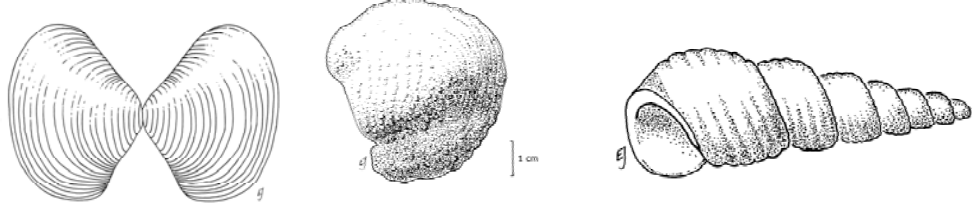
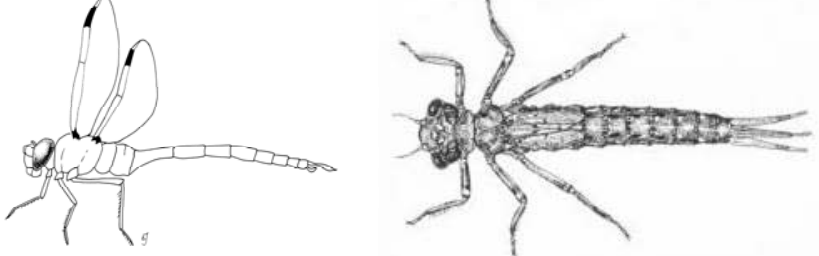
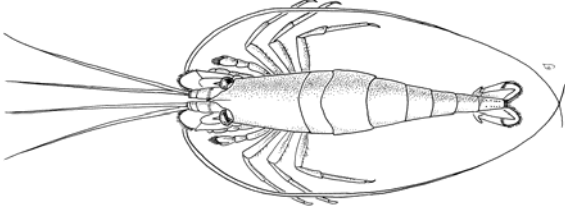
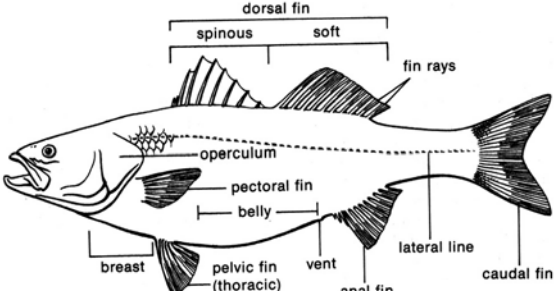
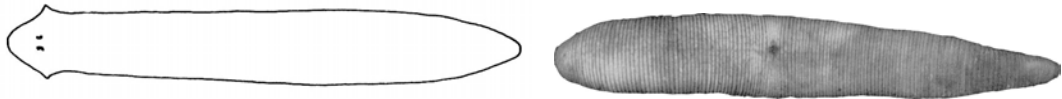
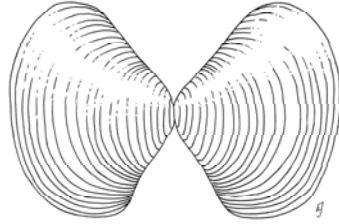


