A REVISION OF THE ARGENTINE SPECIES OF Callilabasis Eaton (Ranitinae; Ephemeropera)

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ABSTRACT

Revisión de las especies argentinas de Callilabasis Eaton (Ranitinae; Ephemeropera).

Se informa sobre un estudio de los tipos de las especies de Callilabasis descriptas de Sudamérica austral por B. Névès. Sobre la base de este trabajo y del estudio de material recientemente colectado en Uruguay y Argentina, se ha establecido las siguientes nuevas sinonimias:

C. fasciatus (Pict.,) 1843 = C. trifasciatus nub. Pat., 1912 = Baeotis gloriouna Nav., 1923
C. guttatus Nav., 1915 = C. apliatus Nav., 1917 = C. arcuatus Nav., 1920
C. zonatus Nav., 1915
C. fuscatus Nav., 1915
C. rufus Nav., 1915 = C. parvus Nav., 1918
C. caudatus Nav., 1915
C. sanguis Nav., 1915
C. radicatus Nav., 1920 = C. varius Nav., 1920
C. notatus (Nav.), 1843 = C. lineatus Nav., 1920
C. milliardi (Nav.), 1920 = C. elegans Nav., 1924
C. zonaris Nav., 1915 = C. amoenus Nav., 1920
C. apertus Nav., 1920 = C. depressurus Nav., 1921

Además, Closeon gonzalesi Nav., 1926, se transcribió al género Callilabasis. Se da una clave para la identificación de los adultos de las nuevas especies ahora reconocidas como propias de esta región.

INTRODUCTION

The study of this ubiquitous New World genus of mayflies has been greatly hampered by the multiplicity of species created by B. Névès in the early decades of this century. Many of the descriptions he gave are so brief as to be almost useless, while...
others are based on subimagines, some of them, as he himself admitted, in very poor condition. In his valuable catalogue of South American Ephemeridae, Huber (1883) listed 29 species of Callimastia, the majority of them described by Navás. If the list is restricted to species from Argentina, Chile, Peru, and southern Brazil, i.e. to the region more or less south of the Tropic of Capricorn, some 24 species remain to be considered.

During the autumn of 1984 I was able to study the collection of merflies made by C. Bruch during the first quarter of this century and now held by the Museo Argentino de Ciencias Naturales "B. Rivadavia" in Buenos Aires and by the Museo de la Ciencia Natural in La Plata. This important collection contains a number of specimens of species described by Navás, labelled "Typus" by Bruch. Dr. A. O. Seckman kindly informed me that Bruch used the term "typus" in a rather loose way since it was his custom, apparently, to send one specimen to Navás for description and to keep another, assumed to be the same, in his collection. Thus, his specimens are not usually types in the strict sense of the word. The term type or typus used in the annotation of the genus below refers, therefore, to one of the type series which may be either the holotype, a paratype or a synotype. The part of Bruch's collection held in La Plata also includes several specimens labelled "Typus". From notes on some of the specimens it appeared that they had been examined in 1963 by Dr. George F. Edwards Jr., whose opinion helped me in deciding the synonymy of some of Navás's species.

As reported by Alba Torcedor and Pavey (1986), Navás's main collection is now housed in the Museo de Zoología, Ayuntamiento de Barcelona. In October, 1985, through the kindness of Dr. O. Rico- la I was able to examine nearly all of Navás's types and associated specimens of Callimastia. Normally only one specimen of each species carried the red "Typus" label, although in at least one instance two named specimens of the same species bore the type label. As noted above, specimens of the same species collected by Bruch and labelled "Typus" occur in collections both in Argentina and Barcelona. Similarly, labels bearing the numbers 189 or 190 occur on some of Bruch's specimens from Provincia Buenos Aires in all three collections.

In January, 1986, I visited the Museo Nacional d'Histoire Naturelle in Paris where several numbers of Navás's types are also held. Finally, the readiness of Dr. R. Fritz of the Instituto Entomológico de Paraguay at Rosario de la Frontera to send me several specimens of Navás's species held in the Institute was of inestimable value.

Apart from the museum collections studied, Dr. E. Dominguez of the Instituto Miguel Lillo sent me valuable material collected by himself, including one specimen which is described here. I myself was also able to collect specimens of a number of species in the Province de Buenos Aires, in Uruguay, which proved useful confirmation of the range of variation occurring within certain taxa. An account of the results of these studies follows.

