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Florida Damselflies (Zygoptera):

A Species Key to the Aquatic Larval Stages

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Introduction

Identification of the 44 species of Florida damselflies (Zygoptera) in the adult stage was recently made possible by the publication of Dr. Sidney W. Dunkle's new book, "The Damselflies of Florida, Bermuda, and the Bahamas." However, descriptions of the larval stages for several of the Florida species were not available until now. This manual incorporates separational characteristics for all species in a dichotomous key format. The manual includes a checklist of the Florida species with the name of the person who first described that species. Field notes were incorporated into the key for most species. Complete ecological and habitat characterizations for all Florida damselfly species are included in the new Florida damselfly book by Dr. Dunkle. At the end of the key is a selected list of references for damselflies. This key will help Florida Department of Environmental Regulation biologists increase the level of taxonomic identifications during bioassessment projects when used in conjunction with other existing reference manuals. Using an aquarium system, larvae can be reared to adults and identification verified with Dr. Dunkle's book.

To ensure consistency with the forthcoming "Manual of the Damselflies (Zygoptera) of North America" by Dr. Minter J. Westfall, Jr., the key utilizes several anatomical terms. For example, "gills" is used instead of "caudal lamellae", "palpal setae" is employed instead of "lateral setae", and "premental setae" is used in place of "mental setae" In addition, the nodal line of the gill is not commonly used in most

other texts. It consists of a curved line demarcating the break (nodus) from spines to hairs along the dorsal gill margin down to the similar break (nodus) along the ventral gill margin. Usually, there is a corresponding marked color difference, such as the dark basal half versus the pale apical half as in *Nehalennia integricollis*.

The majority of Florida damselflies prefer clean, unpolluted aquatic environments. Most of the species should be classified under the Florida Index as Class I indicators. However, *Ischnura hastata*, *I. posita*, *I. ramburii*, and *Enallagma civile* indicate very low oxygen levels and possible organic pollution. They should be classified as Class III indicators.

I wish to thank Dr. Minter J. Westfall for the use of his unpublished drawings of *Argia bipunctulata* (cover illustration and gills), *Enallagma concisum*, *E. dubium*, *E. weewa*, *Ischnura kellicotti*, *I. prognata*, *Neoerythromma cultellatum*, and *Nehalennia integricollis*. In addition, Dr. Westfall kindly supplied me with larval material from which I drew *Enallagma davisi*, *E. pallidum*, *E. pollutum*, *E. sulcatum*, *Lestes vidua*, *Nehalennia pallidula* (supposition) and *Telebasis byersi*. Also, I wish to thank Dr. Ken J. Tennessen, and Mr. Tim Vogt for providing me with several larval descriptions, comments, and suggestions.

The illustrations of *Hetærina americana* and *H. titia* were redrawn from Byers, 1930. The figures of *Enallagma doubledayi* and *E. geminatum* were redrawn from Garman, 1927. The drawings of *Ischnura hastata* (= *Anomalagrion hastatum*) and *Enallagma cardenium* (as *Telebasis dominicanum*) were taken from Klots, 1932.

I wish to expressly thank Dr. Donald G. Huggins and Dr. Warren U. Brigham for the use of the many remaining drawings and the liberal use of their key couplet descriptions.

I would also like to thank the editor, Dr. Landon Ross of the DER Biology Section, for the fine job of editing this manual and for the use of the laboratory facilities. In addition, I would like to thank the DER Biology Section staff for comments, suggestions, and testing the key for “bugs”, particularly Mr. Russel Frydenborg, Ms. Lyn Burton, Mr. Rick Hutchinson, Ms. Sandy McClure, and Ms. Elizabeth Miller.

Glossary

Axial — located at the main axis or central line of a gill.

Extra-tracheal (ET) — extra pigment or coloration found along or mixed with the tracheae.

Labium (L) — the posterior, fused mouthparts forming a hinged, grasping structure.

Lateral carina (LC) — keel or ridge found along the main axis of a gill. Also, located on the abdominal segments of some damselflies.

Mentum (M) — the flat part (ligula) of the labium.

Nodus (N)— point on the edge of a gill where a sudden or abrupt change in the type of seta occurs.

