

**DESCRIPTION OF THE LAST INSTAR LARVA
OF *ERYTHRODIPLAX NIGRICANS* (RAMBUR)
(ANISOPTERA: LIBELLULIDAE).**

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The larva is described and illustrated, based on Argentinean specimens. Larval structural features of 14 *Erythrodiplax* spp. are reviewed.

INTRODUCTION

The American genus *Erythrodiplax* Brauer is mainly neotropical in distribution. It is composed of more than 50 species, 21 of which are presently known from Argentina (MUZÓN & VON ELLENRIEDER, 1998). At present, the last larval instar of 12 species has been described (CARVALHO et al., 1991; LIMONGI, 1991; NEEDHAM, 1904; SANTOS, 1988), from which 7 are found in Argentina, i.e. *E. anomala* (Br.), *E. connata* (Ramb.), *E. fusca* (Ramb.), *E. juliana* Ris, *E. melanorubra* Borrer, *E. ochracea* (Burm.) and *E. umbrata* (L.).

Erythrodiplax nigricans has a large distribution area south of the Amazonas and east of the Andes, being a usual species in southern Brazil, Paraguay, Uruguay and Argentina. It is a very common inhabitant of temporary lentic environments in the grasslands of north, central and eastern Argentina (from Salta and Misiones to Buenos Aires and La Pampa provinces), with its southern known limit the Río Negro river basin at the northern boundary of Patagonia (MUZÓN, 1995).

DESCRIPTION OF THE LAST INSTAR LARVA

Figures 1-7

Material. — Argentina: Buenos Aires, Punta Lara, 34° 47,59' S; 58° 01,55' W, 10 specimens (5 reared); 1 ♂, 27-X-1997 [emergence 27-XI-1997]; — 1 ♀, 7-XI-1997 [emergence 13-XII-1998]; — 2

♂, 14-XII-1997 [emergence 4-I-1998]; — 1 ♀, 14-XII-1997 [emergence 23-III-1998]; — 2 larvae, 27-XII-1997; — 1 larva, 26-II-1998; — 1 larva, 14-VI-1997; — 1 larva, 29-III-1998, N. von Ellenrieder & P.J. Perez Goodwyn leg. The specimens are deposited in the Collection of the Departamento Científico Entomología, Museo de La Plata, Argentina.

H e a d (Fig. 1). — Pale, with diffuse dark pattern on dorsum, setose; 2.2 times as wide as long. Occiput with 8 pilose bands, posterior margin nearly straight. Mandibular formula according to WATSON (1956) (Figs 3-6): *L 1 2 3 4 0 a b / R 1 2 3 4 y a b d*. Labium (Fig. 2) reaching caudad to first coxae; prementum pale, anterior margin slightly crenulated, ligula obtuse, ratio of maximum width to maximum length 0.96, lateral setae 13 (15%), 12 (35%) or 11 (50%); margins of labial palp not crenulated, with minute black spots and a large one on the inner angle, with 8 (10%) or 9 (90%) setae.

T h o r a x. — Pale; prothorax with a mid-dorsal black spot. Wing pads reaching abdominal segment VI; femora and tibiae with three annular dark bands, except tibiae III with only two (a basal and a distal one).

Abdomen. — Pale, except tergites VII-X brownish with pale marks as shown in Fig. 1; lateral spines on segments VIII and IX, ratio of spine length to maximum length of corresponding segment 0.42 and 0.55 respectively. Paraprocts (Fig. 7) nearly five times as long as segment X; ratio relative to paraprocts: epiproct 0.84, cerci 0.62. Epiproct wide at the base, apex acute. Paraprocts, epiproct and cerci tips slightly recurved ventrad.

M e a s u r e m e n t s (mean \pm standard deviation, in mm). — Head maximum length: 1.86 ± 0.12 ; head maximum width: 4.1 ± 0.08 ; prementum maximum length: 2.86 ± 0.17 ; prementum maximum width 2.75 ± 0.23 ; labial palp maximum length: 1.85 ± 0.14 ; hind wing pads: 5.03 ± 0.17 ; length of femora: I, 2.26 ± 0.15 ; II, 2.8 ± 0.22 ; III, 3.71 ± 0.28 ; length of tibiae:

