

each species has a limited number of food plants, but some, like *Pterocyclon mali*, feed in many trees, both coniferous and deciduous.

According to their habits, the North American species of Ipidae may be separated into four fairly well-marked groups: the Bark-beetles, the Timber- or Ambrosia-beetles, the Twig-beetles, and a fourth group containing a few species of varying habit.

THE BARK-BEETLES.—The first of the above-named groups includes those forms which burrow in the bark, or between the bark and the wood. The adults enter through a hole in the bark, cut in many cases by the male, and drive a primary-tunnel between the bark and wood, usually partly in the bark and partly in the wood, and frequently either parallel with or at right angles to the wood-fibres. A few species burrow entirely in the bark, and others, included here in the Bark-beetles, cut their tunnels just below and parallel to the wood surface. The length of the tunnel varies in the different species from less than an inch to more than a foot. The female does the greater part of the work, while the male guards the opening and removes the chips and refuse. These main-tunnels are usually kept strictly clean. In sweeping the tunnels the beetles move backwards, scraping the refuse with the mandibles back to the fore legs, which pass it on to the middle, and these to the hind pair. When the opening of the tunnel is reached the tip of the abdomen is protruded and the refuse passed up to the hind pair of legs in the manner just indicated, and by the hind legs pushed away from the opening. In cutting the tunnels the beetles constantly revolve, and thus obtain such perfectly cylindrical burrows.

When not at work the male beetle is usually guarding the entrance. By backing into the entrance-hole the declivity of the elytra plugs the opening, and thus presents a complete protection from many enemies.

In niches along the sides of the primary-tunnel the whitish, almost transparent eggs are laid, usually one, though sometimes several, in each niche. In some species, *Ips caelatus* and *Dendroctonus simplex*, several eggs are deposited in large niches; while others, *Hylurgops pinifex* and *Dryocoetes autographus*, arrange the eggs in rows along the sides of the tunnel.

When egg-laying is completed the adults of some species die, and their remains may frequently be found long after in the tunnel. Some species, however, cut a new tunnel and rear a second brood.

In those species which lay the eggs in masses along the sides of the primary-tunnel, the larvæ burrow in congress through the