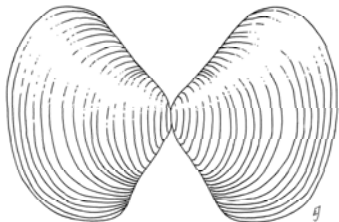



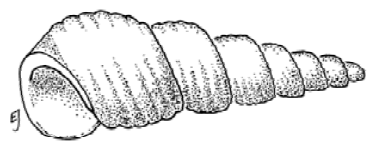



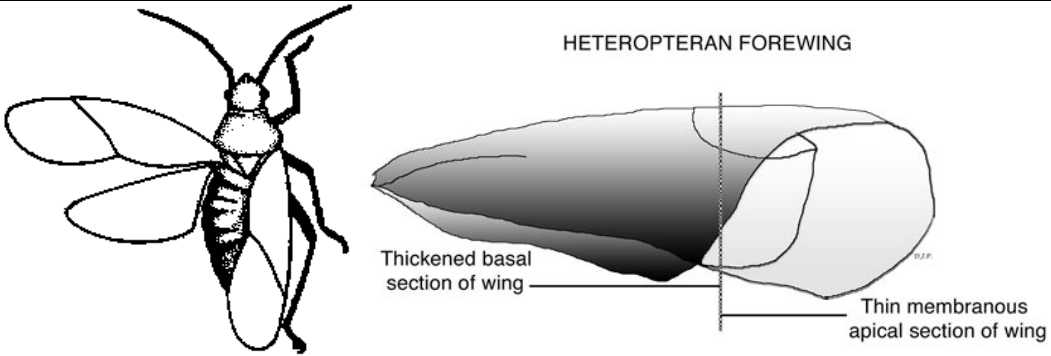


A Key to the Common Aquatic Organisms Found in Waipi‘o Valley


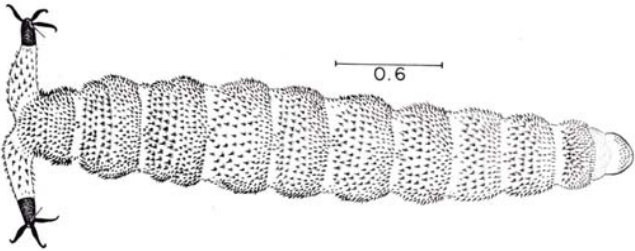
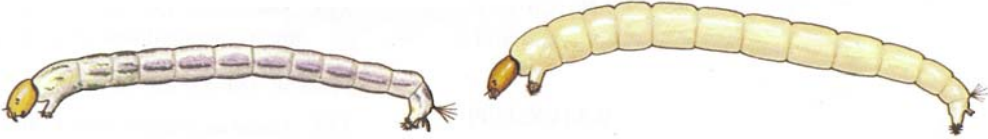

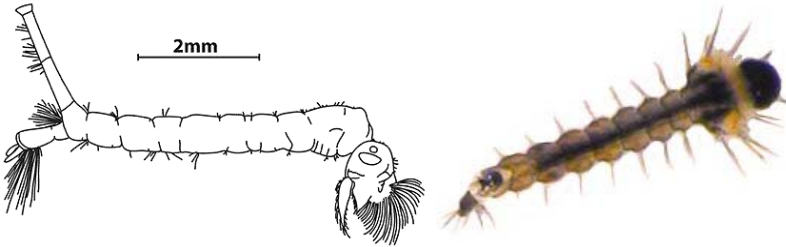
From	Description and Classification	Illustrations	To
1a	<p>Animals with shells covering or enclosing soft fleshy bodies and without legs.</p> <p>Mollusks (Clams and snails)</p>		2
1b	<p>Animals with segmented (jointed) bodies and 3 or less pairs of legs. May or may not have wings</p> <p>Arthropods (Insects)</p>		5
1c	<p>Animals with segmented bodies, 4 or more pairs of legs, and lacking wings.</p> <p>Arthropods (Crustaceans)</p>		9
1d	<p>Animals with apparent backbone and internal skeleton, usually with fins, or no obvious appendages.</p> <p>Vertebrata (Fish)</p>		10
1e	<p>Worm shaped animals lacking legs and a backbone, usually somewhat flattened</p> <p>Flatworms / Leeches</p>		16