**TYPE MATERIAL STUDIED**

The type material examined of Navás's species is listed below, the current location of type being given in brackets afterwards. The abbreviations of the institutions are abbreviated as follows: Museo Argentino de Ciencias Naturales - MACN, Museo de la Ciencia Natural de La Plata - MEB, Museo Nacional d'Histoire Naturelle in Paris - MNHN, Instituto Entomológico de Salta - IEBAL.
C. amoenus (IMESALD), apertus (MACN, MBM), apicatus (MACN, MBM), 
Arachnis (MACN), depressus (MBM), guttatus (MACN), jeffreysi (MBM), jocosenii (MBM), luteatus (MBM), radiatus (MBM), rimulosus (IMESALD), sobrius (MBM), sphenopterus (MACN, MUP, MBM), veumulosus (IMESALD), vitreus Nav., 1915 (MACN, MBM), 
vitreus Nav., 1915 (MUP), willieri (IMESALD), zonale (MACN), 
zonatus (MACN, MBM). In edition, the types of Beatris opacum (MBM), B. viridulus (MACN) and Closeo gonalepis (MBM), species 
all now known to be Callibacteri, were also examined.

The opportunity was also taken of examining the type of 
several tropical species of Callibacteri, namely, campsioides, graph 
ium and Closeo spinosa. The list appearing below, modified from Hubbard (1982), 
gives the names of Callibacteri species currently described from 
sub-tropical and temperate South America, together with the syno 
nomes established here.

**LIST OF CALLIBACTERI SPECIES FROM SUBTROPICAL AND TEMPERATE SOUTH AMERICA**

1. Species treated as Callibacteri 
   by Hubbard (1982) 

<table>
<thead>
<tr>
<th>Species treated as Callibacteri</th>
<th>Names recognized here</th>
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</thead>
<tbody>
<tr>
<td>C. aberrans Nav., 1913</td>
<td>none Dubois</td>
</tr>
<tr>
<td>C. elegans Traver, 1944</td>
<td>willieri Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. amoenus Nav., 1930</td>
<td>zonale Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. apertus Nav., 1915</td>
<td>None Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. apicatus Nav., 1927</td>
<td>guttatus Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. bruchus Nav., 1920</td>
<td>guttatus Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. depressus Nav., 1922</td>
<td>zonale Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. fasciatus (Pictet, 1843)</td>
<td>fasciatus (Pict.)</td>
</tr>
<tr>
<td>C. guttatus Nav., 1915</td>
<td>guttatus Nav. (syn. nov.)</td>
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<tr>
<td>C. melfi Nav., 1918</td>
<td>melfi Nav. (syn. nov.)</td>
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<tr>
<td>C. jocosenii Nav., 1927</td>
<td>jocosenii Nav.</td>
</tr>
<tr>
<td>C. luteatus Nav., 1932</td>
<td>luteatus Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. radiatus Nav., 1920</td>
<td>radiatus Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. spinosa Nav., 1922</td>
<td>spinosa Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. sobrius Nav., 1915</td>
<td>sobrius Nav. (syn. nov.)</td>
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<td>C. sphenopterus Nav., 1915</td>
<td>sphenopterus Nav.</td>
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<tr>
<td>C. trincatulus Eben-Petersen, 1912</td>
<td>trincatulus (Pict.)</td>
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<td>C. veumulosus Nav., 1932</td>
<td>veumulosus Nav.</td>
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<tr>
<td>C. vitreus Nav., 1915</td>
<td>vitreus Nav. (syn. nov.)</td>
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<tr>
<td>C. willieri Nav., 1932</td>
<td>willieri Nav. (syn. nov.)</td>
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<tr>
<td>C. zonale Nav., 1925</td>
<td>zonale Nav. (syn. nov.)</td>
</tr>
<tr>
<td>C. zonatus Nav., 1925</td>
<td>zonatus Nav. (syn. nov.)</td>
</tr>
</tbody>
</table>

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2. Species treated as Beatris 
   by Hubbard (1982) 

<table>
<thead>
<tr>
<th>Species treated as Beatris</th>
<th>Names recognized here</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. gloriosus Nav., 1923</td>
<td>fasciatus (Pict.)</td>
</tr>
<tr>
<td>B. opacys Nav., 1912</td>
<td>somali Nav.</td>
</tr>
<tr>
<td>B. virilis Nav., 1915</td>
<td>somali Nav.</td>
</tr>
</tbody>
</table>
3. Species treated in Clade

by Razbard (1982)

Cl. gonzalezi Navé, 1944 gonzalezi (Nav.)

4. New species described here

C. dominguezi sp. nov.

IDENTIFICATION OF THE ARGENTINE SPECIES OF Callibaetis

As a result of this study of Navé's types and other mate-
rial, as recorded below, I am recognized 9 species of Calli-
baetis as occurring within the region. It appears that the adults
of the genus can be usefully grouped as follows:

Group I. Coastal and subcoastal areas of female fore wing strongly
pigmented, wing field posterior to vein 32 unpigmented, except
sometimes secondary wing base. Male wings largely unpigmented (ex-
cept in C. dominguezi).

