

## THE ARGENTINEAN SPECIES OF THE GENUS *PERITHEMIS* HAGEN (ANISOPTERA: LIBELLULIDAE)\*

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The present work has two aims: to give an updated revision of the genus in Argentina, including a key, and to propose specific characters not included in previous revisions. *Perithemis waltheri* Ris is considered as a junior synonym of *P. icteroptera* (Selys). The first description of the last larval instar of *P. icteroptera*, and a redescription of the last larval instar of *P. mooma* from Argentina are included.

### INTRODUCTION

The American genus *Perithemis* Hagen containing 13 species (RIS, 1930; DUNKLE, 1982; HOFFMANN, 1990) belongs to the pan-tropical subfamily Palpopleurinae, which includes the neotropical genera *Diastatops* Rambur and *Zenithoptera* Selys, and the Ethiopian and Oriental genus *Palpopleura* Rambur. This subfamily is characterized by broad and dark colored wings, arculus between 1<sup>st</sup> and 2<sup>nd</sup> antenodal, fore wings with last antenodal always incomplete and costal border strongly convex (FRASER, 1957; BECHLY, 1996).

Wing color pattern of female and, to a lesser extent, male *Perithemis* is highly variable and has resulted in a confusing taxonomy. Many of these variable forms have been described as varieties and species (i.e. KIRBY, 1889; RIS, 1910).

Four species of *Perithemis* are known from Argentina: *P. icteroptera* (Selys), *P. lais* (Perty), *P. mooma* Kirby, *P. thais* Kirby. Several authors have erroneously cited *P. domitia* (Drury) and *P. tenera* (Say) from different localities of Argentina (FRASER, 1947; RODRIGUES CAPÍTULO, 1992; RODRÍGUES CAPÍTULO et

\* This study is dedicated to our friend Dr Gerhard Jurzitz on his 70<sup>th</sup> birthday, in acknowledgement of his contribution to the knowledge of Argentinean Odonata. His work and friendship have encouraged us to study the Argentinean Odonata over the last two decades.

al., 1991). Considerable doubt exists about the identity of *P. waltheri*, which was proposed as a probable junior synonym of *P. icteroptera* (RIS, 1930; DUNKLE, 1982).

The last larval instar of four species of *Perithemis* have been described: *P. electra* (SANTOS, 1970), *P. domitia* (NEEDHAM & WESTFALL, 1955), *P. mooma* (SANTOS, 1973), and *P. tenera* (NEEDHAM, 1901; NEEDHAM & WESTFALL, 1955). BUTLER (1904) figured the labium of *P. domitia*, and WATSON (1956) gave the mandibular formula of *P. tenera*. DUNKLE (1982) described the two first larval instars of *P. rubita*.

Here, we describe the last larval instar of *P. icteroptera*, and redescribe that of *P. mooma*, whose first description was incomplete and based on a single specimen. The present descriptions are based on specimens from the southernmost known localities for these species.

#### MATERIAL AND METHODS

RIS (1930), in his revision of *Perithemis*, used mainly wing venation and color pattern as specific characters. However, these character sets often fail in correctly assigning unknown specimens to species. For example according to RIS (1930), *P. mooma* can be separated from *P. icteroptera* by the absence of crossveins in all triangles and subtriangles. However, 18.5% of the presently examined specimens of *P. mooma* have at least one triangle or subtriangle crossed; indicating that this character is highly variable.

We used the following characters from the male secondary genitalia and female vulvar lamina as follows: **H a m u l i:** overall shape and position of sclerotized tip (distance from tip to ventral margin). **P e n i s:** first segment contours in ventral view, and shape of distal sclerotized portion of fourth segment. **V u l v a r l a m i n a:** length and degree of divergence of lobes. The shape of the posterior lobe of the prothorax of the female of *P. icteroptera* was found to be diagnostic.

The four species of *Perithemis* recorded from Argentina are considered separately. Each species account includes synonymy including name changes and Argentinean records, distributional data and a diagnosis.

Examined material are from the following collections: Collection Selys deposited at Institut Royal des Sciences Naturelles de Belgique (IRSNB), Departamento Científico Entomología, Museo de La Plata (MLP); Fundación e Instituto Miguel Lillo, Tucumán (FML); Museu Nacional do Rio de Janeiro (MRJ); Facultad de Zoológica Agrícola, Maracay, Venezuela (IZA); Dr. S. W. Dunkle personal collection, Plano, Texas, U.S.A. (SWD). Final instar larvae were reared in laboratory until metamorphosis. Drawings were made with the aid of a net reticule. Measurements are in mm.

#### *PERITHEMIS ICTEROPTERA* (SELYS, 1857)

Figures 1-3, 13, 17, 19-23, 29, 31

*Libellula domitia* RAMBUR, 1842: 124 (misident., record from Argentina, Buenos Aires).

*Libellula icteroptera* SELYS, 1857: 451 (descr., type locality: Buenos Aires, Argentina).

*Perithemis icteroptera* (Selys, 1857): KIRBY, 1890: 10; MARTIN, 1896: (record from Salta); RIS, 1910: 330, 341-342, figs 177, 190, pl. 3 (in key, fig. wings, record

