

Introduction & Key to Scale Insects

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Cottony maple scale (Eugene Nelson, Bugwood.org)

Scale insects are a diverse group of insects in the order Hemiptera. There are about 6,000 species of scale insects in 21 families worldwide. About 1,000 species occur in North America. The three most common families of scale insects are the armored scale, the soft scale, and the mealybugs. Most of the pest species belong to one of these three families.

Armored Scale Insects: Armored scales are the smallest of scale insects, ranging in size from 1 to 3 millimeters. The body of the scale insect is protected by a cover (the armor) made from wax secreted by the insect and cast skins (exuviae) of previous growth stages. One must remove the hardened wax cover to expose the body of the insect. The exposed body usually is yellow or orange, but may have a pink or red color to it. This cover also protects the eggs laid by the female. Armored scale insect covers vary from circular to elongate or oyster shell shaped. Male and female covers may differ in size and shape for the same species. The cover of the female is generally largest. Boisduval scale and fern scale are common armored scale insects attacking flowers and foliage plants.

Most armored scale insects reproduce sexually. The eggs hatch beneath the protective scale cover and the first instars, commonly called "crawlers", migrate to the new growth to settle and feed. Armored scale females lose their legs at the first molt and are sessile for the rest of their lives. Females develop through three instars and males develop through five. Armored scales may overwinter as eggs, nymphs, or adult females. Adult males are usually present about two weeks in each generation. Some armored scales have four generations per year.

Soft Scale Insects: Soft scales differ from armored scales in that they do not secrete a waxy covering that is separate from the body. If wax is present, it adheres tightly to the body of the female and cannot be easily separated from it. Most soft scales produce a thin, glassy wax that does not obscure the color or form of the female soft scale. Soft scales are fairly large (2 to 6 millimeters long) and can be distinguished by their larger size, round or oval body outline, and convex or hemispherical profile. Soft scale females vary from flat to almost spherical. Often different host plants will alter the body form of a single species so much that taxonomists have described the different forms as separate species. If one turns the adult soft scale over, legs, antennae and thread-like mouthparts are readily visible with the aid of a microscope. Three common soft scales found in greenhouses and interior plantscapes are the brown soft scale, hemispherical scale, and tessellated scale.

Soft scales may reproduce sexually or parthenogenically and every female may be capable of producing progeny without fertilization. Tremendous populations can develop during a single growing season. Most outdoor species have one generation per year. Females either lay eggs or give live birth, depending on the species. There are three instars in the females and five instars in the males. In warmer climates and in greenhouses, species with multiple generations may have all stages present simultaneously throughout the year.

Key to Scale Insects

1. Body of insect protected with a wax or varnish-like covering that is not attached to the body of the insect; the insect can be seen by lifting off this covering. **Armored scale insects.....2**
 - 1.' Body of insect oval in top view, bare or covered with a clear glassy-type wax that adheres to the insect's body; infested plants often sticky with honeydew excreted by the insect. **Soft scale insects.....3**
2. **Fern Scale.** Scale covering of female brownish and oystershell shaped; male cover snow-white with three ridges down the back.
 - 2.' **Boisduval scale.** Scale covering circular or oval, thin, flat, white to light yellow, semitransparent, and exuviae central or subcentral; male cover oblong oval, white, also with three ridges down the back.
3. **Hemispherical scale.** Mature individuals noticeably convex or hemispherical in side view, shiny brown in color; sometimes hundreds of eggs found under the body.
 - 3.' Mature individuals flat or only slightly convex in side view; yellowish-green to black in color; no eggs found under body although a few crawlers may be present under the female4
4. **Brown soft scale.** Body yellowish-green to yellowish-brown in color; often mottled with brown spots.
 - 4.' Tessellated scale. Body oval, opaque, reddish-brown, and 4 to 5 millimeters in length; the dorsal surface appears checkered or cellular in pattern when examined with a magnifying glass.