C. dominguezi sp. nov. C. williamsoni Nav.
C. gonzalezi Nav. C. zonalis Nav.
C. radiatus Nav.

Group II. In both sexes, wing field posterior to vein 32 with
varying degrees of pigmentation, not forming discrete bands.

C. guttatus Nav. C. focatus Nav.

Group III. In both sexes, fore wings with oblique and transverse,
pigmented bands.

C. cecatus (Pict.) C. sellachi (Mey.)

No synonyms of South American Callibaetis have been described
except that of C. williamsoni which, under the name algaro, was
figured and briefly described by Traver (1946). Identification,
therefore, rests solely on the adults. The following key has been
constructed, which it is hoped may assist the reader to identify
most species from the southern parts of the continent. Its reli-
dity depends on the species definitions that I have introduced in
this paper. This may be modified with further studies of the
genus so that, to this extent, the key should be regarded as a
preliminary one.

KEY TO THE ADULTS OF CALLIBAETIS FROM SOUTHERN SOUTH AMERICA

1. Fore wings with marginal intercalaries simple, except
sometimes for 1 or 2 spaces at tip or base of wing.

--- Marginal intercalaries mostly double

---
2. In female, vitta without clear windows round cross-veins, pigment extending broadly across base of wings to inner margin (fig.19); in outer one-third of wing field, posterior to vein R2, 13-15 cross-veins; basal half to one-third of hind wings tinted brown .................................. C. gomesiisi

--- Vitta with numerous clear windows, pigment overlapping extreme bases of main veins, not extending to inner margin (fig. 4); outer wing field with 7-9 cross-veins; hind wings hyaline ........................................... C. radiatus

3. Fore wings in both sexes with conspicuous, oblique or transverse, pigmented bands, leaving broad, clear areas between (fig. 13) .................................................. 4

--- Wings without clearly defined bands; if banding present, this takes the form of lines of narrow windows in an otherwise lightly pigmented wing field ................................................. 5

4. Fore wings with 3 more or less discrete bands (fig. 12) ........................................... C. fasciatus

--- Fore wings with 2 main bands, the outer one parallel with the posterior margin of the wings (fig. 14) .......... C. wallacei

5. Hind wings without cross-veins; in female fore wings, vitta restricted to costal and subcostal areas, without windows (fig. 20); in male, outer one-third of wings uniformly tinted brown (fig. 19) .................................. C. dominguezi

--- Hind wings with 6-20 cross-veins; vitta extending at least partly to area posterior to vein R1, with numerous windows; male fore wings clear or with a small spot in stigma ........................................... 6

6. Hind and hind tibiae with 2 dark spots in basal half in addition to sub-apical spots; abdominal sterna with dark anterolateral stripes but without paired submedian markings; fore wing pigment not diffused over whole membrane, in male unpigmented except sometimes in stigma ........................................ 7

--- Tibiae may be dark at base or apex but not showing 2 discrete spots in basal half; abdominal sterna with paired, submedian dash-dot markings (fig. 24) in addition to anterolateral streaks; fore wings diffusely and lightly pigmented throughout, sometimes with lines of clear windows round all cross-veins (fig. 10) .................................. C. jocosus

7. Fore wings in both sexes with extensive spotting over general wing field (Figs. 6, 8); occasionally reduced to a series of spots along posterior margin .................................. C. gutturnum

--- In female, pigment of fore wings confined to a broad vitta along anterior margin; in male, wings either hyaline or lightly pigmented in stigma ........................................... 8
8. In female, basal half of vitta of fore wings overlapping vein R1 as far as R2 in less than 1/2 of its length (fig. 2); in male, stigma of fore wings often with a patch of smoky pigment; no median markings on abdominal sternum... C. zonalis

--- In female, basal half of vitta of fore wings overlapping vein R1 as far as R2 in 1/2 or more of its length (fig. 1); in male, fore wing entirely hyaline; a median, maroon dash usually present on sternum II-VIII... C. willisi

TAXONOMIC NOTES ON THE NAMED SPECIES

Calibeaetis abundans (Nov.)

Raeis abundans Hava, 1912:194.

Calibeaetis abundans, Ulmer, 1943:14.