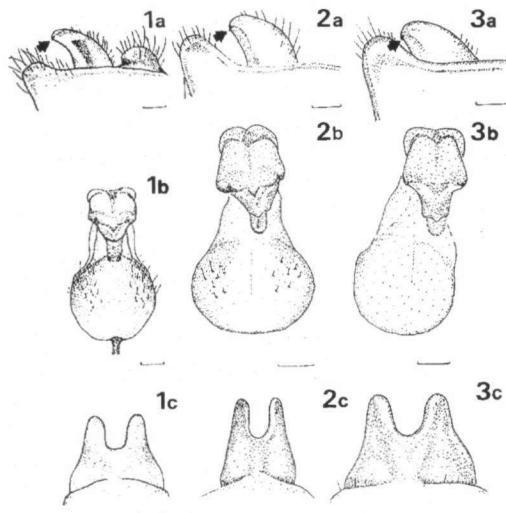
from San Isidro and Tigre, Buenos Aires); RIS, 1930: 7, 14, 43-45, figs 18, 35-36 (redescr. ♂ and ♀, in key, fig. penis and wings, record from San Isidro and Tigre, Buenos Aires); NAVÁS, 1927a: 23 (record from Paraná de Las Palmas, Buenos Aires); NAVÁS, 1927b: 27 (record from La Risueña, Delta del Paraná, Buenos Aires); FRASER, 1947: 434, 451 (record from Concordia, Entre Ríos, and Buenos Aires); PAULSON, 1977: 177 (listed from Argentina); RODRÍGUES CAPÍTULO et al., 1991: 65, 68 (in part; record from Buenos Aires and Entre Ríos; chromosomal data); RODRÍGUES CAPÍTULO, 1992: 64 (listed from Argentina); MUZÓN & VON ELLENRIEDER, 1998: 25 (listed from Entre Ríos and Buenos Aires).

*Perithemis dominia icteroptera* (Selys, 1857): RIS, 1904: 30 (in part; record from San Isidro, Buenos Aires); CALVERT, 1901-1908: 312 (record from San Isidro, Buenos Aires).

*Perithemis waltheri* Ris, 1910: 330, 340-341, pl. 3 (descr. ♂ and ♀, type loc. Rio de Janeiro, Brazil, also recorded from Espírito Santo, Minas Gerais, Brazil, Surinam and Sapucay, Paraguay); RIS, 1913: 87 (record from Misiones); RIS, 1930: 7, 14, 42-43, fig. 17 (record from Misiones); FRASER, 1947: 434, 452 (record from Misiones and Entre Ríos); PAULSON, 1977: 177 (listed from Argentina); JURZITZA, 1981: 118 (listed from National Park Iguazú, Misiones); RODRÍGUES CAPÍTULO et al., 1991: 65 (listed from Argentina; Entre Ríos and Misiones); CARVALHO & PUJOL-LUZ, 1992: 157-159 (record from Ilha Grande, Rio de Janeiro); MUZÓN & VON ELLENRIEDER, 1998: 25 (listed from Entre Ríos and Misiones).

**M a t e r i a l.** — ARGENTINA, Buenos Aires prov., Buenos Aires, W. de Selys leg, 6 C, (IRSNB); Tigre, W. de Selys leg., 2 ♀ and 2 specimens lacking abdomens (IRSNB); Los Talas, 24-II-1989, Muzón leg., 2 ♀ (MLP); Delta, XI-1967, Mauri & Hepper leg., 1 ♂, 2 ♀ (MLP); Brazo Largo, 27-II-1936, Castillo leg., 1 ♂ (MLP); Brazo Chico, Castillo leg., I-1942, 1 ♀ (MLP); Punta Lara, XI-1953, Cuembuena leg., 1 ♂ (MLP); 08-II-1985, R. Capítulo & Muzón leg., 1 ♂, 1 ♀ (MLP); 04-XI-1996, von Ellenrieder leg., 1 ♂ (MLP); 20-XI-1996, Muzón & von Ellenrieder leg., 26 ♂, 2 ♀ (MLP); 02-XI-1996, von Ellenrieder leg., 8 ♂ (MLP); same data except 09-XII-1996, 6 ♂; 17-XII-1996, 3 ♂; 23-XII-1996, 4 ♂; 30-XII-1996, 2 ♂, 4 ♀; 23-I-1997, 6 ♂; 31-I-1997, 2 ♂, 3 ♀; 15-II-1997, 2 ♂; 05-III-1997, 2 ♂; 12-III-1997, 1 ♂, 1 ♀; 16-III-1997, 1 ♂, 2 ♀; 23-III-1997, 2 ♂, 2 ♀; Entre Ríos prov., Concordia, XII-1935, Hayward leg., 1 ♂, 1 ♀, 1 specimen without abdomen (FML); Parque Nacional El Palmar, Arroyo el Palmar, 20-IX-1985, J. Muzón leg., 1 ♂ (MLP); Misiones prov., Pto. Bemberg, 12/29-I-1945, Hayward, Willink & Golbach leg., 2 ♂ (FML); Salta prov., Dique Campo Alegre, 12-I-1997, Muzón & von Ellenrieder leg., 1 ♂ (MLP). — PARAGUAY, Sapucay, 07-III-1970, 1 ♂ (MLP). — BRAZIL, Rio de Janeiro, Araruama (km 77), 09-II-1968, N. Santos leg., 1 ♂ (MLP), 2 ♂ (MRJ); entre Araruama e Silva Jardim (km 25), 07-II-1968, N. Santos leg., 1 ♂; Ilha Grande, 31-III-1956, N. Santos leg., 2 ♂; Rio Claro, Rio Pirai, 15-III-1968, N. Santos leg., 1 ♂; Goiás, Brasília, Rio Guar, 25-XI-1963, N. Santos leg., 1 ♂; Rio Grande do Sul, Jaguarão, 17-I-1979, 1 ♂; São Paulo, Onda Verde, 25-I-1946, F. Lane leg., 1 ♂; Espírito Santo, Santo Antônio, 02-V-1967, Paulo Elias leg., 1 ♂ (MRJ).

**DIAGNOSIS.** — Female and male wings uniformly colored, without hyaline areas; several specimens with diffuse color pattern and hyaline between triangle and nodus and diffuse dark stripes; costal and posterior margins of pterostigma black. Wings length/maximum width ratio: Males  $2.47 \pm 0.06$  (Range 2.39-2.64) (n=20), Females  $2.51 \pm 0.07$  (Range 2.37-2.64) (n=20). Pterothorax golden brown, with dark antehumeral stripes. Tip of hamuli almost at level of ventral margin (Figs 1a, 2a, 3a). Penis with first segment rounded, basal portion of fourth segment subquadrate, margins of sclerotized distal portion of fourth segment convergent (Figs 1b, 2b,



Figs 1-3. *Perithemis icteroptera* (Figs 1-2) and *P. waltheri*, (Fig. 3): — a: hamulus, tip indicated by arrow, lateral view, — b: penis, ventral view, — c: vulvar lamina, ventral view, — bar: 0.2 mm: (1) *P. icteroptera*, Buenos Aires, Punta Lara, MLP; — (2a-b) ditto, paratype, IRSNB; — (2c) ditto, female compressed, IRSNB; — (3) *P. waltheri*, syntype, IRSNB.

