

Damselfly Naiads (Odonata: Zygoptera) of Sindh–Pakistan

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ABSTRACT

The damselfly naiads collected from various localities of Sindh Province of Pakistan, belonged to two zygopterous families namely Lestidae and Coenagrionidae. The study revealed *Lestes*, *Pseudagrion*, *Ceriagrion* and *Ischnura* spp., which are described in this paper.

Key Words: Damselfly; Naiads; Zygoptera; Odonata; Sindh; Pakistan

INTRODUCTION

The damselfly naiads are voracious predators of waterfleas, larvae of mosquitoes and bugs and in turn fall a prey to other predators such as fishes, frogs and birds. At egg stage, they are parasitized by the aquatic Hymenoptera. They harbor many human parasites and also serve as the second intermediate hosts of amphibian and avian flukes. The latter can cause 90% losses in egg production in hens. Taxonomic studies on these zygopterous naiads have been done in other countries e.g. India (Needham, 1911), China (Needham, 1930), England (Gardner, 1960) and America (Nevin, 1930; Lutz & Pittman, 1968; Provonsha & McCafferty, 1973; Provonsha, 1975; Huggins, 1978a & b; Masseur & Pilon, 1982; Huggins, 1984; Pilon & Franchini, 1984; Leggott & Pritchard, 1985; Pilon, 1994). In Pakistan, some reports are available on naiads of suborder Anisoptera (Khaliq *et al.*, 1994a & b; Hussain & Riaz, 1999a & b; Hussain & Riaz, 2000), while the naiads of the suborder Zygoptera are rarely known. This paper presents the taxonomy with illustrations of these naiads collected from various localities of the Sindh Province of Pakistan.

MATERIALS AND METHODS

The damselfly naiads were collected with the help of a D-shaped dip net and an ordinary sieve from various places of the following localities in Sindh.

1. District Sukkur: Sukkur, Rohri
2. District Shikarpur: Shikarpur
3. District Hyderabad: Kotri, Tando Muhammad Khan
4. District Therparker: Sindhri
5. District Thatta: Sonda

The naiads were found in shallow water usually sticking to the branches or roots of the sub-merged bushes or erect grasses. The collected specimens were killed and preserved in 75% ethyl alcohol and put in properly labeled small plastic jars. The specimens were examined under a

Wild M3B binocular microscope (3.04X, 7.61X and 19.04X) and a Carl Zeiss binocular microscope (100X), and identified and described with the help of relevant literature. The figures of representative naiads and taxonomically important body parts were drawn with the help of a camera lucida fitted with E. Leitz Wetzler microscope (2X). The labia to be figured were first detached from the specimens and then mounted in glycerine.

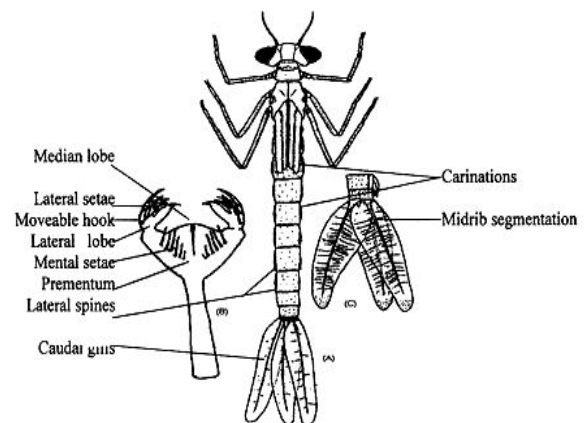
The terminology of Needham (1930) and Gardner (1960) has been used in the present manuscript and no new terms have been introduced. The study is based on about 197 specimens, which have been deposited in the Taxonomic Laboratory, Department of Agricultural Entomology, University of Agriculture, Faisalabad.

RESULTS AND DISCUSSION

Family Lestidae

1. *Lestes* sp. (Fig. 1). The naiad is long, non hairy and brown in colour.