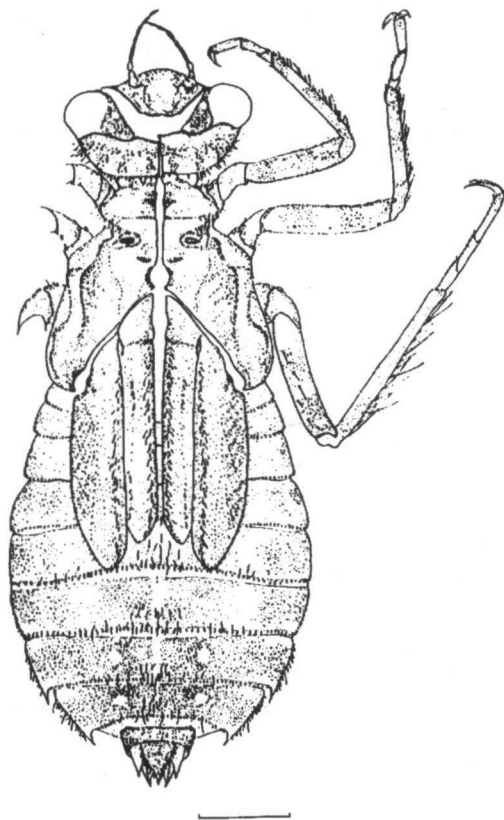
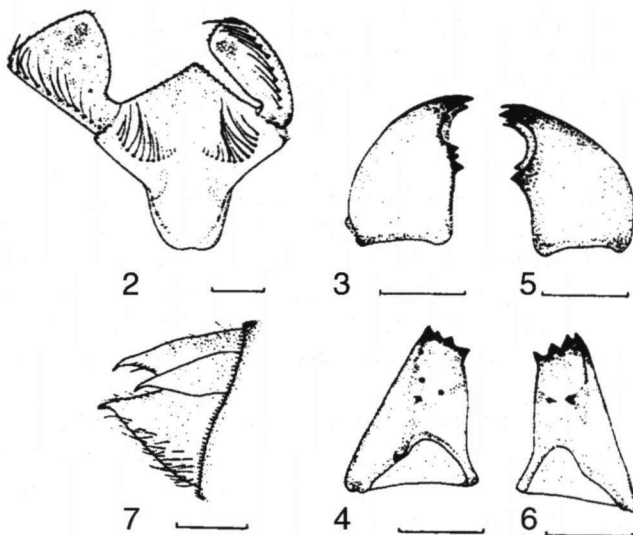


Fig. 1. Last larval instar of *Erythrodiplax nigricans* (Ramb.): general aspect, dorsal view. — [Bar: 2 mm]



Figs 2-7. Last larval instar of *Erythrodiplax nigricans* (Ramb.): (2) prementum, dorsal view; — (3) right mandible, posterior view; — (4) same, inner view; — (5) left mandible, posterior view; — (6) same, inner view; — (7) terminalia, lateral view. — [Bars: Fig. 2: 1 mm; all others: 0.5 mm]

I, 2.41 ± 0.25 ; II, 2.98 ± 0.19 ; III, 4.47 ± 0.26 ; length of abdominal tergites: VI, 0.78 ± 0.07 ; VII, 0.82 ± 0.06 ; VIII, 0.73 ± 0.06 ; IX, 0.62 ± 0.05 ; X, 0.22 ± 0.02 ; width of abdominal tergites: VI, 4.92 ± 0.38 ; VII, 4.8 ± 0.03 ; VIII, 4.45 ± 0.26 ; IX, 3.44 ± 0.18 ; X, 1.44 ± 0.07 ; lateral spines on abdominal segment VIII: 0.31 ± 0.03 ; on segment IX: 0.34 ± 0.03 ; cerci: 0.66 ± 0.04 ; paraprocts: 1.07 ± 0.1 ; epiproct: 0.9 ± 0.07 .

DISCUSSION

The current knowledge of the immature stages of the *Erythrodiplax* species is still scarce, with the larvae of less than a third of the species known. Considering that all the larval descriptions were made on non-Argentinean specimens, and that the larvae of many of the species sympatric with *E. nigricans* in Argentina are still unknown, the elaboration of a useful key, both generic or regional, is not yet possible.

The information provided in the descriptions and redescrptions of the *Erythrodiplax* larvae shows a remarkable uniformity of metric and morphological characters in the genus, with the distinction between several species very difficult (Tabs I, II). The last larval instar of *E. nigricans* can be distinguished from that of the other hitherto known Argentinean species by the number of labial palp setae (from *E. anomala*, *E. connata*, *E. melanorubra*, *E. umbrata*), the mandibular formula (from *E. juliana* and *E. ochracea*), and the hind wing pads length (from *E. fusca*).