Paraná de las Palmas, La Risueña (NAVÁS, 1927b), Brazo Chico, Brazo Largo (MLP); Tigre (RIS, 1910, 1930); San Isidro (RIS, 1904, 1910, 1930); Punta Lara (MLP); Los Talas (MLP); PARAGUAY (MLP); — BRAZIL (IRSNB; MLP; MRJ).

**TYPES.** — *Libellula icteroptera* Selys: Lectotype ♂ by present designation: ARGENTINA, Buenos Aires (IRSNB). Another ♂ from the same locality is a paralectotype. — *Perithemis waltheri* Ris: Lectotype ♂ by present designation: BRAZIL, Rio de Janeiro. Another 13 ♂ and 1 ♀ (same data) are paralectotypes (IRSNB). The lectotype and one paralectotype male included within the series of *P. icteroptera* and *P. waltheri* in IRSNB are labeled as lectotypes in an unknown hand (probably by Karl Buchholz who was doing a revision of the group several years ago) and carry the manuscript name *L. chlorotica* in Selys' hand.

#### DESCRIPTION OF FINAL LARVAL INSTAR

**M a t e r i a l.** — ARGENTINA, Buenos Aires prov., Punta Lara, 29-IX-1996, von Ellenrieder & P. Goodwyn leg., 1 larva (MLP); same data except 15-II-1997, 1 larva (MLP); 23-III-1997, 1 larva (MLP); 30-VII-1997, 1 larva (MLP); 7-XI-1997, 1 larva (MLP); 27-XI-1997, 3 exuviae (reared) (MLP).

**H e a d.** — Twice as wide as long; eyes prominent; antenna 7-segmented, the third the longest; frons with posterior margin with a row of dark spots; occiput with irregular patches of hairs, posterior margin nearly straight, anterior margin dark;

3b). Female posterior lobe of prothorax slightly cleft, each half as wide as twice its length (Fig. 13). Length of vulvar laminar lobes as long as twice the distance between them, nearly parallel, cleft U-shaped; external margin slightly concave (Figs 1c, 2c, 3c).

**DISTRIBUTION.** — ARGENTINA: Salta prov., Salta (MARTIN, 1896), Dique Campo Alegre (MLP); Misiones prov., Misiones (RIS, 1930, as *P. waltheri*), P. N. Iguazú (JURZITZA, 1981, as *P. waltheri*); Entre Ríos prov., Concordia (FRASER, 1947); Parque Nacional El Palmar (MLP); Buenos Aires prov., Buenos Aires (RAMBUR, 1842; SELYS, 1857; RIS, 1910, 1913; FRASER, 1947; IRSNB),

dark areas of the head (frons and occiput) with a transverse stripe resembling a "mask" (Fig. 17); labium reaching caudad to second coxae; prementum (Fig. 23) almost as wide as long (0.84), with 9-12 setae on either side; ligula angulated. Labial palp with 6 setae on its external margin, proximal margin bearing a row of paired short setae; movable hook shorter than lateral setae. Mandibles (Figs 19-22): Formula (sensu WATSON, 1956): L 1234 0 a b / R 1234 y a b d.

**T h o r a x** (Fig. 17). — Wing pads reaching abdominal segments 5-6. Femora and tibiae each bearing 2 dark annuli, except for femur 2, which exhibits 3.

**A b d o m e n**. — Color pattern as in Fig. 17, dorsal hooks on tergites 3-9 (Fig. 29); on 3 small; on 4 perpendicular, on 4 and 5 fingerlike, the remaining ones pointed and projecting caudally. Lateral spines on segments 8 and 9, spine length / maximum dorsal length of corresponding segment ratio 0.3 and 0.42 respectively. Epiproct nearly four times as long as segment 10. Ratio relative to epiproct: paraprocts 0.65; cerci 0.45.

**M e a s u r e m e n t s** (n=8). — Total length (without caudal appendages):  $11.96 \pm 0.83$ ; head maximum length:  $1.8 \pm 0.11$ ; head maximum width:  $3.62 \pm 0.11$ ; prementum maximum length:  $1.83 \pm 0.1$ ; palp movable hook:  $0.39 \pm 0.01$ ; femur I length:  $2.15 \pm 0.05$ ; femur 2:  $2.92 \pm 0.1$ ; femur 3:  $4.07 \pm 0.18$ ; hind wing pads length:  $3.41 \pm 0.2$ ; fore wing pads length:  $3.18 \pm 0.18$ ; lateral spines on segment 8:  $0.29 \pm 0.04$ ; lateral spines on segment 9:  $0.34 \pm 0.04$ ; epiproct:  $0.7 \pm 0.05$ ; cerci:  $0.32 \pm 0.03$ ; paraprocts:  $0.48 \pm 0.03$ .