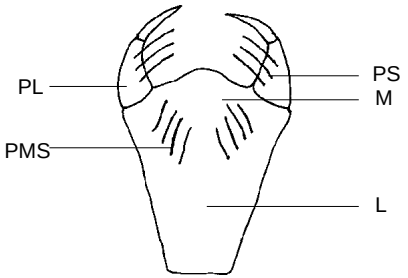
Nodal line (NL) — line joining the dorsal nodus and the ventral nodus of a gill.

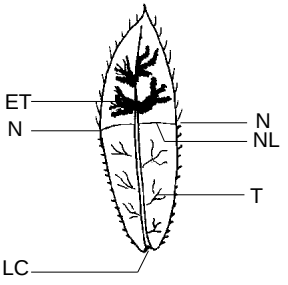
Palpal lobe (PL) — a movable hooked part of the labium which has an end hook.

Palpal setae (PS) — setae or long hairs located on the palpal lobes.

Premental setae (PMS) — setae found on the mentum, usually in a right side group and a left side group.

Tracheae (T) — network of tiny tubes transporting air throughout the gill.





Checklist of the Damselflies of Florida

Calopterygidæ

(1) *Calopteryx dimidiata* Burmeister
(2) *C. maculata* Beauvois
(3) *Hetærina americana* Fabricius
(4) *H. titia* Drury

Lestidæ

(5) *Lestes disjunctus australis* Walker
(6) *L. inæqualis* Walsh
(7) *L. rectangularis* Say
(8) *L. spumarius* Hagen
(9) *L. tenuatus* Rambur
(10) *L. vidua* Hagen
(11) *L. vigilax* Hagen

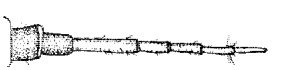
Cœnagrionidæ

(12) *Argia apicalis* Say
(13) *A. bipunctulata* Hagen
(14) *A. fumipennis* Burmeister
(15) *A. mœsta* Hagen
(16) *A. sedula* Hagen
(17) *A. tibialis* Rambur
(18) *Enallagma basidens* Calvert
(19) *E. civile* Hagen
(20) *E. cardenium* Selys
(21) *E. concisum* Williamson
(22) *E. dæckii* Calvert
(23) *E. davisi* Westfall
(24) *E. divagans* Selys
(25) *E. doubledayi* Selys
(26) *E. dubium* Root
(27) *E. durum* Hagen
(28) *E. geminatum* Kellicott
(29) *E. pallidum* Root
(30) *E. pollutum* Hagen
(31) *E. signatum* Hagen
(32) *E. sulcatum* Williamson
(33) *E. vesperum* Calvert
(34) *E. weewa* Byers
(35) *Ischnura hastata* Say
(36) *I. kellicotti* Williamson
(37) *I. posita* Hagen
(38) *I. prognata* Hagen
(39) *I. ramburii* Selys
(40) *Nehalennia gracilis* Morse
(41) *N. integricollis* Calvert
(42) *N. pallidula* Calvert
(43) *Neoerythromma cultellatum* Hagen
(44) *Telebasis byersi* Westfall

Keys to the Zygoptera Larvae of Florida

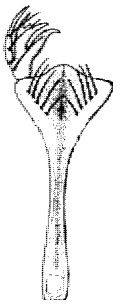
(1) First antennal segment equal to or longer than succeeding 6 segments together; labium (ligula) with a deep, open, median cleft..... **Calopterygidæ**

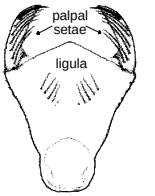
Each antennal segment approximately equal in length to each other; labium (ligula) entire or with a closed median cleft.....2



(2) Basal half of labium greatly narrowed, stalk-like; palpal lobes cut deeply by 2 or 3 incisions; median cleft present and enclosed ..... **Lestidæ**

Basal half of labium not greatly narrowed; palpal lobes not deeply cleft; median cleft absent..... ..... **Cœnagrionidæ**

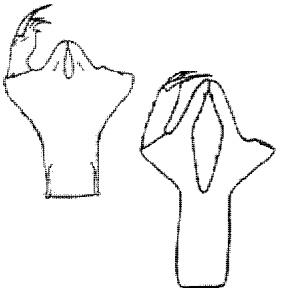




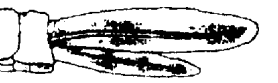
Calopterygidæ

(1) Labium cleft only to base of palpal lobes 2

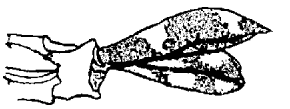
Labium cleft far below base of palpal lobes 3