In his description of Raees abundans from Paraguay Hava gave few details that could be of value for specific determination beyond the fact that the wings were unpigmented and that the hind tibiae had two dark rings. Ulmer (1943) examined the type, a male, in the Munich Museum and noted that it was in very poor condition with no hind wings, only one (hind) leg and the abdomen partially destroyed. His redescriptions of the specimen as he found it provided little in the way of specific characters, although he was able to establish that it belonged to the genus Calibeaetis. A further male was present at that time in the Museum in Vienna. Dr. E.G. Burmeister kindly informed us that the type is still in the Zoologische Staatssammlung, Munich, but in a very poor state of preservation. Since it seems impossible to establish the identity of the type specimen of this species I am treating abundans as a nomen dubium.

Calibeaetis alegre Traver

Calibeaetis alegre Traver, 1944: 46.

In her very detailed description of all stages including the nymph of this species from the extreme south of Brazil, Traver (1944) remarked "the exact combination of characters does not exactly fit any previously-described species from Brazil, Paraguay or Argentina". While it is perfectly true that none of Hava's descriptions would enable one to recognize Traver's species from these, I produce evidence here to show that this statement is not quite correct and that C. alegre is to be regarded as a synonym of C. willisi Hava.

The males of both species have unpigmented wings, even in the stigma, and share the same markings on the legs and abdominal sternum. The female of C. willisi has not been described, but the same leg and sternal characters were shown by Traver to be present in C. alegre. Thus it appears that the male of Traver's species, as well as material of mine collected in Provincie Buenos Aires, had already been described by Hava under the same willisi and that C. alegre falls in synonymy with it.

In both C. alegre and C. willisi the female closely resembles zonalis, but differs from it in the following two
Callibaetis amoenus Navás

Callibaetis amoenus Navás. 1930: 131.

Described from a single male from Martínez, Buenos Aires. The type of this species is now in IMEBASY in Salta. Although most of the abdomen and half of the legs is missing, the wings are still intact. The stigmas of the fore wings show a gray rintling figured by Navás that is characteristic of many males of C. amoenus Nav., including some that I caught myself in the same Province at the same time of year. The dark spots on the femora and tibiae are also as in that species. C. amoenus, therefore, is to be regarded as a synonym of C. somalis.

Callibaetis spartus Navás

Callibaetis spartus Navás. 1917: 190.

Navás described the subspecies from specimens collected in the Province of Buenos Aires, 4. and 17 October, 1916. There is a female subspecies in IMEB, labeled Type, 27.0.16, and another in MBM, with a red Type label. 4.X.16. Both are in poor condition with the wings either crumpled or missing on one side. The legs are as in C. somalis, i.e. with the tibiae bearing basi and subapical dark spots and an intervening dark area. The one examineable wing shows the costal and subcostal areas somewhat darker than the rest of the wing field. There is also a male [xero], determined by Navás, in MBM. In Paris and collected in Provence, which has clear wings and a line of atavistic veins in the stigma area. This specimen is in C. Fries, Sperius (1943) attributed a female Imago from Buenos Aires to this species.

Callibaetis apicatus Navás

Callibaetis apicatus Navás. 1917: 189.

Navás described the male from Provencia Buenos Aires, 15.
May and 6. October, 1915. One male is in MACH, labelled Typus, another in MEB also with a red Typus label, with dates corresponding to the above. Both show faint pigmentation of the outer third of the costal and subcostal areas and elsewhere in the wing field, particularly over marginal intercalaries. Navés's figure shows the same feature in the apex of the wings, on which grounds I am treating apicetus as a synonym of C. guttatus.

_Calibethis bruchius_ Navés
_Calibethis bruchius_ Navés. 1920b: 55.

In the collection of MACH there is a female imago from the Cordoba hills, Argentina, labelled Typus. The specimen is in fair condition and the fore wings show a series of dark spots on the veins in transverse bands, corresponding in position to the more continuous distribution of pigment across the veins in _C_. _guttatus_. The hind wings have a band of pigment behind the spur and the suggestion of a spot centrally. These characters agree well with _C_. _guttatus_, of which it is clearly a synonym.

_Calibethis campuari_ Navés
_Calibethis campuari_ Navés. 1910b: 18.

Although this species comes from outside the region covered by the present study, having been described from Guayaquil, Ecuadoor, I took the opportunity of examining the type in MEB. The specimen, a female imago, is in fair condition. The costal, subcostal and R1 areas of the fore wings are strongly pigmented with well marked windows and with discrete extensions of the pigment posterior to this. From a brief examination it appeared that all marginal intercalaries were single. It seems, therefore, to be a well defined species.

_Calibethis depressus_ Navés
_Calibethis depressus_ Navés. 1912: 59.

Navés gave this name to a female subimagos from Santiago del Estero, Argentina, the body of which had been distorted and the tip of the abdomen turned down. I have examined the type in MEB and find it cannot be separated from the subimagos of _C_. _melalis_. It falls in synonymy, therefore, with that species.