Fig. 1. Naiad of *Lestes* sp. (A), labium (B), lateral views of caudal gills (C).



Head. Flat, smooth, dark brown, two times wider than long, blackish coloration along the inner borders of eyes; hind angles rounded and hind margin between them concave. Eyes large, wider than long and more lateral in position. Antennae very long, light brown, scape shorter than pedicel. Labium with its hinge reaching the bases of meta-legs; prementum much contracted basally, ladle shaped; median lobe smooth, not triangular; lateral lobes of labium with its anterior sides tri-parted and with deep notches between the spine-like tops; movable hooks strong, longer than lateral setae; lateral setae 3, two of them arising from movable hook; mental setae 6, the 6th one shorter.

Thorax. Prothorax much narrower than the hind margin of head. Wing-pads parallel, reaching up to 4th abdominal segment. Legs long, slender, without any specific colouration; hind femora reaching up to 4th abdominal segment.

Abdomen. Segments long, smooth, having lateral carination up to 9th segment; lateral spines present on segments 7-9; caudal gills very long, broader at bases and gradually narrowing towards apices, which are slightly but broadly pointed; midrib apparently segmented.

Remarks. The specimen of this species completely resembles with the published description of Needham (1930) and Gardner (1960). It can be easily distinguished from other related species by its elongated body, two lateral setae which arise from movable hooks of lateral lobes, the secondary tracheae which are almost at right angle to the main stem and the peculiar shape of the caudal gills.

Material examined. Total one, collected from Shikarpur, 28-08-1987.

Family Coenagrionidae

1. *Pseudagrion* sp. (Fig. 2). The naiads vary in body colour from pale brown to blackish-brown.

Head. Flat, rectangular in outline, two times wider than long, its hind angles greatly angulated, bearing short spinules. Eyes prominent, more lateral in position. Antennae

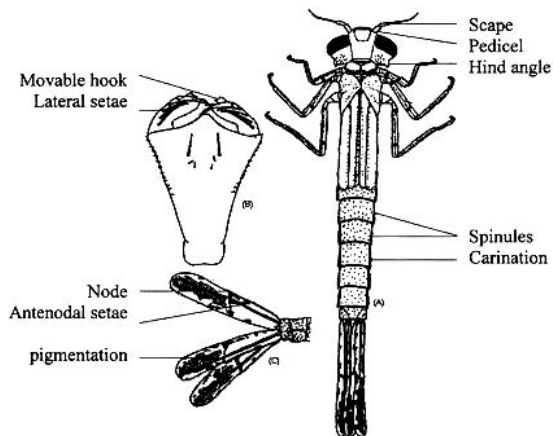


Fig.2. Naiad of *Pseudagrion* sp. (A), labium (B), lateral view of caudal gills (C)

6-segmented, scape and pedicel thicker, dark in colour and almost equal in length. Labium with its hinge reaching the bases of meso-legs; median lobe prominent, triangular, bordered with minute dents; movable hooks strong, longer than lateral setae; anterior borders of labial palpi with minute serration (intermediate hooks); lateral setae 4; mental seta 1 on each side.

Thorax. Prothorax narrower than hind margin of head, its anterior lobe with a triangular structure. Wing-pads parallel, reaching up to 4th abdominal segment. Tibiae and femora with short setae, the latter with one brown annulus on their apices; hind femora reaching up to 4th abdominal segment.

Abdomen. All segments completely covered with short spinules; segments 1-9 carinated laterally, 10th rounded; caudal gills pale yellow to dark brown, elongate, rounded at tips, distal portion slightly wider than proximal, nodate, stout antenodal setae present up to node on outer margin only; small pigmentation of more or less dendric form near wide transparent marginal area; secondary tracheal branches present but not prominent.

Remarks. The naiads of this species completely resemble with the published description of Needham (1911) and can be easily identified from other related species by the extreme angulation of hind angles of head, 6-segmented antennae, mental seta 1 on each side and rounded apices of caudal gills.