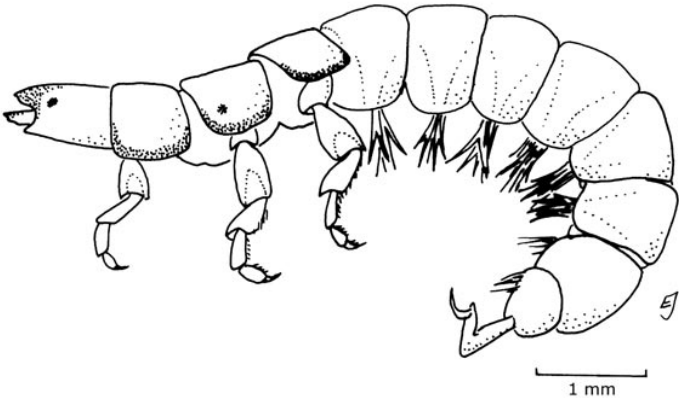


Key to the Mollusks

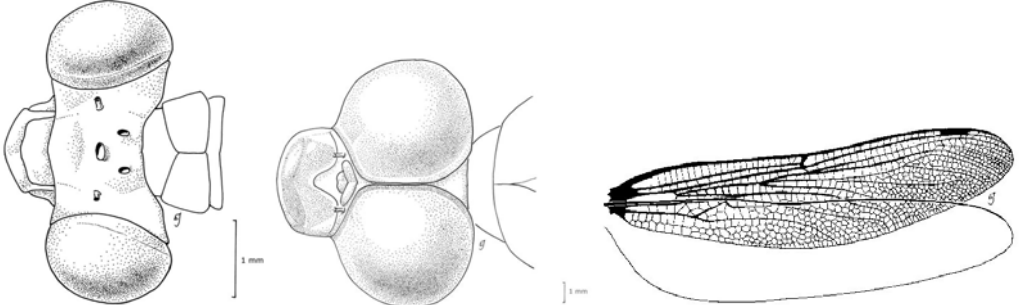


From	Description and Classification	Illustrations	To
2a	Animals with a double shell hinged at one side, figure 1a Bivalves (clams)	 Figure 1a	3
2b	Animals with a single shell, various shapes and colors as in figures 1b and 1c. Snails, limpets, 'opihi	  Figure 1b Figure 1c	4
3a	Clam-shaped, dark brown color white patches, figure 1a Corbicula (Introduced)	  Figure 1a	
4a	Single shell with wide opening. Shell is dome-shaped and dark in color with a few light spots, figure 1c. Neritina granosa (Hihīwai, Wī) (Native)	  Figure 1b	
4b	Single shell with small opening. Shell is elongate in shape with distinct whorls. Shell color mottled and can vary from light to dark brown, figure 1c. Thiaridae (Introduced)	  Figure 1c	

Key to the Insects

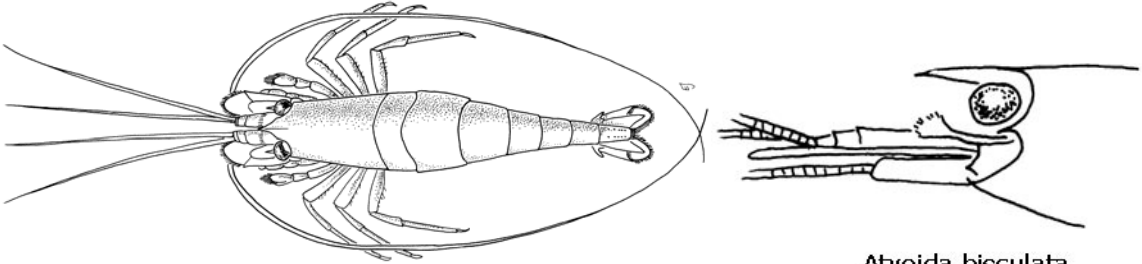
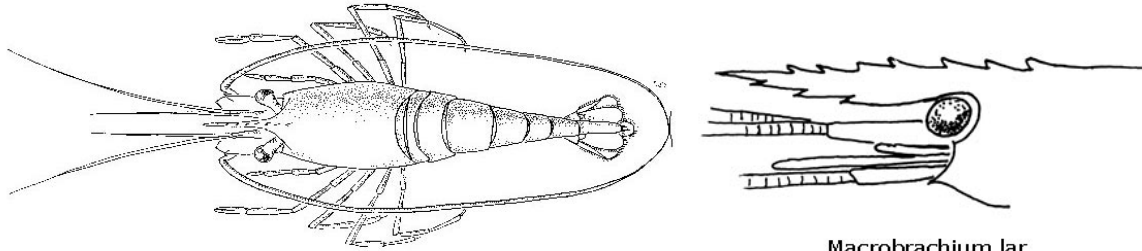
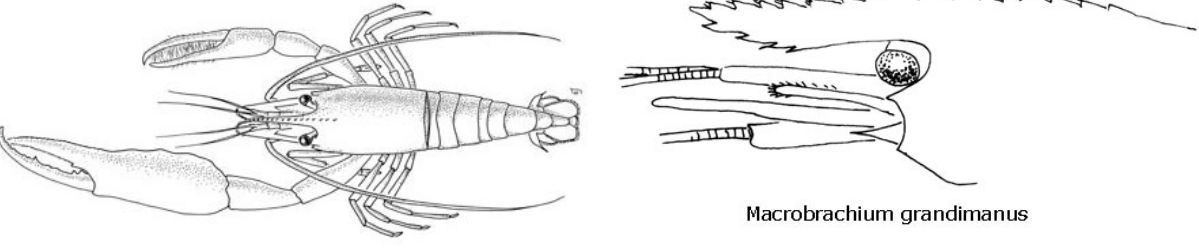
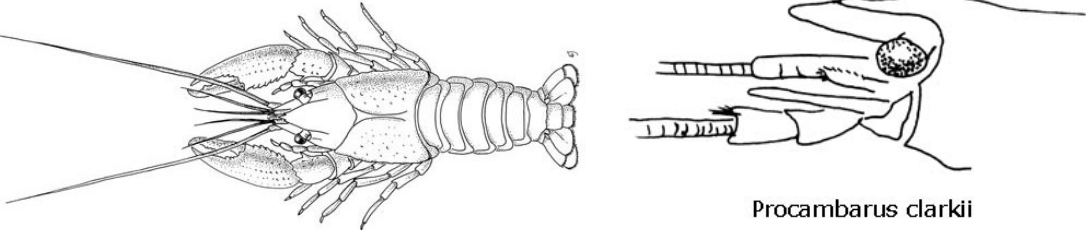
From		To
<p>1b</p> <p>Insects with piercing sucking mouth parts, front wings with hard basal section and membranous tip.</p> <p>Heteroptera (true bugs)</p>	 <p style="text-align: center;">HETEROPTERAN FOREWING</p> <p style="text-align: center;">Thickened basal section of wing</p> <p style="text-align: center;">Thin membranous apical section of wing</p>	<p>5</p>
<p>5a</p> <p>Small, dark species with elongate body, sometimes lacking developed wings, about 2 millimeters long, swims rapidly on surface of water.</p> <p><i>Microvelia vegans</i> Hawaiian Pond Bug (Native)</p>		
<p>5b</p> <p>Small, dark, speckled species with oval body, developed wings, about 3 – 5 millimeters long having bulbous eyes. In nature, runs swiftly on rocks and will jump when disturbed.</p> <p><i>Saldula exulans</i> Hawaiian Saldid Bug (Native)</p>		
	If not as above go to 6	