_Calibethis dominguesi_ sp. nov.
(Figh. 18-22, 25)

Male imagos, eyes red, body generally dark brown. Outer one-third of fore wings reddish brown, more heavily marked atala (fig. 18); no cross-veins in costal area basal to stigma which sometimes 5-11; those in mid wing field strongly pigmented: marginal intercalaries double except in basal two cubital spaces. Hind wings (fig. 18) without any cross-veins either between longitudinal veins or linking these to the margins. Fore and hind legs not preserved; mid femora and tibial spines tarsus brown, a dark preapical femoral spot present. Abdominal tergs
dark brown, on II-V with small, anteromedial, pale triangles. Sternum cream, strongly stippled with chocolate-brown spots; II-IX each with chocolate-brown, anterolateral dashes extending a little less than half length of segment and, internal to this, much smaller spots, both becoming broader on basal 3 segments (fig. 38). Forcups dark brown, terminal segment elongate (fig. 39). Caudal filaments not preserved.

Female imago. Occipital area of head cream with a pair of brown, subocular spots; protocon paler brown with a pair of small red spots laterally and an indistinct transverse red streak; mesonota pale brown with a very fine, median red streak anterior to scutellum. Costal and subcostal areas of fore wings lightly tinsel brown, not overhanging vein R1 at any point; no costal cross-veins basal to stigma; vitta without windows; about 13 elating cross-veins in stigma. Hind wings as in male. Lees not preserved. Abdominal terga pale brown. IV-VII paler antero- posteriorly. IV-VIII with broad chocolate-brown bands extending laterally across posterior margin of segment; anterolateral dashes and spots much as in male, but those on II rather larger. Caudal filaments not preserved.

Wing. male 8.0 mm, female 9.5 mm; body, male 8.0 mm, female 9.4 mm.


C. domingozaui possesses a number of unusual characters that distinguish it from all other South American species. Of particular note is the fact that the pigmentation of the wings in the male is more extensive than in the female and that it forms a broad apical band in the male while the female has the more usual vitta along the anterior border of the wings. The absence of cross-veins in the hind wings apart from the stigma, and the absence of cross-veins in the hind wings are also distinctive features of this species.

Callibatis fasciatus (Pictet) 

Close fasciata Pictet, 1843: 262.

Callibatis fasciatus, Eaton, 1885: 197.

Callibatis trifasciatus Menes-Petersen, 1912: 339. (syn. nov.)

Batis gloriosa Navás, 1923: 2. (syn. nov.)

Callibatis gloriosa, Navás, 1920: 360.

There are 8 females in MNHBA, labelled Prov. Buenos Aires. C. bruneus forming part of a series apparently sampled by Navás and identified by him as C. trifasciatus Ehr. Pav. There are a further 3 specimens with the same provenance in MNHBA. labelled C. trifasciatus Ehr. Pav. by Navás. I also have 3 males, a female imago and a female subimago collected recently in Dpto. Valdés, Province
Uruguay.

Picott gives a clear figure of a wing of C. fasciatus which, coupled with Rahn-Remens' detailed description and figures of C. trifasciatus, leaves little doubt about the synonymy of the latter species. Figs. 12, 13 show the wings of one of Bruch's specimens. A further distinctive character lies in the pair of median, blackish, dash-dot markings on each of abdominal segments II-IX (fig. 26). Navás (1923a) gives a figure of a wing of *Beetis* gloriosus Nav. from Chile which, together with his description, makes it clear that this taxon is also a synonym of *C. fasciatus*. In 1930, in a later paper (Navás, 1930a) he tacitly acknowledged his error in placing the species in *Beetis* when he referred to a further specimen from the same locality in Chile as *Callibaetis gloriosus*.

**Calibaetis gonzalezi** (Navás) new comb.

*Callocon gonzalezi* Navás, 1934: 27.

I have examined the type, a female leaf in good condition from Asunción, Paraguay, which is held in MMNH. The fore wing markings are much as figured by Navás, i.e. vitta orange-brown, without windows, extending broadly across base of wings to inner margin, marginal intercalaries single except for Cu1 and, on one side, MP2 where they are double. I could not find any trace of hind wings. Legs unarmed. Abdominal terga strongly stippled, sternae more lightly stippled with anterolateral chocolate-brown dashes on most segments.