Table I
Head characters of the last larval instar in 14 *Erythrodiplox* species

Species	Max. length	Max. width	Prementum max. length	Prementum max. width	Prementum setae	Labial palp setae	N° setae on each crenulation	Mandibular formula	References
<i>anomala</i>	1.82/1.71	3.88/3.77	3.22/3.04	2.71	11-12	7	1	1234 y? ab 1234 y abc-d	CARVALHO et al., 1991 NEEDHAM & WESTFALL, 1955 CARVALHO et al., 1991
<i>berence</i>					10-11 10-11 ⁵	9-10 9-10 ⁵	3-4		NEEDHAM & WESTFALL, 1955 CARVALHO et al., 1991
<i>connata</i>	2.4	4.1/3.99	2.94/3.4	3.22/2.94	10	6	1		CARVALHO et al., 1991
<i>funerea</i>					10-11	9-10	1		NEEDHAM & WESTFALL, 1955
<i>fusca</i>	2*	4	3.5	2.8	10; 9-11 ¹	8; 6 ¹	1?		SANTOS, 1967
<i>juliana</i>	1.71/2.28	3.88/4.21	3.63	2.94/2.18	11	9	1	1234 0 ab 1234 y abc-d	CARVALHO et al., 1991
<i>justiniana</i>					12-13	10	1-2		NEEDHAM & WESTFALL, 1955
<i>justiniana</i> [?]	4.3				9-10	7-8	1-2		WESTFALL, 1955
<i>melanorubra</i>	2.58*	4	4.16*	4.44*	11	7	1		KLOTS, 1932 LIMONGI, 1991
<i>minuscula</i>		3.5 ⁴			12; 12 ⁴ ; 11 ³	8; 8 ⁴ ; 7 ³	1 ³		KLOTS, 1932
<i>naeva</i>					10-11; 13 ³	9-10; 10 ³	3-4; 3 ³		KLOTS, 1932
<i>nigricans</i>	1.86±0.2	4.1±0.08	2.86±0.17	2.75±0.23	11-13	8-9	1, without crenulations	1234 0 ab 1234 y abb' 1234 y abcd	this work CARVALHO et al., 1991 NEEDHAM, 1904
<i>ochracea</i>	1.93/1.82	4.33/4.22	3.64/3.76	3.53	12	9	1		CARVALHO et al., 1991
<i>pallida</i>		3.5			9	6	? without crenulations		NEEDHAM, 1904
<i>umbra</i>	2.17/2.85	4.79/4.56; 4.8 ² ; 4.88-5.18 ⁶	4.09	3.5/3.86	13-15; 13-14 ² ; 13 ³ 13-16 ⁶	10-11; 10 ³ 10-11 ^{2,6}	2-3; 2 ³ ; 2-3 ^{2,6}		CARVALHO et al., 1991

¹ Venezuelan specimens cited by LIMONGI, 1991; - ² KLOTS, 1932; - ³ NEEDHAM & WESTFALL, 1955; - ⁴ NEEDHAM, 1904; - ⁵ CALVERT, 1904; - ⁶ CALVERT, 1928; - * based upon the description's figures.

Table II
Thorax and abdomen characters of the last larval instar in 14 *Erythrodiplax* species