**R E M A R K S**. — The original description of *Perithemis waltheri* (RIS, 1910) was based on specimens from Brazil (Rio de Janeiro, Espírito Santo and Minas Gerais), Paraguay (Sapucay) and doubtfully from Surinam. His redescription (RIS, 1930) based on Argentinean (Misiones) specimens offer no diagnostic character which permits separation from *P. icteroptera*. Ris expressed doubt as to the identity of this species, and in his revision (RIS, 1930: 7) he stated: "*waltheri* might well be a luxuriant tropical form of the same species which is represented by the smaller and less intensely colored *icteroptera* of the region of Buenos Aires". We examined type material (IRSNB) under both names and 13 specimens previously identified as *P. waltheri* as follows: two males from Misiones determined by F.C. Fraser and included in his work on Argentinean Odonata (FRASER, 1947) and 11 males from Brazil (MRJ), two of them included in CARVALHO & PUJOL-LUZ (1992). We believe *Perithemis waltheri* is a junior synonym of *P. icteroptera*. These specimens show no consistent morphological differences in the characters described here, nor clinal variation in coloration intensity within triangle and nodal spots from specimens of *P. icteroptera*. RIS (1930: 43) included four males and one female from Misiones, Argentina as *P. waltheri*. He noted that these specimens were not enough to modify his opinion as to the specificity of *P. waltheri*. However, intermediate records of this species from Buenos Aires, Entre Ríos and Misiones (Argentina), Sapucay (Paraguay) to Rio de Janeiro, Rio Grande do Sul, Espírito Santo, Goiás and São Paulo (Brazil) indicate that this taxon occupies continuous distribution over southeastern Brazil to northern Argentina.

The range of *Perithemis icteroptera* is enlarged with re-examination of the speci-

mens of *P. waltheri* studied by Selsys, Ris, Fraser and Carvalho & Pujol-Luz and the new records from Paraguay and Brazil (Fig. 31).

RIS (1930) considered the presence of crossveins in triangles and subtriangles as a specific character for *P. icteroptera*. Of 102 specimens we examined from a population from Punta Lara, 52% has all triangles and subtriangles crossed, 48% has at least one triangle or subtriangle crossed, 24.5% has the anterior triangles free and 2.9% has all triangles and subtriangles free.

### *PERITHEMIS LAIS* (PERTY, 1834)

Figures 4-6, 14, 31

*Libellula lais* PERTY, 1834: 125.

*Perithemis lais* KIRBY, 1889: 325; RIS, 1930: 7, 12, 40-42, figs 15-16, 60-63 (redescr. ♂ and ♀, figs penis and wings, in key, records from Colombia, Venezuela, Guiana, Brazil); JURZITZA, 1981: 117 (first record from Argentina, Misiones, Iguazú); RODRÍGUES CAPÍTULO et al., 1991: 65 (listed from Argentina); RODRÍGUES CAPÍTULO, 1992: 64 (listed from Argentina); MUZÓN & VON ELLENRIEDER, 1998: 25 (listed from Misiones).

*Perithemis naias* RIS, 1910: 331, 344-345, figs 192-195, pl. 2 (nom. nov. for *P. lais*, sensu Kirby; descr. ♂ and ♀, figs wings, in key, record from Brazil, Venezuela, Surinam, French Guiana).

*Perithemis tenera* (Say): FRASER, 1947: 434, 452 (misident., record from Pto. Bemberg, Misiones); RODRÍGUES CAPÍTULO et al., 1991: 65 (listed from Argentina, Misiones); RODRÍGUES CAPÍTULO, 1992: 64 (listed from Argentina).

**M a t e r i a l.** — ARGENTINA, Misiones prov., Pto. Iguazú, 10/12-IV-1985, Muzón leg., 1 ♀ (MLP); — BRAZIL, Minas Gerais, Lagoa Dourada, Fazenda Urupuca, Go. Valadares, N. Santos & Machado leg., 10-II-1955, 1 ♂ (MLP); São Paulo, Morro do Diablo, 13-X-1985, N. Santos & L. Fernando leg., 2 ♂ (MRJ); — ECUADOR, Napo, La Selva Lodge, lake, 00°29.9' S, 76°22.4' W, 200 m, 23-XI-1997, Donnelly leg., 1 ♂ (MLP); — VENEZUELA, Guárico, Espino, 26/29-XII-1954, Rácenis leg., 2 ♂ (IZA); Amazonas, Río Sipapo, 22-III-1957, Rácenis leg., 1 ♂ (IZA); Delta Amacuro, Jotacuay, 19-XII-1952, Rácenis leg., 1 ♀ (IZA); Maracaibo, Neblina base camp, 2/12-II-1984, De Marmels & Chacón leg., 1 ♂ (MLP).

**DIAGNOSIS.** — Female and male wing pattern with hyaline areas and dark stripes; nodal dark stripe narrower than basal one; costal and posterior margins of pterostigma black. Pterothorax with two defined dark stripes on lateral sutures. Tip of hamuli almost at level of ventral margin (Fig. 4). First segment of penis rounded; length of sclerotized distal portion of fourth segment less than half that segment, margins of sclerotized distal portion of fourth segment parallel, basal portion subquadrate (Fig. 5). Female's posterior lobe of prothorax slightly cleft, each half as wide as twice the length (Fig. 14). Vulvar lamina lobes little developed, their length shorter than the distance between them, strongly divergent, cleft V-shaped; external margin straight (Fig. 6).

**DISTRIBUTION.** — ARGENTINA: Misiones, Parque Nacional Iguazú (JURZITZA, 1981), Puerto Iguazú (MLP), Puerto Bemberg (misident. as *P. tenera* by FRASER, 1947); — Brazil; Ecuador; Suriname; French Guiana; Guyana; Colombia; Venezuela.

**REMARKS.** — The doubtful identification of a single female from Misiones as *P. tenera* (FRASER, 1947), is here assigned to *P. lais*, because of the known distribution area of *P. tenera* (North America) and the resemblance of both species.