It is not surprising that Navás placed this species in *Cloeon*, since the type apparently lacks hind wings and nearly all the marginal intercalaries are single. However, Dr. Domínguez has sent me 3 females from Delta, Dpto. San Martin, A Madrejanes, 19. IV. 63, which are clearly the same as Navás's species with the fore wings as in fig. 16. However, these specimens all have hind wings (fig. 17). In which the basal half is tinted brown. Accordingly, I am transferring *gonzalezi* to *Callibaetis*. The fore wing markings are distinctive and serve to distinguish it from all other known species in the region.

Dr. Domínguez also collected some *Callibaetis* nymphs from the same site as the females, in which the tarsal claw has two rows of unusually long teeth — about one-third the length of the claw (fig. 27). The hind wing buds are brownish, as in the adult hind wings, and the abdominal markings are similar to the females. It is extremely likely that these specimens represent the nymph of *C. gonzalezi*.

**Calibaetis gregorius** Navás

*Callibaetis gregorius* Navás, 1930: 72.

This tropical species was described from 5 males (♂) from Ibirapuera, Amazonas. There is a male from this series in MB with crumpled fore wings, absent hind wings and faded legs. Examination of the other male specimens, stated to be in 'Muse. Entom. de Berlín', will be necessary before the status of this taxon can be established.
Callibaetis grisali (Berthélemy) nom. nud.
Cloeon grisali Navás, 1965: 2.

In the 1965 issue of Taxon, Berthélemy gave a list of Ephemeroptera types in the Natural History Museum in Paris, which included the name Cloeon grisali Navás. I have examined this type, which is pinned and stuck down to a card and bears the label "Cloeon grisali Nav., det Navás, S.J. Venezuela, San Fernando de Apure, Mayuri-Grial. 1924." The specimen, a female with well-developed hind wings and a dark vitta in the fore wings, is clearly a species of Callibaetis. However, I have been unable to find any description of this species in any of the 8 papers by Navás entitled "Insectos del Museo Paris" and published between 1925 and 1931, nor in any other of his publications. The name "grisali" must therefore be regarded as a nomen nudum.

Callibaetis guttatus Navás
Callibaetis guttatus Navás, 1915b: 120.
Callibaetis apicatus Navás, 1917: 189. (syn. nov.)
Callibaetis bruchius Navás, 1920b: 55 (syn. nov.)
Callibaetis sanus Navás, 1929a: 231. (syn. nov.)

There is a female imago, labelled Typos, in fair condition in the Bruch Collection in MACH, all wing of which is figured here. I also collected a series of females from Rosario de Laram, Prov. Salta and from La Cumbre and Carlos Paz in the Cordova Hills. Type material of C. apicatus, C. bruchius and C. sanus was also studied (q.v.).

This species is highly variable as regards the extent of pigmentation in the wings (figs. 6-9). A wing of C. guttatus, as drawn from the type series, represents the minimal degree of wing spotting, while that of C. sanus illustrates the more commonly seen condition. In some specimens from Provincia Salta the pigmentation is more extensive still and the hind wings are strongly banded. In specimens from the Cordova Hills, the hind wings are partially banded or unpigmented. The males, as typified by the type specimens of apicatus, have the pigment much more lightly marked than in the females, and the basal quarter of the costal and subcostal areas is almost unpigmented; a series of light spots are present along the margin, and traces of pigment can be made out in a band across the middle of the wings.

Callibaetis Jaffuali Navás
Callibaetis Jaffuali Navás, 1918: 214.

This species was apparently described from a single male from Chile, now held in MCB. The specimen is in good condition and carries a red Typos label. The fore wings are strongly pigmented in costal, subcostal and radial 1 areas with 3 pale interruptions, broadening out posteriorly to give the appearance of pale bands. There are posterior extensions of pigment into the radial area and beyond, as well as several small infusions of dark pigment in the rest of the wing field. The venter has mar-
highly similar to those seen in C. strictipennis. This, in combination with the abdomen of spotting on the timelike screens, leads me to regard C. jaffueli as another synonym of C. jucunda.

**Callicebitis jucunda Neváez**

*Callicebitis jucunda Neváez*, 1911: 196.

*Callicebitis strictipennis Neváez*, 1912b: 121. (syn. nov.).

*Callicebitis jaffueli Neváez*, 1918: 244. (syn. nov.).

*Callicebitis eugenezzi neváez*, 1930: 36. (syn. nov.).

*Callicebitis riniatus Neváez*, 1935: 131. (syn. nov.).