Material examined. Total 30, collected from following localities: Rohri (Sukkur) 6, 27-08-87; Kotri (Hyderabad) 10, 04-09-1987; Tando Muhammad Khan (Hyderabad) 10, 02-09-1987; Sonda (Thatta) 4, 03-09-1987.

2. *Ceriagrion* sp. (Fig. 3). The naiads of this genus are of brown colour with short body.

Head. Large, flat, two times wider than long, its hind angles rounded having short spinules and hind margin between them concave. Eyes rounded outwardly, more prominent laterally, a narrow rod-like streak running back obliquely from posterior inner margin of each eye. Antennae 7-segmented, scape and pedicel thin, latter one longer than scape. Labium with its hinge reaching between the bases of

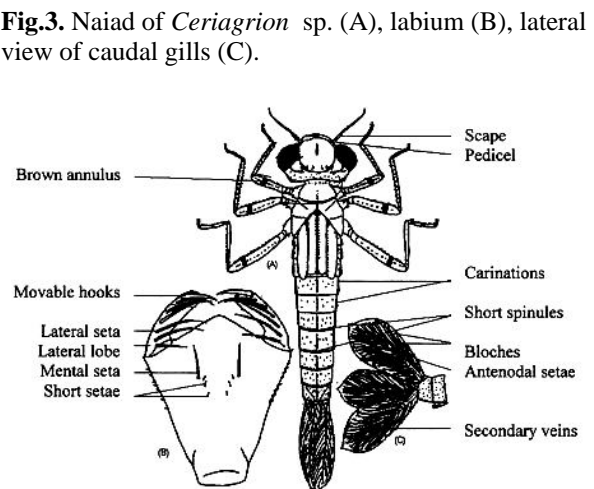


Fig.3. Naiad of *Ceriagrion* sp. (A), labium (B), lateral view of caudal gills (C).

pro-legs; median lobe smooth; triangular, with its apex rounded; movable hooks shorter than lateral setae, area between movable hook and fixed hook margined with minute spiniform setae; lateral setae 6; mental seta 1 on each side and area between them with short setae convergent backwards.

Thorax. Prothorax narrower than hind margin of head. Wing-pads parallel, reaching the base of 4th abdominal segment. Legs long, femora encircled with sub-apical brown annulus; hind femora reaching up to 6th abdominal segment.

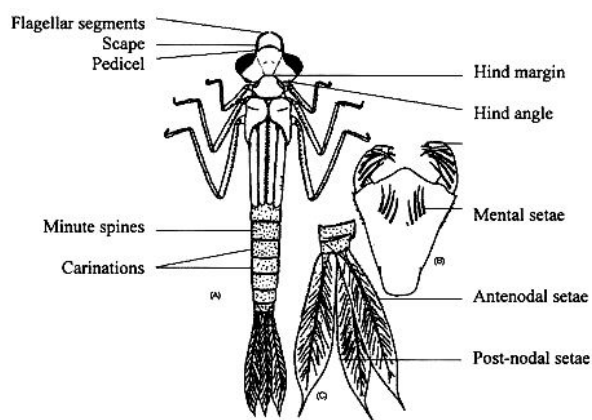
Abdomen. Smooth, with a transverse row of short spinules on distal margin of segments 6-10; all segments carinated laterally except 8-10 which are rounded; caudal gills short, denodate, abruptly pointed, marked with marginal blotches, distal portion broader than the basal one; stout antenodal setae present on almost basal half of the outer margin and one-fourth of the inner margin; parallel secondary veins obliquely present to main stem.

Remarks. The representatives of this species exactly tally with the published description of Needham (1930) and Gardner (1960) and can easily be identified from those of related species by their small size, scape shorter than pedicel, area between movable and fixed hooks not serrated but margined with spiniform setae. The caudal gills with parallel secondary veins obliquely present to main stem.

Material examined. Total 15, collected from Sonda (Thatta), 03-09-1987.