(2) Gills 8.5 mm to 10 mm long on mature larvae and with obscure transverse white bands; rare, only found in the Chipola River..... *Hetærina americana*



Gills 6.0 mm long on mature larvae and very dark with very distinctive white blotches/bands; common statewide and confined to lotic waters ..... *H. titia*



(3) Gills long and slender with many thin marginal hairs, but no stiff setae along the gill margins; common statewide on shady streams..... *Calopteryx maculata*

Gills short and stout with a few hairs but many short stiff setae along gill margins; found on sunny streams ..... *C. dimidiata*

Lestidæ

(1) Florida Keys only..... *Lestes spumarius*

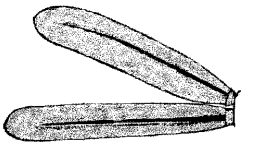
Everglades National Park..... *L. tenuatus*

Peninsular and Panhandle Florida 2

(2) Gill margins straight and parallel-sided 3

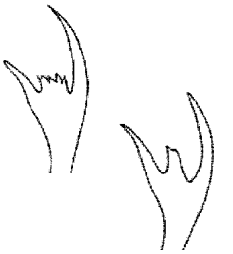
Gill margins tapering to a point 5

(3) Gills with 3-4 contrasting dark and light bands; weedy margins of lakes, swamps 4



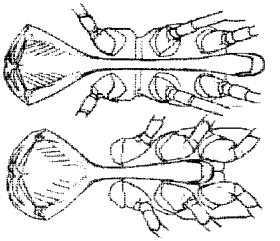
Gills uniform dark brown, no banded pattern; temporary ponds ..... *L. vidua*

(4) Lateral spines present on abdominal segment 1; the denticulate process of palpal lobe with definite teeth; Found only in Alachua County ..... *L. inæqualis*



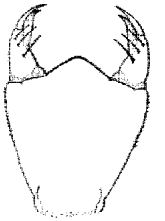
Lateral spines absent on abdominal segment 1; the denticulate process of palpal lobe merely serrated; common, swampy habitats..... *L. vigilax*

(5) Labium very long and slender, extending past thorax to abdomen; common in North Florida .... *L. disjunctus australis*



Labium shorter, not extending past thorax; rare, North Florida ..... *L. rectangularis*

Cœnagrionidæ



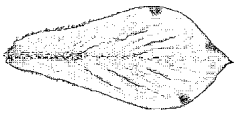
(1) Short, thick-set, somewhat depressed larvae; **no premental setae** and the palpal setae 0-4 (rarely 4); distal margin of each palpal lobe produced into 2 unequal pointed hooks; gills usually 1/3 to 1/2 as broad as long..... *Argia*

Larvae long and slender; labium with 1-4 premental setae; palpal setae 3-7 (usually 5 or more); distal margin of one or both hooks blunt or truncate; gills at mid-length less than 1/3 as broad as long 2

(2) Labium with only 1 long premental setae (sometimes with 3 much smaller setae in *Nehalennia integricollis*), 6 palpal setae 3

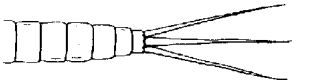
Labium with 2-4 premental setae, 3-7 palpal setae.. 4

(3) Small larvae with white spots infused through out pale body integument, weedy margins of lentic waters ..... *Nehalennia*



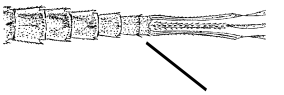
No such white spots or speckles; always only 1 premental setae, gills shaped like a light bulb, found on mats of floating vegetation (duckweed) .... *Telebasis byersi*

(4) Antennal segments 7; abdominal segments usually smooth; if lateral carinae present, no setae tufts on carinae; no basal row of spines and setae... *Ischnura*

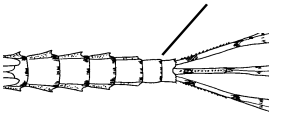


Antennal segments 6; abdominal segments rough with setae tufts on lateral carinae; with basal row of spines and setae 5