### *PERITHEMIS MOOMA KIRBY, 1889*

Figures 7-9, 15, 18, 24-28, 30, 31

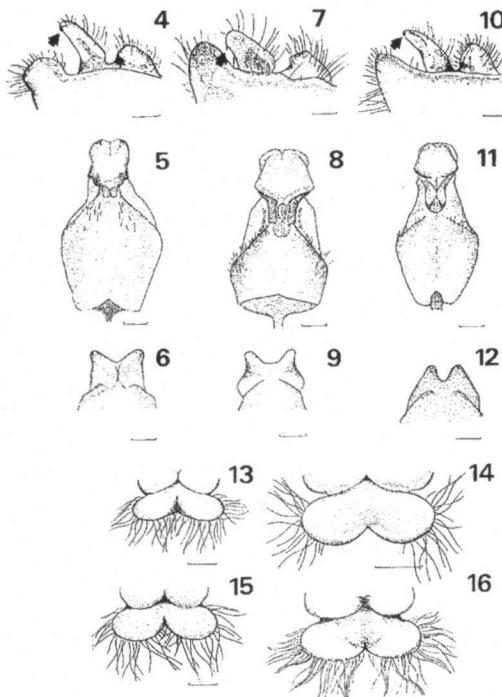
*Perithemis mooma* KIRBY, 1889: 233 (descr. type loc.: Jamaica); RIS, 1930: 12, 21-26, figs 5-8, 27-34, 39-40, 43 (redescri. ♂ and ♀, figs penis and wings, in key, records from Posadas, Misiones; Chaco; San Isidro, Buenos Aires); FRASER, 1947: 434, 451 (records from Buenos Aires; Concordia, Entre Ríos; Tucumán; Córdoba); PAULSON, 1977: 177 (listed from Argentina); RODRÍGUES CAPÍTULO et al., 1991: 65, 68 (chromosomal data; listed from Argentina: Buenos Aires, Córdoba, Corrientes, Entre Ríos, Misiones, Santa Fe and Tucumán); RODRÍGUES CAPÍTULO, 1992: 64 (listed from Argentina); MUZÓN & VON ELLENRIEDER, 1998: 25 (listed from Corrientes, Entre Ríos, Misiones, Salta, Jujuy, Tucumán, Santa Fé, Santiago del Estero, Córdoba and Buenos Aires).

*Perithemis domitia* (Drury), RIS, 1904: 30-32 (misident., in part; record from San Isidro, Buenos Aires); CALVERT, 1901-1908: 311, 314-316 (records from Corrientes and Córdoba, as var. *mooma*); RIS, 1910: 320-330, 333-338, figs. 181-185, pl. 3 (except specimens from Cuba, fig. wings, records from San Isidro, Buenos Aires, as var. *octoxantha*; Corrientes, as var. *pocahontas*; San Isidro, Buenos Aires, as var. *mooma*); RIS, 1913: 87-88 (records from Misiones; Tucumán, as var. *octoxantha* - *pocahontas*; Buenos Aires, as var. *octoxantha* - *mooma*); NAVÁS, 1927a: 23 (record from Paraná de Las Palmas, Buenos Aires, as var. *cloe*); FRASER, 1947: 434, 451 (record from Entre Ríos); RODRIGUES CAPÍTULO et al., 1991: 65 (listed from Argentina: Buenos Aires, Corrientes, Entre Ríos, Misiones and Tucumán); RODRÍGUES CAPÍTULO, 1992: 64 (listed from Argentina).

*Perithemis icteroptera* (Selys, 1857), RIS, 1910: 341-342 (in part, misident.; Argentina, Buenos Aires, 2 ♂ and 1 ♀, coll. Selys).

**M a t e r i a l.** — ARGENTINA, Jujuy prov., Parque Nacional Calilegua, laguna, 675 m, 16-I-1997, Muzón & von Ellenrieder leg., 2 ♂ (MLP); Salta prov., Dique Campo Alegre, 07-I-1995, von Ellenrieder leg., 2 ♂ (MLP); same data except 12-I-1997, 16 ♂, 2 ♀ (MLP); Barrio Los Lapachos, 01-IV-1997, von Ellenrieder leg., 2 ♂ (MLP); Tucumán prov., Monteagudo, 07-I-1997, Muzón & von Ellenrieder leg., 1 ♂ (MLP); Quebrada de Lules, II-1932, 1 ♀ (FML); Santiago del Estero prov., Embalse de Rio Hondo, 07-I-1997, Muzón & von Ellenrieder leg., 5 ♂, 2 ♀ (MLP); Córdoba prov., La Tablada, 4 ♂, 1 ♀ (FML); Misiones prov., Puerto Iguazú, arroyo Mbocay, 13-IV-1991, Muzón leg., 1 ♂ (MLP); San Pedro, 12-IV-1991, Muzón leg., 2 ♂ (MLP); Iguazú, 30-I/13-III-1945, Hayward, Willink & Golbach leg., 1 ♀ (FML); Pto. Bemberg, 12/29-I-1945, Hayward, Willink & Golbach leg., 1 ♂, 1 ♀, (FML); Corrientes prov., arroyo Peuaho, 10-IV-1991, Muzón leg., 1 ♀ (MLP); San Roque, II-1920, 1 ♀ (MLP); Entre Ríos prov., Gobernador Echagüe, 08-IV-1991, Muzón leg., 1 ♂ (MLP); Santa Fé prov., Tres de Mayo, 09-XI-1967, Bulla leg., 2 ♀ (MLP); Buenos Aires prov., Buenos Aires, 2 ♂, 1 ♀ (as *P. icteroptera* in Selys coll., IRSNB); Delta, Isla Talavera, 07-III-1989, Muzón leg., 1 ♀ (MLP); Lima, 19-XII-1994, Muzón leg., 1 ♀ (MLP); same data except 11-I-1995, 1 ♀; 23-III-1995, 1 ♀; 23-XI-1995, 1 ♂; arroyo Pescado, Rd 9, 23-III-1995, Muzón & von Ellenrieder leg., 1 ♂, 1 ♀ (MLP); Punta Lara, 14-I-1985, R.Capítulo & Muzón leg., 1 ♂ (MLP); same data except 08-II-1985, 1 ♂ (MLP); 23-XII-1996, von Ellenrieder leg., 3 ♂ (MLP); Los Talas, XI-1983, Muzón & R.Capítulo leg., 1 ♂ (MLP); 24-II-1989; Muzón leg., 2 ♂, 2 ♀ (MLP); Delta, XI-1967, Mauri & Hepper leg., 1 ♂, 1 ♀