3. *Ischnura* sp. (Fig. 4). The naiads are of various body colours from pale yellow to dark brown.

Fig.4. Naiad of *Ischnura* sp. (A), labium (B), lateral view of caudal gills (C).



Head. Flat, smooth, two times wider than long (including eyes); its hind angles rounded, bearing short spinules and with straight hind margin. Eyes small, rounded, two times wider than long, more lateral in position, an area of black colour may or may not be extending from inner side of each eye to base of antenna. Antennae 7-segmented, with scape shorter than pedicel and both dark brown, flagellar segments transparent. Labium with its hinge reaching the bases of pro-legs; median lobe triangular and smooth; movable

hooks strong, incurving, shorter than lateral setae; intermediate hooks (serration) present at anterior borders of lateral lobes; lateral setae generally 5 (rarely 6); mental setae generally 4 (rarely 5 or 6), on each side, convergent backwards.

Thorax. Prothorax narrower than hind margin of head. Wing-pads parallel, reaching up to 4th abdominal segment. Legs short to medium size, femora with one sub-apical faint brown annulus; hind femora reaching up to 4th abdominal segment.

Abdomen. Segments covered with minute spines but lateral spines absent, lateral carinations present up to 8th segment while 9th and 10th rounded; caudal gills light yellow to dark brown, denodate to subnodate with apices sharply pointed; stout antenodal setae present on both margins, but that of one side reaching to or beyond the mid point, while fine post-nodal setae may or may not be present.

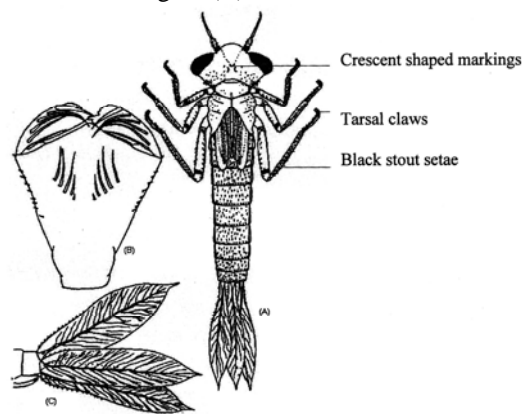
Remarks. The naiads of this species completely resemble with the published description of Needham (1930) and Gardner (1960) and can be distinguished from other related species by the marginal stout antenodal setae reaching up to middle or beyond the one side of acutely pointed caudal gills, hind margin of head straight between hind angles, antennae with scape shorter than pedicel.

Material examined. Total 126, collected from the following localities; Rohri (Sukkur) 15, 27-08-1987; Shikarpur 4, 28-08-1987; Kotri (Hyderabad) 20, 04-09-1987; Tando Muhammad Khan (Hyderabad) 17, 02-09-1987; Sindhri (Mirpur Khas) 5, 31-08-1987; Sonda (Thatta) 65, 03-09-1987.

3. *Ischnura* sp. (Fig. 5)

The characters examined in this species are same as in above except that in the middle of head, 3 crescent shaped markings are present. The tibiae and tarsi are provided with black stout setae and tarsal claws with blackish colour while in above species these are pale in colour.

Fig.5. Naiad of *Ischnura* sp. (A), labium (B), lateral view of caudal gills (C).



Material examined. Total 25, collected from the following localities: Rohri (Sukkur) 5, 27-08-1987; Kotri (Hyderabad) 7, 04-09-1987; Tando Muhammad Khan (Hyderabad) 3, 02-

09-1987; Sindhri (Mirpur Khas) 02, 31-08-1987; Sonda (Thatta) 8, 03-09-1987.