Species	Inner W.P. length	3 rd femur length	3 rd tibia length	Spine seg.VIII	Spine seg.IX	Dorsal hook	Cerci/ Paraproct	Epiproct/ Paraproct	Abd. max. width	Abd. length	Total length	References
<i>anomala</i>	3.99/3.88	3.19	3.99/3.88	0.3*	0.3*	0	<1	1	4.33	6.61/6.72	11.97/12.08	CARVALHO et al., 1991
<i>berenice</i>				0.3; 0.5 ¹	0.4; 1 ¹	6; 0 ²	0.7; 0.5 ³	0.8; 0.75 ⁵			14; 14 ³	NEEDHAM & WESTFALL, 1955
<i>connata</i>	4.45/4.33	3.08/3.31	3.99/3.88						4.22	7.07/6.95	12.8	CARVALHO et al., 1991
<i>funerea</i>				0.3	0.4	0	0.8	1			14	NEEDHAM & WESTFALL, 1955
<i>fusca</i>	4	3*	3*	7 0.4*	7 0.6*		0.7	1	4	4	10;	WESTFALL, 1955 SANTOS, 1967
<i>juliana</i>	3.99/3.87	3.42/3.07	3.88/2.96	0.3*	0.4*	0	<1	1	4.1	6.61/7.52	10.8-12 ¹ 12.2/13.11	CARVALHO et al., 1991
<i>justiniana</i>				0.5	0.6	0	0.5	0.6			15	NEEDHAM & WESTFALL, 1955
<i>justiniana</i> (?)		3.8		0.33	0.33		0.75	1			10.5	KLOTS, 1932
<i>melanorubra</i>	5.48*	3.5	4.3	0.4	0.4	0	0.8	approx. 1	4.8	7	13	LIMONGI, 1991
<i>minuscula</i>		3.54		0.7 ³	0.8 ³	5 ³ , 0 ⁴	0.8 ³ ; 0.75 ⁴	0.9 ³ ; 1 ⁴	4 ⁴	7 ⁴	12; 12 ³ ; 12-14 ³	KLOTS, 1932
<i>naeva</i>				0.5; 0.3 ³	0.5; 0.4 ³	6 ³	0.7 ³	0.9 ³			14; 15-17 ³	KLOTS, 1932
<i>nigricans</i>	5.03±0.17	3.71±0.28	4.47±0.26	0.42	0.75	0	0.6	0.84	4.92±0.38			this work
<i>ochracea</i>	4.21/4.1	3.3/3.88	4.44/4.67	0.4*	0.5*	0	<1	1	4.67/4.52	7.52	13.33/13.91	CARVALHO et al., 1991
<i>pallida</i>		3.5		0.33	0.33	0	approx. 0.5	1	4.5	7	12	NEEDHAM, 1904
<i>umbra</i>	5.24/5.13	4.33/4.1;	5.13/4.79	0.5 ² ;	0.5 ² ;	0 ³	0.6 ² ; 0.5 ⁶	0.9 ² ; 0.77 ⁶	4.79/5.2	8.32	14.84/16.3;	CARVALHO
		3.9 ² ;		0.3 ³	0.4 ³				4; 5.5 ² ;	9.01	14 ² ; 16-17 ² ;	et al., 1991
		3.85-4.6 ⁶							5.03-5.48 ⁶	16-19 ⁶		

¹ Venezuelan specimens cited by LIMONGI, 1991; - ² KLOTS, 1932; - ³ NEEDHAM & WESTFALL, 1955; - ⁴ NEEDHAM, 1904; - ⁵ CALVERT, 1904; - ⁶ CALVERT, 1928; - * based upon the description's figures.

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REFERENCES

- CALVERT, P.P., 1904. Doings of Societies. *Ent. News* 15: 174-175.
- CALVERT, P.P., 1928. Report on Odonata, including notes on some internal organs of the larvae. *Univ. Iowa Stud. nat. Hist.* 12: 3-44
- CARVALHO, A.L., N. FERREYRA, Jr & J.L. NESSIMIAN, 1991. Descrição das larvas de tres especies do genero *Erythrodiplax* Brauer (Odonata, Libellulidae). *Revta bras. Ent.* 35(1): 165-171.
- KLOTS, E.B., 1932. Insects of Puerto Rico and the Virgin Islands: Odonata or dragonflies. *Scient. Surv. P. Rico* 14(1): 1-107, pls 1-7 excl.
- LIMONGI, J., 1991. Estudio morfo-taxonómico de nayades de algunas especies de Odonata en Venezuela. 2. *Mems Soc. Cien. nat. "La Salle"* 49/50: 405-420.
- MUZON, J. 1995. Los Odonata de la Patagonia argentina. *Revta Soc. ent. argent.* 54(1/4): 1-14.
- MUZÓN, J. & N. VON ELLENRIEDER, 1998. Odonata. In: J.J. Morrone & S. Coscarón, [Eds], Biodiversidad de artrópodos argentinos: una perspectiva biotaxonomica, pp. 14-25. Sur, La Plata.
- NEEDHAM, J.G., 1904. New dragon-fly nymphs in the United States National Museum. *Proc. U. S. nat. Mus.* 27: 685-720, pls 38-44 excl.
- NEEDHAM, J.G. & M.J. WESTFALL, 1955. *A manual of the dragonflies of North America (Anisoptera), including the Greater Antilles and the provinces of the Mexican border.* Univ. Calif. Press, Berkeley.
- SANTOS, N.D., 1967. Notas sobre a ninfa de *Erythrodiplax connata fusca* (Rambur, 1842) Brauer, 1868 (Odonata, Libellulidae). *Atas Soc. Biol. Rio de J.* 10(6): 145-147.
- SANTOS, N.D., 1988. Catálogo bibliográfico de ninfas de odonatos neotropicais. *Acta amazon.* 18 (1/2): 265-350.
- WATSON, M.C., 1956. The utilization of mandibular armature in taxonomic studies of anisopterous nymphs. *Trans. Am. ent. Soc.* 81: 155-202.