The type, a male labelled "E. Pablos (Br.), 8.IV.10", is now held in MNHN. It is in a generally rather bad state with squashed head, no legs and the tip of the abdomen missing. However, the wings are well preserved and show diffuse, if faint, pigments over much of the wing field, as described by Neváez. In his description, in the less than two lines devoted to the female, there occurs the surprising statement - "als illicius culcul". The type series of C. strictipennis in MNHN and MNP includes 4 females and one male, all of which have faintly tinted fore wings as described for the male of C. jucunda. In particular, the wings around the crossveins between veins II and III are especially common. This establishes the synonymy of C. strictipennis with C. jucunda as well as allowing one to discount Neváez's statement on the female wings.

**Callicebitis lineatensis Neváez**

*Callicebitis lineatensis Neváez*, 1912b: 82.

The type, a female image in good condition from Marga-Marga, Chile, is in MNHN. The wings have two oblique dark bands, the outer of them parallel with the outer (= posterior) margin of the wings as in C. callichrous (fig. 14) and indicates its conspecificity with that species.

**Callicebitis radiatus Neváez**

*Callicebitis radiatus Neváez*, 1930c: 132.

*Callicebitis vaseului Neváez*, 1935a: 144. (syn. nov.).

Although Alba-Tercedor and Peters (1988) stated that the type, a male, from Santa Fe 18.VI.13, is present in the Neváez collection in MNHN, I was unable to locate it. However, in the same collection in Barcelona there are 3 females from Santa Fe 18.VI.18, and Asunciun, 1-18.X.19, determined by Neváez as Callicebitis radiatus, some of them labelled as type. Another female, from Santa Fe 1.I.18, is in MNHN, labelled type by Neváez (1926b). Neváez (1928) gives a further and later record of this species from Santa Fe.

Two of the Barcelona specimens (one from each locality) are specimens with the wings in good condition, although the legs and...
caudal filaments are missing in one specimen. The pigmentation of the fore wings (fig. 4) is characteristic and clearly differentiates this species from the other two members of Group 1. In particular, the wing area posterior to vein R1 is heavily infused with dark brown pigmentation, leaving only small windows present 1 or 2 cross-veins. In the basal half of the wings the pigments extend in a stepped fashion across the bases of all the other veins up to vein CuP. Further points of interest are the absence of cross-veins from the posterior portion of the fore wing except near the tip and the presence of single marginal intercalaries in all species except those at the wing tip behind veins R1 and R2. The hind wings (fig. 5) are rather unusual in shape, being narrow with a squared-off costal spur and slightly thickened and fringed cross-veins. The third specimen, a subimago from Manicouac, is of doubtful identity. From the pallor of the radial area of the fore wing I judge it to belong to C. annulatus rather than C. radiatus. From the absence of pigmentation in the fore wings it would seem that Navas's description was that of the female and that the male has not therefore been described, however, as recorded below, the type of C. venosus has the apex thickened cross-veins in the hind wings and the marginal intercalaries in the fore wings are all single. This clearly represents the unknown male of C. radiatus, from which it is concluded that the wings of the latter are unpigmented. This species resembles C. gonzalezii in certain respects, notably in the extension of pigmentation across the base of the wing and in the mainly single marginal intercalaries. However, in the latter species the pigments extend as far as 1/4-1/3 of the distance from the base of the wing to the middle of the posterior margin, whereas in C. radiatus it is very much less extensive.

Calibastes radiatus Navas


This species was described from two females from Santa Fé and San Nicolás, Prov. Buenos Aires. The two specimens are now in the collection in INHERENT, one an isago, the other a subimago and both in poor condition. Both are labelled "Pipe", Navas, and the insect, which agrees well with the figure given by Navas and is identical with that of C. jocueneus. C. radiatus therefore falls in synonymy with C. jocueneus.

Calibastes solliciti (Wayenbergh)

Cloe Solliciti Wayenbergh, 1883: 164. (syn. nov.)

Cloe Lorentzi Wayenbergh, 1883: 167.

Calibastes solliciti, Batan, 1885: 198.

Calibastes trifasciatus (parum), Navas, 1935b: 120 (syn. nov.).

Calibastes fasciatus, Vinter, 1931: 366 (syn. nov.).

Calibastes limatuvus Navas, 1933b: 82 (syn. nov.).

There are 6 specimens in MACH in the Bruce Collection from Prov. Buenos Aires, that form the bulk of the series labelled C.
trifasciatus and referred to under that name by Navés (1915). There is also a female subimago, by now badly damaged, in MNH labelled C. trifasciatus, Zloty, and bearing the later label 'not trifasciatus, det. O.P. Edmond, 1963.' There is also a single male specimen from the same series in NHM, identified as C. trifasciatus, Kehlet, by Navés. In addition, I collected 4 males referable to this species in Dpto. Malvín, Uruguay.