REFERENCES

- Gardner, A.E., 1960. "A Key To The Larvae Of The British Odonata". *The New Naturalist Dragonflies*. Collins St. James, London, pp. 190-225.
- Huggins, D.G., 1984. Description of the nymph of *Enallagma daeckii* (Calvert) (Odonata: Coenagrionidae). *J. Kan. Ent. Soc.*, 57: 190-6.
- Huggins, D.G., 1978. Description of the nymph of *Enallagma divagans* Selys (Odonata: Coenagrionidae). *J. Kan. Ent. Soc.*, 51: 140-3.
- Huggins, D.G., 1978. Redescription of the nymph of *Enallagma basidens* Calvert (Odonata : Coenagrionidae). *J. Kan. Ent. Soc.*, 51: 222-7.
- Hussain, R. and M. Riaz, 1999a. Description of Last Instar Naiads of *Rhyothemis variegata variegata* (Linnaeus) and *Pantala flavescens* (Fabricius) (Libellulidae: Odonata). *Int. J. Agri. Biol.*, 1: 145-6.
- Hussain, R. and M. Riaz, 1999b. The Naiads of *Acisoma panoroides panoroides* Rambur and *Brachythemis contaminata* (Fabricius) (Libellulidae: Odonata). *Int. J. Agri. Biol.*, 1: 147-8.
- Hussain, R. and M. Riaz, 2000. Description of the Naiads of *Gomphidia t-nigram* Selys and *Anax parthenope* Selys (Anisoptera: Odonata). *Int. J. Agri. Biol.*, 1: 167-8.
- Khaliq, A., S. Aslam and S.A. Anjum, 1994b. Description of the last instar naiad of *Anax immaculifrons* Rambur (Aeshnidae: Odonata). *Pakistan Entomol.*, 16: 75-6.
- Khaliq, A., S. Aslam and S.A. Anjum, 1994a. The naiads of *Orthetrum pruinosum neglectum* (Rambur) and *Trithemis pallidinervis* (Kirby) (Libellulidae: Odonata). *Pakistan Entomol.*, 16: 51-3.
- Loggott, M. and G. Pritchard, 1985. The life cycle of *Argia vivida* Hagen : developmental types, growth ratios and instar identification (Zygoptera : Coenagrionidae), *Odonatologica.*, 14: 201-10.
- Longfield, C., 1949. *The Dragonflies of the British Isles*, pp. 231-243. Fredrick Warne and Co., Ltd., London.
- Lutz, P.E. and A.R. Pittman, 1968. Oviposition and early developmental stages of *Lestes eurinus* (Odonata: Lestidae), *Amer. Midl. Nat.*, 80: 43-51.
- Maseau, M.J. and J.C. Pilon, 1982. Clef de determination des stades larvaires de *Enallagma boreale* selys, *E. ebrium* (Hagen), *E. hageni* (Walsh) et *E. vernale* Gloyd (Zygoptera: Coenagrionidae), *Odonatologica*, 11: 189-99.
- Needham, J.G., 1911. Notes on a few nymphs of Agrioninae (Order Odonata). *Ent. News*, 22: 342-5.
- Needham, J.G., 1930. *A Manual of Dragonflies of China*. Fan. Mem. Inst. Biol., Peiping, China.
- Nevin, F.R., 1930. A study of the larva of *Calopteryx (Agrion) maculata* (Odonata : Agrionidae), *Trans. Amer. Ent. Soc.*, 55: 425-48.
- Pilon, J.G. and J. Franchini, 1984. Etude morphologique des larves de *Ischnura verticalis* (Say) elevees en laboratoire (Zygoptera : Coenagrionidae), *Odonatologica*, 13: 551-64.
- Pilon, J.G., 1994. Morphologie larvaire d' *Enallagma carunculatum* Morse (Zygoptera: Coenagrionidae). *Odonatologica*, 23: 133-47.
- Provonsha, A.V. and W.P. McCafferty, 1973. Previously unknown nymphs of Western Odonata (Zygoptera: Calopterygidae, Coenagrionidae), *Proc. Ent. Soc. Wash.*, 75: 449-54.
- Provonsha, A.V., 1975. The Zygoptera (Odonata) of Utah with notes on their biology. *Great Basin Naturalist*, 35: 379-90.

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