Jacksonville; ESCAMBIA: Pensacola; HARDEE: Bowling Green, Ft. Green Springs, Lemon Grove, Limestone, Ona, Wauchula, Zolfo Springs; HIGHLANDS: Avon Park, Ft. Basinger, Sebring; HILLSBOROUGH: Balm, Brandon, Lutz, Plant City, Tampa, Thonotosassa; JEFFERSON: Capps, Monticello, Wacissa; LAKE: Clermont, Eustis, Ferndale, Grand Isle, Groveland, Lady Lake, Lake Jem, Leesburg, Mascotte, Paisley, Tavares, Umatilla; LEON: Tallahassee; LEVY: Cedar Key; LIBERTY: Bristol; MANATEE: Gillett, Oneco, Palma Sola, Parrish, Terra Ceia, Tallevast; MARION: Blichton, McIntosh, Ocala, Weirsdale; NASSAU: Ft. Clinch St. Park; ORANGE: Apopka, Clarcona, Conway, Fairvilla, Lockhart, Ocoee, Orlovista, Plymouth, Taft, Vineland, Windermere, Winter Garden, Zellwood; OSCEOLA: Lake Wilson; PASCO: Dade City, Land O' Lakes; PINELLAS: Clearwater, Largo, Ozona, St. Petersburg, Tarpon Springs; POLK: Dundee, Ft. Meade, Haines City, Lake Alfred, Lakeland; PUTNAM: Crescent City, Satsuma; SARASOTA: Laurel, Nokomis, Osprey, Sarasota, Siesta Key, Venice; SEMINOLE: Casselberry, Forest City, Geneva, Lake Mary, Longwood, Sanford; VOLUSIA: Cassadaga, Deland, DeLeon Springs, Harbor Oaks, New Smyrna Beach, Oak Hill, Ormond Beach, Pierson.

Pachnaeus litus: BREVARD: Melbourne; BROWARD: Cooper City, Coral Springs, Davie, Ft. Lauderdale, Hollywood, Miramar, Pembroke Pines, Pompano Beach; COLLIER: Everglades, Marco Island, Naples; DADE: Coral Gables, Goulds, Homestead, Kendall, Miami, Miami Beach, Naranja, Opa-Locka, Perrine, Sunny Isles; DE SOTO: Ft. Ogden; GLADES: Moore Haven; HENDRY: Clewiston; HIGHLANDS: Lake Placid; HILLSBOROUGH: Mango; INDIAN RIVER: Vero Beach, Winter Beach; LEE: Estero, Ft. Myers, Jona, Sanibel Island; MARTIN: Stuart; MONROE: Bahia Honda S. P., Big Pine Key, Cape Sable, Islamorada, Key Largo, Key West, Grassy Key, Marathon, Marathon Shores, Pigeon Key, Rock Harbor, Saddlebunch Key, Sugarloaf Key, Tavernier, Upper Matecumbe Key, Windley Key; OKEECHOBEE: Okeechobee; PALM BEACH: Boynton Beach, Hypoluxo, Lake Worth, Loxahatchee, Palm Beach, Riviera Beach, West Palm Beach; PINELLAS: St. Petersburg; ST. LUCIE: Ft. Pierce, Indrio; SARASOTA: Sarasota, Siesta Key, Venice.



Although the distributions of these 2 species are basically separate and distinct, 2 localities appear to represent either questionable records or possibly specimens transported on nursery stock (shown by numbers on the map, fig. 5).

ADULT HOSTS: During preparation of this circular, host lists were prepared for both species (27 species for P. opalus and 70 for P. litus). Since they were not correlated with any special plant families or feeding hosts distinguished, the records are not included here. All varieties of commercial citrus were the predominant hosts.

ECONOMIC IMPORTANCE: These weevils are often responsible for severe damage and sometimes death of citrus trees, when the cambium of a tap root is completely girdled. The exact amount of damage is difficult to assess because several weevils cause similar damage, and some damage has been erroneously diagnosed as spreading decline. It was considered to be "...the most serious immediate enemy of citrus culture in Cuba" (Cook & Horne 1908).