(MLP); Capital Federal, Belgrano, 21-I-1912, 1 ♂ (MLP); Palermo, 24-II-1918, 1 ♀ (MLP). — PARAGUAY, Villarrica, 21-II-1947, Schade leg., 2 ♀ (MLP); Sacupay, 07-III-1970, 3 ♂ (MLP). — BRAZIL, Minas Gerais, Belo Horizonte, Lagoa da Pampulha, 09-III-1979, Jurzitza leg., 2 ♂ (MLP); Rio Grande do Sul, Jaguarão, 12-II-1978, J. M. Costa leg., 1 ♂ (MRJ); 12-XII-1978, J. M. Costa leg., 1 ♂; Santa Maria, 22-XI-1968, J. M. Costa leg. 1 ♂, 1 ♀ (MRJ); Rio de Janeiro, Cabral, 19-II-1966, N. Santos & J. M. Costa leg., 3 ♂ (MRJ). — ECUADOR, Napo, Garzacocha, 12-X-1988, Dunkle leg., 1 ♂ (SWD); Limoncocha, 28-VIII-1980, Dunkle leg., 1 ♂ (SWD). — VENEZUELA, Bolívar, stream near Bochinche, 70 km E Tumeremo, 200 m, 28-VII-1987, Donnelly leg., 1 ♂ (MLP). — BELIZE, Stann Creek District, 02-VI-1993, Dunkle leg., 1 ♂ (SWD). — HONDURAS, Olancho Dept., 3/4-III-1990, Dunkle leg., 2 ♂ (SWD); El Paraíso Dept., Río Chicoto, 10-XII-1987, Dunkle leg., 1 ♂, 1 ♀ (SWD). — GUATEMALA, Dpto. El Petén, Tikal, Aguada, 300 m, 27-VII-1963, Donnelly leg., 1 ♀ (MLP); same data except 28-VII-1963, 1 ♂ (MLP). — TRINIDAD, St. Andrew Co., small stream E of Turure River, on Valencia Rd., 29-IV-1988, Dunkle leg., 1 ♂ (SWD); Matura River, at Toco main Rd., 22-VIII-1986, Dunkle leg., 1 ♂ (SWD); St. George Co., on Antigua Rd., 31-VII-1975, Knopf leg., 1 ♂ (SWD). — MEXICO, Oaxaca, San Pedro Ixcatlán, 20/26-VIII-1964, Temescel leg., 1 ♀ (SWD).



Figs 4-16. *Perithemis lais* (Figs 4-6, 14), *P. mooma* (Figs 7-9, 15), *P. thais* (Figs 10-12, 16) and *P. icteroptera* (Fig. 13): (4, 7, 10) male secondary genitalia, tip of hamulus indicated by arrow, bar 0.2 mm; — (5, 8, 11) penis, ventral view, bar 0.2 mm; — (6, 9, 12) vulvar lamina, ventral view, bar 0.2 mm; — (13-16) female prothoracic posterior lobe, dorsal view, bar 0.5 mm.

**DIAGNOSIS.** — Male wings uniformly colored, posterior margin of pterostigma black, costal margin color as pterostigma membrane; female wings always with hyaline areas and dark stripes, posterior margin of pterostigma black, costal margin variable (75% black, 25% as pterostigma membrane). Wings length/maximum width ratio: males  $2.92 \pm 0.13$  (range 2.66-3.35) (n=38), females  $2.79 \pm 0.09$  (range 2.53-2.94) (n=18). Prothorax with two diffuse dark stripes on lateral sutures. Tip of hamuli about 0.40 from ventral margin (Fig. 7). First segment of penis trapezoidal, basal portion of fourth segment trapezoidal, margins of sclerotized distal portion of fourth segment parallel (Fig. 8). Female posterior lobe of prothorax deeply cleft, each half rounded, nearly as wide as long (Fig. 15). Vulvar lamina

lobes as long as distance between them, strongly divergent, cleft V-shaped; external margin concave (Fig. 9).

DISTRIBUTION. — ARGENTINA: Jujuy, Calilegua (MLP); Salta, Dique Campo Alegre, Bº Los Lapachos (MLP); Tucumán (RIS, 1910, 1913; FRASER, 1947), Monteagudo (MLP); Chaco (RIS, 1930); Santiago del Estero, Río Hondo (MLP); Córdoba (CALVERT, 1901-1908; FRASER, 1947); Misiones (RIS, 1913), Posadas (RIS, 1910), San Pedro, Puerto Iguazú, Arroyo Mbocay (MLP), Corrientes (CALVERT, 1901-1908, RIS 1910), Arroyo Peuaho, Rt.12, km 966, San Roque (MLP); Entre Ríos, Concordia (FRASER, 1947), Gobernador Echagüe (MLP); Santa Fé, Tres de Mayo (MLP); Buenos Aires (RIS, 1904, 1910, 1913; FRASER, 1947), Paraná de las Palmas (NAVÁS, 1927a), Delta, Isla Talavera, Lima, Arroyo Pescado, Rt. 9, km. 64 (MLP), San Isidro (RIS, 1910, 1930), Palermo, Belgrano, Punta Lara, Los Talas (MLP); Uruguay; Paraguay; Bolivia; Peru; Brazil; Colombia; Venezuela; Belize; Trinidad; Honduras; Guatemala; Panama; Mexico.

REDESCRIPTION OF FINAL LARVAL INSTAR. — Material. — ARGENTINA, Buenos Aires, Punta Lara, 9-IV-1997, von Ellenrieder & P. Goodwyn leg., 1 larva (MLP); same data except 13-V-1997, 1 exuviae (reared) (MLP); 4-I-1998, 1 exuviae (reared) (MLP); Los Talas, 3-XII-1997, von Ellenrieder leg., 2 exuviae (reared), 1 larva (MLP).