6a	<p>White, translucent elongate body with dark head capsule. Posterior end with distinct tubercles.</p> <p>Tipulidae: <i>Dicranomyia</i> sp Crane-fly larvae (Native)</p>		
6b	<p>Insect larva usually with elongate 12-segmented bodies without well developed head capsules.</p> <p><i>Scatella clavipes</i> Hawaiian Shore Fly (Native)</p>		
6c	<p>One set of well-developed legs with distinct brown head capsule. Body is white colored.</p> <p>Chironomid larvae (Native)</p>		
6d	<p>Light brown to almost transparent in color. Legs not present, but eyes visible, with small projections (early wings) below head and eyes. This is the stage between the larvae and adult, just before the Chironomid emerges to become an adult.</p> <p>Chironomid Pupae (Native)</p>		
6e	<p>The larvae look like hairy maggots with siphons.</p> <p>Culcidae larvae Mosquito larvae (Introduced)</p>		
	<p>If not as above go to 7</p>		


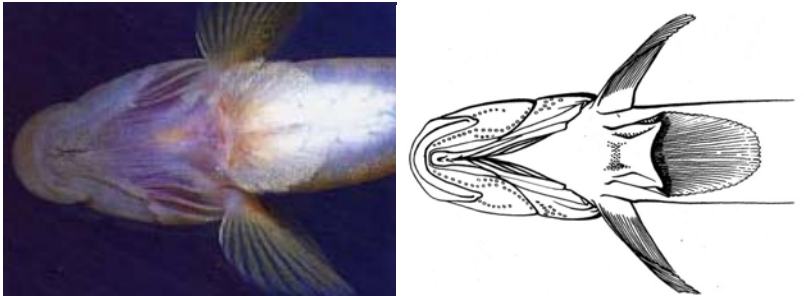

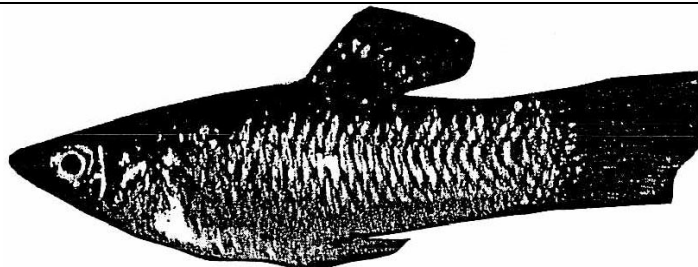
<p>7</p>	<p>Insects with no wings as immatures, found under rocks in streams, worm-like in appearance with well-developed thoracic legs.</p> <p>Trichoptera Caddisfly larvae (Introduced)</p>		
<p>7a</p>	<p>Green worm-like species with three pairs of well-developed legs on the first three body segments and hooks on the last segment.</p> <p><i>Cheumatopsyche analis</i> Little Sister Sedge Caddisfly (Introduced)</p>		
<p>7a</p>	<p>Brown colored case covered with tiny sand particles. Larva inside case is bright white, smaller but with fatter abdomen. Much smaller than caddis flies above.</p> <p><i>Hydroptila potosina</i> Micro Caddisfly (Introduced)</p>		
<p>If not as above go to 8</p>			