(5) Lateral carinae of abdominal segments 8 and 9 bearing 1 stout seta, venter of 2-6 with equal-sized setae evenly scattered on venter; Miami lakes .... *Neoerythromma cultellatum*



Lateral carinae of abdominal segment 9 without such stout setae; diverse genus, common statewide..... ..... *Enallagma*

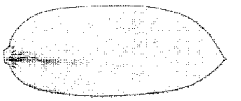


Argia

(1) Thick lateral gills triangular in cross-section (see cover illustration); no premental setae, palpal setae 3; local in small sphagnum seepage areas, North Florida ..... *Argia bipunctulata*

Thin gills flat in cross-section.....2

(2) Palpal setae 0-1, gills uniformly gray; large rivers... ..... *A. mæsta*



Palpal setae 2-3, gills patterned..... 3

(3) Gills with a marginal fringe of numerous stiff setae mixed with long, finer hairs towards the apex of gill 4

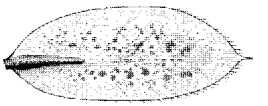
Gills without such stiff setae near apex..... 5

(4) Palpal setae 2, gills uniformly colored, an obscure, irregular band near apex; slow waters, lakes .... *A. fumipennis*

Palpal setae 3, gills with coarse dark blotches on a pale background and a darker middle transverse band; lotic ..... *A. sedula*

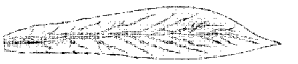
(5) Gills with 3 broad dark transverse bands, palpal setae 2; lotic ..... *A. tibialis*

Gills without any bands but with several scattered obscure dots, palpal setae 3; large rivers in North Florida ..... *A. apicalis*



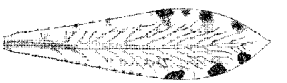
Nehalennia

(1) Pale gills unspotted; very rare, Alachua County only ..... *Nehalennia gracilis*



Gills with several dark marginal spots..... 2

(2) Pale gills broad with several dark marginal spots; very rare, South Florida, possibly extinct..... *N. pallidula*



Slender gills with very dark basal half but with dark marginal spots in pale apical half; 1-4 premental setae; common statewide in marshes. *N. integricollis*

Ischnura

(1) Gills with 0-2 transverse bands, 5-6 palpal setae ... 2

Gills with 3-4 distinct transverse bands and an apical blotch 4

(2) Gills with no transverse bands, 6 palpal setae..... 3

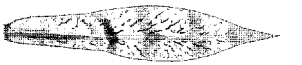
Gills with 1, rarely 2 transverse bands; 5 palpal setae; very common .....*I. hastata*

(3) Pale greenish gills with no distinct nodus; stiff setae extending along entire length of gill margins; mentum strongly convex; underside of waterlilies.....
.....*I. kellicotti*

Gills with distinct nodus; stiff setae extending only 2⁄3 length of gill margins; mentum slightly convex; very common statewide ..... *I. ramburii*

(4) Median gill lanceolate, its greatest width 1/5 total length; nodus of lateral gills generally indistinct with 3 transverse bands; rare, North Florida .....
..... *I. prognata*

Median gill oblanceolate, its greatest width 1/4 total length; nodus of lateral gill distinct with 3-4 transverse bands; very common statewide.....*I. posita*



Enallagma

(1) Palpal setae 3, premental setae 1; lotic waters .....
..... *Enallagma cardenium*

Palpal setae 4-6, premental setae 2-4 2

(2) 2nd segment of antenna distinctly longer than 1st; 3rd segment at least twice as long as 1st; gills usually without pigment except tracheal walls; extra-tracheal pigment, if present, confined to ill-defined axial stripe or spot, or slight pigmentation at apex of gills..... 3

2nd antennal segment not longer than 1st; 3rd antennal segment subequal to or only slightly longer than 1st antennal segment, not twice as long; gills with extra-tracheal pigment and with stripes; palpal setae 4-5, premental setae 2-4.....8

(3) Extra-tracheal pigment on pointed gills confined to axial spot with faint transverse band near apex; palpal setae 5, premental setae 2-3; very long, usually greater than 30 mm when fully grown..... *E. dæckii*

Extra-tracheal pigment on gills absent or present as faint spots in *E. durum*; usually less than 30 mm .. 4