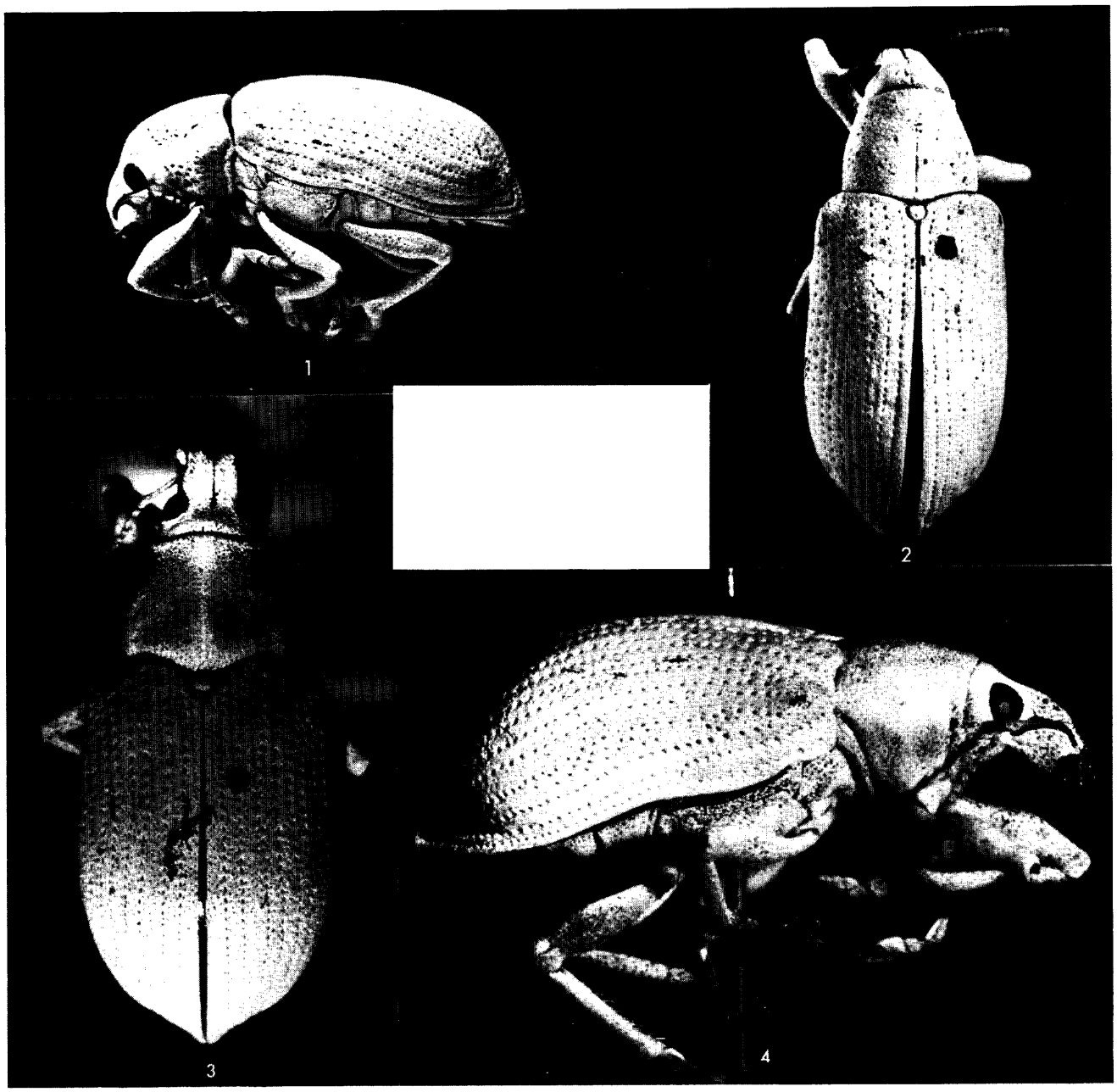


Fig. 1-2: P. opalus, 1) lateral, 2) dorsal; 3-4: P. litus, 3)dorsal, 4) lateral

SURVEY & DETECTION: These weevils are common both day and night, especially on citrus. Since they often drop when disturbed, and their color contrasts sharply with the soil and debris under the trees, they can be collected by shaking or beating branches. They have only rarely been attracted to lights. The foliage is often heavily notched, but this damage is similar to that caused by all weevils known to feed on citrus.

CONTROL: Heptachlor and aldrin are apparently effective insecticides, but neither is currently registered by EPA for use on citrus. Wolfenbarger (1952) gave data that suggest Cryolite might be partially effective.

Baranowski (1960) recorded a parasitic wasp, Brachyufens (=Ufens) osborni Dozier (Hymenoptera: Trichogrammatidae), from eggs of P. litus at Homestead. Another member of this family, a new species of Trichogramma, was recorded by Beavers, Lovestrand, and Selhime (1980) from P. opalus eggs at Oak Hill, Florida. It was later colonized in the laboratory on egg masses of D. abbreviatus, P. litus, P. opalus, and Artipus floridanus Horn.

Another effective parasite described from Puerto Rico, and later introduced into the U. S., is Tetrastichus haitiensis Gahan (Hymenoptera: Eulophidae). This species was first released in the U. S. at Apopka, Florida, for control of D. abbreviatus (Sutton et al. 1972). From 1975 to 1978 attempts to recover it from P. litus at West Palm Beach were unsuccessful, but it was recovered from P. opalus eggs at Oak Hill in 1977 (Beavers, et al. 1980). Further research is underway to determine the effectiveness of the complex of parasitic wasps.

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