<p>8</p>	<p>Large insects with adults having well developed wings with net-like vanes, very large eyes. Immatures do not have wings.</p> <p>Odonata (dragonflies and damselflies)</p>	 <p>Damselfly eyes Dragonfly eyes Dragonfly wings</p>	
<p>8a</p>	<p>Head dumbbell-shaped with eyes bulging and widely separated. Gills with dagger-like shape. Body narrow and elongate.</p> <p><i>Megalagrion blackburni</i> (Pinao 'ula) Blackburn 's Hawaiian Damselfly (Native)</p>		
<p>8b</p>	<p>Golden brown species with head round and eyes meeting in middle. Body round and more oval.</p> <p><i>Pantala flavescens</i> Globe Skimmer (Native)</p>		



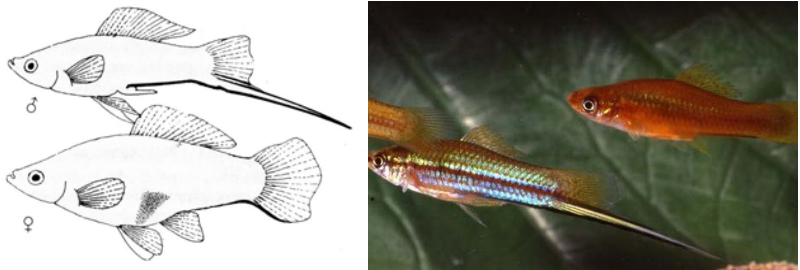

Key to the Crustaceans

<p>9a</p>	<p>Thin transparent shell covering segmented body with 5 pairs of legs, front pair developed into pincers with small equal sized pincers</p> <p><i>Atyoida bisulcata</i> 'O'pae kala'ole (Native)</p>	 <p style="text-align: right;">Atyoida bisulcata</p>	
<p>9b</p>	<p>Thin transparent shell covering segmented body with 5 pairs of legs, front pair developed into pincers with small equal sized pincers. There are 8 dorsal teeth on the rostrum.</p> <p><i>Macrobrachium lar</i> (Introduced)</p>	 <p style="text-align: right;">Macrobrachium lar</p>	
<p>9c</p>	<p>Thin transparent shell covering segmented body with 5 pairs of legs, front pair developed into pincers with one pincer greatly enlarged. There are 15 dorsal teeth on the rostrum.</p> <p><i>Macrobrachium grandimanus</i> 'O'pae 'oeha'a (Native)</p>	 <p style="text-align: right;">Macrobrachium grandimanus</p>	
<p>9d</p>	<p>Thick red shell covering segmented body with equal sized enlarged pincers. The rostrum is shaped like a triangle.</p> <p><i>Procambarus clarkii</i> crayfish (Introduced)</p>	 <p style="text-align: right;">Procambarus clarkii</p>	

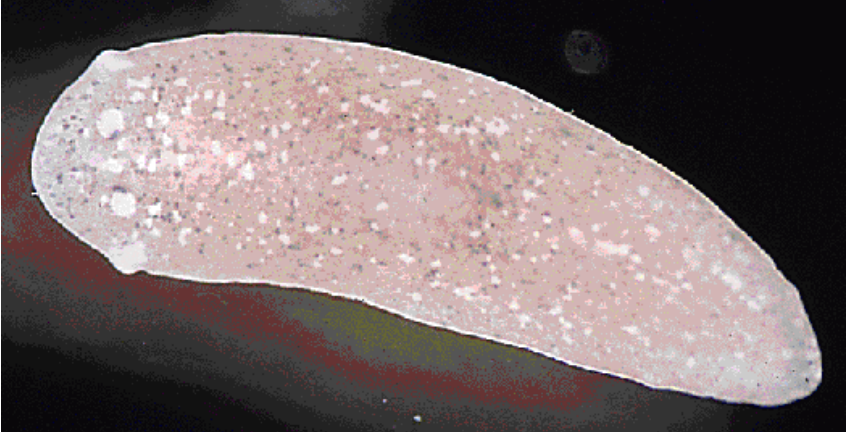
Key to the Fish

<p>10a</p>	<p>Pelvic (ventral) fins separate or not fused to form a sucker (Family Eleotridae)</p>		<p>11</p>
<p>10b</p>	<p>Pelvic (ventral) fins fused to form a sucker (Family Gobiidae)</p>		<p>12</p>
<p>11a</p>	<p>Dorsal fins split in two. Body shape rounder and wider. Postlarvae coming in from the ocean are >16 mm standard length, a uniform dark brown on the sides and light brown on the top or dorsal surface.</p> <p><i>Eleotris sandwicensis</i> ('O'opu akupa) (Native)</p>		
<p>11b</p>	<p>Fish is flattened, long and narrow and pelvic fins separate or not fused to form a sucker</p>		<p>15</p>