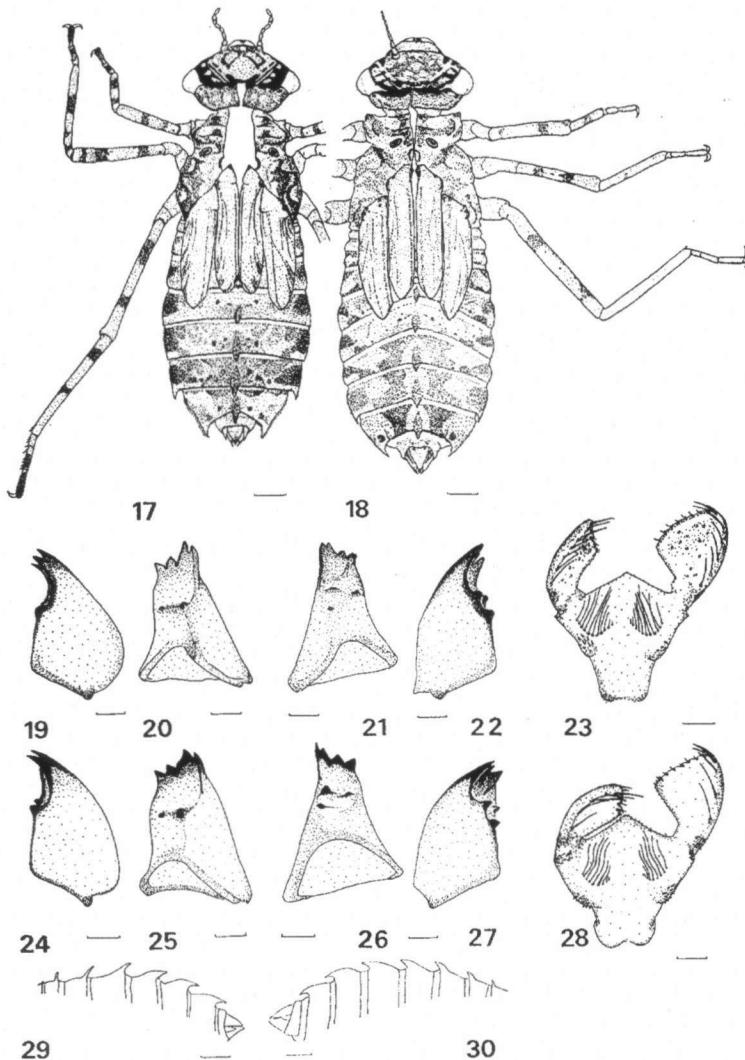
**H e a d.** — Almost twice as wide as long; eyes prominent; antenna 7-segmented, the third the longest; posterior margin of frons with row of dark spots; occiput with irregular patches of stiff hairs, posterior margin nearly straight, anterior margin dark; dark areas of frons and occiput forming a transverse stripe resembling a "mask" (Fig. 18); labium reaching second coxae; prementum (Fig. 28) almost as wide as long (0.81), with 7-12 setae on each side; ligula angulated; labial palp with 4 setae on external margin, proximal margin with row of paired short setae, movable hook shorter than lateral setae; mandibular formula (Figs 24-27): L 1234 0 a b / R 1234 y a b d.

**T h o r a x** (Fig. 18). — Wing pads reaching abdominal segments 5-6. Each femur with 2 dark annuli.

**A b d o m e n.** — Color pattern as in Figure 18, dorsal hooks on tergites 3-9 (Fig. 30), all pointed and projecting posteriorly. Lateral spines on segments 8 and 9; spine length / maximum dorsal length of corresponding segment ratio 0.25 and 0.4 respectively. Epiproct nearly three times as long as segment 10. Ratio relative to epiproct: paraprocts 0.62; cerci 0.45.

**M e a s u r e m e n t s** (in mm). — (n=6): Total length (without caudal appendages):  $13.11 \pm 1.06$ ; head maximum length:  $2.01 \pm 0.15$ ; head maximum width:  $3.8 \pm 0.23$ ; prementum maximum length:  $1.9 \pm 0.1$ ; palp movable hook:  $0.39 \pm 0.01$ ; femur I length:  $2.32 \pm 0.07$ ; femur II:  $3.02 \pm 0.11$ ; femur III:  $4.58 \pm 0.2$ ; hind wing pads length:  $3.75 \pm 0.09$ ; fore wing pads length:  $3.38 \pm 0.07$ ; lateral spines on segment 8:  $0.28 \pm 0.04$ ; lateral spines on segment 9:  $0.38 \pm 0.05$ ; epiproct:  $0.88 \pm 0.12$ ; cerci:  $0.4 \pm 0.08$ ; paraprocts:  $0.55 \pm 0.07$ .

**REMARK.** — The distribution of *Perithemis mooma* in Argentina is more extensive than for any of its congeners.



Figs 17-30. Last larval instar of *Perithemis icteroptera* (Figs 17, 19-23, 29) and *P. mooma* (Figs 18, 24-28, 30): (17-18) general dorsal view, bar 1.0 mm; — (23, 28) prementum and labial palps, dorsal view, bar 0.5 mm; — (19, 24) left mandible, posterior surface, bar 0.2 mm; — (20, 25) left mandible, inner surface, bar 0.2 mm; — (21, 26) right mandible, inner surface, bar 0.2 mm; — (22, 27) right mandible, posterior surface, bar 0.2 mm; — (29-30) abdominal hooks, lateral view, bar 1.0 mm.

***PERITHEMIS THAIS* KIRBY, 1889**

Figures 10-12, 16, 31

*Perithemis thais* KIRBY, 1889: 324 (descr., type loc.: Pará, Brazil); RIS, 1910: 331, 342-343, fig. 191, pl. 2 (redescr. ♂ and ♀, figs wing, record from Brazil); RIS, 1930: 14, 38-40, figs 14, 66-67 (redescr. ♂ and ♀, fig. penis and wings, in key, record from Guiana, Trinidad, Brazil); FRASER, 1947: 434, 451 (first record from Argentina, Misiones, Iguazú); PAULSON, 1977: 177 (listed from Argentina); RODRÍGUES CAPÍTULO et al., 1991: 65 (listed from Argentina); RODRÍGUES CAPÍTULO, 1992: 64 (listed from Argentina); MUZÓN & VON ELLENRIEDER, 1998: 25 (listed from Misiones).