(4) Pale gills rounded at apices, no pigmented areas; sand-bottom lakes..... *E. davisi*

Gills with acute apices; extra-tracheal pigment on gills absent or present 5

(5) Dorsal antenodal setae of median gill less than 20; gills 4.0 mm long; rare in North Florida only.....
..... *E. geminatum*

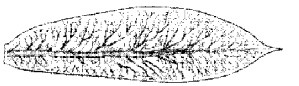
Dorsal antenodal setae of median gill more than 20, usually exceeding 25; gills greater than 4.5 mm long
..... 6

(6) Gills narrowly lanceolate, their greatest width no more than 1⁄5 total length; extra-tracheal pigment present; apices of gills rounded or convexoacute; brackish or hard waters..... *E. durum*

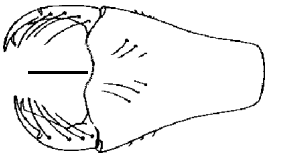
Gills broadly lanceolate, their greatest width about 1⁄4 total length; apices of gills tapering rather abruptly, somewhat acute; gills pale 7

(7) Lateral carina of median gill with 8 or fewer short, stiff setae scattered on proximal 1/3 of gill; palpal setae 5, premental setae 4; ponds ..... *E. doubledayi*

Lateral carina of median gill with regular row of 15 or more short stiff setae on proximal 1/3 of gill; palpal setae 6, premental setae 3 large and 1 small .... *E. civile*



(8) Margin of mentum strongly concave; sand bottom lakes only ..... *E. sulcatum*



Margin of mentum flat or convex 9

(9) Gills with patches of closely branched and deeply pigmented tracheae, pigmentation sometimes reduced and restricted to basal 1/2 of gill 10

Gills without patches of closely branched, deeply pigmented tracheae; 3-5 large, wide bands 13

(10) Gills oblanceolate, their greatest width 1/4 to 1/5 of the total length.....11

Gills narrowly lanceolate, scarcely widening beyond the middle, their greatest width 1/6 to 1/8 of the total length..... 12

(11) Gills with 4-5 well-defined narrow, transverse, dark stripes which are confined to the apical 1/2 of the gills with the basal 1/2 without dark pigmentation; rare, Jackson County only ..... *E. basidens*

Gills with a single, wide transverse band or blotch located at or near the apex; basal 1/2 of gills dark although usually not as dark as the apical band; gills 4.5 to 5.0 mm long; nodus of median gill at 2/3 distance from base to apex; shady, sandy streams in North and Central Florida ..... *E. weewa*

(12) Extra-tracheal pigment present as a single, dark transverse band at the apex of each gill; very light axial stripe may be present on the basal 6/10 of each lateral gill; closely branched, deeply pigmented tracheae appearing in ill-defined bands; tannic streams in North Florida ..... *E. divagans*

Extra-tracheal pigment pattern otherwise; random pigmented tracheae not forming bands; basal 6/10 to 7/10 and apex of gill a uniform dark color leaving a clear cross band on the apical 1/3; usually swampy lakes and streams..... *E. pallidum*

(13) Dorsal margin of median gill without a group of stiff setae just proximal to the 1st dark, transverse band and without a definite nodus; ventral edge of lateral gill without a concavity following the ventral series of setae.....14

Dorsal margin of median gill with a group of stiff setae just before the notched nodus; transverse bands equally dark 16

(14) Palpal setae 5, premental setae 3; proximal transverse bands much darker than the more distal bands; gills broadly shaped like a leaf; lakes only .... *E. vesperum*

Palpal setae 4, premental setae 2-3; bands equal in darkness; gills more slender 15

(15) Mentum edge finely serrated, hind tibiae much longer than hind femora; premental setae 3; tannic waters ..... *E. dubium*

Mentum edge not serrated, hind tibiae and femora about equal in length; premental setae 2, sometimes with a smaller third; sandy lakes..... *E. concisum*

(16) Ventral margins of lateral gills with 40-46 stout setae; 20-30 stout setae on median carinae; little or no dark pigment along the median carinae..... *E. pollutum*

Ventral margins of lateral gills with 45-55 stout setae; 30-40 stout setae on median carinae; dark pigment along the median carinae; North Florida .... *E. signatum*

Selected References

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