<p>12a</p>	<p>Dark, tear-drop shaped bar extending backwards from the bottom of the eye toward the base of lower edge of the gill cover -The black teardrop below the eyes extending toward the back of the fish is the prominent feature of this species, postlarvae returning from the ocean are >16 mm in length. This species found in the lower reaches of streams and estuaries</p> <p><i>Stenogobius hawaiiensis</i> ('O'opu naniha) (Native)</p>	 <p>Stenogobius genivittatus Illustration by: Patric Ching Courtesy of: Division of Aquatic Resources</p>	
<p>12b</p>	<p>No dark bar extending backwards from bottom of eye across cheek.</p>		<p>13</p>
<p>13a</p>	<p>One or three notches in upper lip.</p>		<p>14</p>
<p>13b</p>	<p>No notches in upper lip, large black spot at base of caudal (tail) fin, faint bar extending forward from bottom of eye to upper lip -Postlarvae range in size from 16-22 mm in size but the dark spot at the base of the caudal fin or tail makes distinguishes this species from others.</p> <p><i>Awaous guamensis</i> ('O'opu nākea) (Native)</p>	 <p>Awaous guamensis Illustration by: Patric Ching Courtesy of: Division of Aquatic Resources</p>	

<p>14a</p>	<p>One notch in the center of the upper lip (lip furthest away from tail), fresh postlarvae (hinana) arriving from ocean are smaller (16 mm on average) The female is olive to brownish all over, while the male is brownish on the head and pale yellow to bright red on the tail.</p> <p><i>Lentipes concolor</i> (‘O‘opu hi‘u kole or ‘O‘opu ‘alamo‘o) (Native)</p>	 <p><small>Lentipes concolor Illustration by: Patric Chang Courtesy of: Division of Aquatic Resources</small></p>	
<p>14b</p>	<p>Three notches in the upper lip, one notch in the center and two notches on the side, larger (25 mm) and more darkly pigmented. The snout of this fish is semicircular in shape, two or three stripes on second dorsal fin, one stripe on first dorsal fin, and one stripe on the anal fin. It often has a distinct black line running from the mouth to the tail. The very high first dorsal fin is the best positive identifying characteristic.</p> <p><i>Sicyopterus stimpsoni</i> (‘O‘opu nōpili) (Native)</p>	 <p><small>Sicyopterus stimpsoni Photo courtesy of: Mike Yamamoto</small></p>	
<p>15a</p>	<p>Fins not fused to form a sucker, fish is flattened, long and narrow with mature males having a long filament extending out from the caudal fin. Females and immature males lacking the long caudal fin, but all have a red line down the center of both sides of the body, with the red line being visible but faint when fish is preserved in alcohol. If lacking red line down the side and not having a long tail fin, then go to 15 b.</p> <p><i>Xiphophorus helleri</i> Green Swordtail (Introduced)</p>		
<p>15b</p>	<p>Fins not fused to form a sucker, fish is flattened, long and narrow. Overall color yellowish-light blue, lacking long tail fin. Dorsal fin spotted with variously colored black, white, and/or light yellow spots in life, spots visible in alcohol specimens but not as brightly colored. Males and females similarly colored.</p> <p><i>Poecilia mexicana</i> Mexican molly (Introduced)</p>		

Key to the Flatworms and Leeches

16a	<p>2A: Unsegmented and flattened worm with broad, almost triangular shaped head with two noticeable but faint eyespots near the tip of the head, never with a suction cup at the head or mouth, if not this go to 2B</p> <p><i>Dugesia</i> sp. Flatworm (Introduced)</p>		
16b	<p>2B: Segmented worm that is flattened, but not as flat as <i>Dugesia</i>, two faint eyespots that usually visible. Mouth is round and all leeches have a sucker or suction cup for attaching to its host.</p> <p><i>Euhirudinea</i> Leech (Introduced)</p>	