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NOTES ON THE EXTERNAL CHARACTERS OF THE SAN JOSE SCALE, CHERRY SCALE, AND PUTNAM'S SCALE.

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March 14th, 1898.—During the last two or three weeks, I have received inquiries from Georgia, Iowa, Kansas, and Canada, regarding the structural external characters of the San José scale (*Aspidiotus perniciosus*), Cherry scale (*A. Forbesi*), and Putnam's scale (*A. ancylus*). I present, therefore, a few notes on these species, which I hope may be of some use to my fellow workers.

It is not a very difficult matter at this time of the year to separate these species at a glance. As is well known, *perniciosus* winters as a partially matured insect, and when the insects are perfectly normal, they are almost always uniformly blackish, with the exuviae or nipple-like prominences, very conspicuously surrounded by a circle, of the same general colour, as a rule, as the rest of the scale. Of course, on trees badly infested with this insect, there are always many scales of the old males, females, and young, which were not sufficiently covered to protect them at the time cold weather set in; but where a sufficient number of young in good condition can be found, the above character does not vary much, and rarely, if ever, are the pupae of the males to be found at this time of the year.

*Forbesi* also winters in a partially matured condition, but male pupae are conspicuously present at this season, or even very much earlier. The colour of the scales varies considerably, but usually conforms somewhat to the colour of the bark. The nipple-like prominence is very conspicuous and is of an orange, brick-red or purplish tinge. The exuviae are usually covered with a delicate film or membrane of rather light colour, but are ruptured in most cases, exposing the bright coloured centres. The scales of the males and females are not uniform in colour, being much lighter around the border of the young female and at the caudal end of the male scale. The conspicuousness of the exuviae and the presence of the pupae at this time of the year are characters which almost always distinguish this species from *perniciosus*.

The female of *ancylus*, in this location at this season, is much more developed than either of the foregoing species. The young females are usually not so convex as *perniciosus* or *Forbesi*. The exuviae are lighter than *perniciosus*, and not nearly so bright as in *Forbesi*, varying in

colour from amber to grayish. The general colour of the scale varies also from nearly black to a grayish tinge, depending largely upon the plants upon which it is found. The scale is very delicate, more uniform in general colour, approaching *pernicius* nearer than it does *Forbesi* in this respect.

The structural characters of the mature females are very marked. In *pernicius*, the two pairs of anal lobes and the absence of spinnerets are very characteristic. In *ancylus*, while there are two pairs of lobes also, they are usually very broad and flattish, the second pair being widely separated from the first. The presence of the spinnerets is also a distinctive mark for this species, and if the lobes are carefully examined, this species need not be confounded with either *pernicius* or *Forbesi*. In *Forbesi*, the two pairs of anal lobes approach *pernicius* much more than they do *ancylus*, but *Forbesi* can be distinguished readily from *pernicius* by the presence of conspicuous thickenings of the body wall, forming club-shaped masses between the lobes. The spinnerets are always present, usually arranged in five groups in the mature female. In this connection, I might say that I have never seen spinnerets in any of the immature forms of either *ancylus* or *Forbesi*.

There are a few characters presented by the plant which will serve as a mark for identifying the species. On most of our deciduous fruit trees there is a purplish tinge formed about the scales of all three species on young succulent wood. This tinge varies considerably, and depends largely upon the trees, showing more plainly upon some varieties than upon others. With *pernicius* the purple extends into the bast, and on some very badly infested apple trees I have seen even the young tender wood coloured to bright carmine. I have also seen the fruit of peach badly spotted on account of the attacks of *pernicius*, and on some varieties the colour extended into the flesh, sometimes to a depth of a quarter of an inch. The purplish tinge caused by *ancylus* and *Forbesi* is usually not so marked as in *pernicius*. The bast is brightly coloured at times by both these species, but this does not occur as often as with *pernicius*.

*Forbesi* also causes a peculiar rough, pitted appearance upon peach and apple that is not usually produced by either *ancylus* or *pernicius*. The insect seems to retard the cellular growth of the plant immediately surrounding it, and it is not an uncommon thing to find isolated matured females in rather deep depressions. This character is especially prominent on apple and peach in the nursery.