**M a t e r i a l.** — ARGENTINA, Misiones prov., Iguazú, 30-I/13-III-1945, Hayward, Willink & Golbach leg., 1 ♂ (FML). — BRAZIL, Rio de Janeiro, Tingu, 18-IV-1970, N. Santos leg., 2 ♂ (MRJ); Espírito Santo, Santa Cruz, 15-I-1973, N. Santos leg., 3 ♂ (MRJ); Amazonas, B. Constant, V-1942, Parko leg., 1 ♂ (MRJ). — VENEZUELA, Bolívar, El Bochinche, Reserva Forestal Imataca, 200 m, 6/13-XII-1974, Expedición IZA leg., 1 ♂ (MLP), 1 ♀ (IZA); TFA, Culebra, 10/17-III-1985, De Marmels leg., 1 ♂ (IZA). — TRINIDAD, Trib. Oropuche R., 7 mi. E of Valencia, 7-IV-1965, Donnelly leg., 1 ♂ (MLP).

**DIAGNOSIS.** — Female and male wings pattern with hyaline areas and two dark stripes (nodal and triangular); costal and posterior margins of pterostigma black. Pterothorax with antehumeral dark stripes. Tip of hamuli almost at level of ventral margin (Fig. 10). First segment of penis ovoid; margins of sclerotized distal portion of fourth segment concave, basal portion trapezoidal (Fig. 11). Posterior lobe of prothorax of female slightly cleft, each half as wide as twice the length (Fig. 16). Length of vulvar lamina lobes as long as the distance between them, nearly parallel, cleft U-shaped; external margin slightly convex (Fig. 12).

**DISTRIBUTION.** — ARGENTINA: Misiones, Iguazú (FRASER, 1947, FML); Brazil; Venezuela; Guyana; Trinidad.

**KEY TO THE ARGENTINEAN SPECIES OF *PERITHEMIS***

- 1 Pterothorax with two dark stripes on lateral sutures; lobes of vulvar lamina divergent, cleft V-shaped ..... 2
- Pterothorax with only an antehumeral dark stripe; lobes of vulvar lamina parallel, cleft U-shaped ..... 3
- 2 Pterothorax lateral dark stripes well defined; lobes of vulvar lamina poorly developed, its external margin straight; tip of hamuli almost at level of ventral margin (Fig. 4); penis with length of sclerotized distal portion of fourth segment less than half the length of that segment, margins parallel, basal portion subquadrate (Fig. 5) ..... *lais*
- Pterothorax lateral dark stripes diffuse; vulvar lamina lobes as long as distance between them, external margin strongly concave; tip of hamuli at nearly 0.40 from ventral margin (Fig. 7); margins of penis with sclerotized distal portion of fourth segment parallel, basal portion trapezoidal (Fig. 8) ..... *mooma*
- 3 Vulvar lamina lobes poorly developed external margin slightly convex; margins of penis with sclerotized distal portion of fourth segment concave, basal portion trapezoidal (Fig. 11) ... *thais*

- Vulvar lamina lobes as long as twice the distance between them, external margin slightly concave; margins of penis with sclerotized distal portion of fourth segment convergent, basal portion subquadrate (Figs 1b, 2b, 3b) ..... *icteroptera*

### CONCLUDING REMARKS

Of the five species of *Perithemis* recorded from Argentina, four are confirmed: *P. icteroptera*, ranging along the Paraná river basin from Misiones to Buenos Aires; *P. lais* and *P. thais*, recorded only from Misiones, which is their southernmost known locality; and *P. mooma*, widespread in the northern half of the country. *Perithemis waltheri* is considered a junior synonym of *P. icteroptera*. The morphology of male secondary genitalia and female vulvar lamina are shown to be useful in separating all the species here considered. *P. icteroptera* and *P. mooma* are the most variable species as regards wing characters (color pattern, males pterostigma color, triangle and subtriangle crossveins and length/maximum width ratio). These characters do not always allow for a correct determination for all species considered here, however they are useful as an aid in field identification.

In the larvae, the number of palpal setae of the labium, the features of the mandibular teeth and the shape and length of the abdominal dorsal hooks seem to be diagnostic.

Larvae of *P. icteroptera* are easily distinguishable from *P. mooma* by the presence of 6 palpal setae on the labium, mandibular teeth mainly rounded and tapered, and abdominal hooks with rounded tips, the hook on the tergite 9 covering almost the entire length of the next segment; while in *P. mooma* the labial palp has 4 setae, the mandibular teeth are heavier and pointed, the dorsal hooks have pointed tips, and the hook on the 9th tergite covers half the length of segment 10. Both species can be distinguished from *P. tenera* by the number of palpal setae on labium (5 in *tenera*) and the mandibular formula (*tenera* has a "d" tooth on the left mandible).

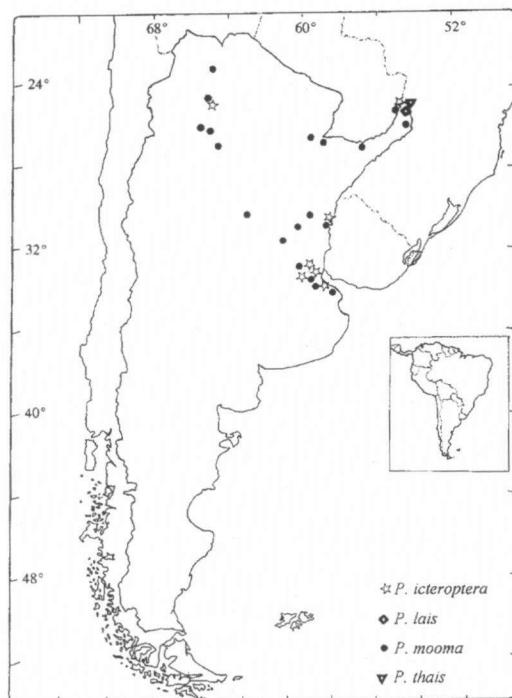


Fig. 31. Topographic location of *Perithemis* records in Argentina.

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