Previously confused with C. fasciatus, this species is readily distinguished from the former by the two-barred appearance of the fore wings (fig. 14). The paired ventral markings on the abdomen are generally similar to those of C. fasciatus. Waynebergh evidently drew the wings of this specimen while they were still attached to the insect so that the hind wing spur was not visible. However, the characteristic bending of the fore wings is well shown and makes it possible to refer other specimens to this taxon. The differences in size and minor features of wing pattern, used by Waynebergh to distinguish C. joriei to C. melissae, should be regarded as falling within the range of variation shown by the latter.

Callilabisia sobrius


It would appear from Navés's account that this species was described from a male imago ("alia anterior vittae, imbecilis") from San Pablo, Brazil, 8.7.10. However, the specimen labelled type in NHM and carrying the above details is a female subimago. The specimen is in fair condition and the leg markings are typical of C. zomelia. As noted by Alme-Tercedor and Patera, there is a female and a bare pin (since discarded) in NHM, both labelled C. sobrius by Navés. Neither of them carry type labels, but the collecting details are the same as the above. The wings and the leg markings are again characteristic of C. zomelia, of which species it is clearly a synonym.

Callilabisia apograpthus Navés

Callilabisia apograpthus Navés, 1920a: 36.

C. apograpthus was described from two females from Asunción, Paraguay. Both are held in NHM, labelled as types. One has crumpled wings and is in poor condition, but the other is clearly a rather pale specimen of C. jocuena.

Callilabisia stictogaster Navés

Callilabisia stictogaster Navés, 1915b: 121.

The type material of this species, which is in the British Museum, is distributed as follows: NHM, 4 female imagines including one with the red type label, MACN, one female imago, MNH, 1 male, two female imagines (one wingless) and one female subimago. All these specimens have the wing pigmentation characteristic of C. jocuena (fig.). The morphological feature that may have led Navés to apply the name stictogaster to material from Buenos Aires is the presence of

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paired submedian markings on the abdominal sternum (fig. 24). The same markings are present on a male determined by him as C. joco-
sus in MBH coming from the type locality for that species, San
Pablo. The synonymy of the two species is therefore confirmed.

Callicebatia trirascicatus Hagen-Petersen
Callicebatia trirascicatus Hagen-Petersen, 1912: 339.
Hagen-Petersen’s description is so detailed that, even with-
out examination of the type, the synonymy of this species with C.
fuscatus seems inescapable.

Callicebatia venulosus Navás
Callicebatia venulosus Navás, 1932a: 114.
This species was described from a clear-winged male imago
from Santa Fé, characterized by rather unusual round-tipped hind
wings with somewhat thickened cross-veins. The type, now in very
poor condition, is held in the collection of INEREAT in Salta. Much
of the abdomen of this specimen, part of the wings and all
of the legs except one fore leg are missing. The fore wings show
lack of pigment in the costal brace, numerous cross-veins before
the bulla, as well as in the stigma, and apparently all marginal
intercalaries single. One hind wing remains, showing the thicken-
ed, slightly frosted appearance of the numerous cross-veins that
were figured by Navás. The combination of single marginal inter-
calaries and thickened cross-veins in the hind wing shows that C.
venulosus is the male of C. radiatus.

Callicebatia vitreus Navás
Callicebatia vitreus Navás, 1915b: 121.
Callicebatia vitreus Navás, 1919: 41.
Callicebatia vitreus Navás, 1919 (nom. syn.). Hubbard and Edmunds,
1977: 95.
This name has had a somewhat tangled history. Hubbard and
Edmunds (1977) showed that Navás was guilty of the sleight of
creating a junior synonym and a junior homonym of a species al-
ready named by himself. He achieved this by using the same name
in two different publications for two series of specimens of Ca-
licebatia, collected in the same Province of Argentina in the
same month and year but by two different collectors. Hubbard and
Edmunds also recorded that the name was subsequently used a third
time for a North American species.

As regards type material, there is a female subimago in the
Brush Collection held in NAMNH, labelled cuprina 4.X.15, C.
Brush. This would seem to be a paratype of C. vitreus Navás,
1919. As noted by Hubbard and Edmunds, further material of the
Brush Collection is held in NAMNH including a male subimago dated
20.V.15. It carries a label in Edmunds’s writing — ‘Type of Ca-
licebatia vitreus Navás, 1918. homonym of C. vitreus Navás, 1919.
synonym Callicebatia monale Navas. ’ I concur with both of these
conclusions. On the other hand, in Barcelona (NHB) there is a
single male subimago with a red tympan label and the "46." Plate (R.A.J. 12.11.19. Hirschen leg.) (= 12. IV. 1957). Indicating that it could be part of the type series of Wilson C. "alveus Nov. 1913 or Nov. 1819. In either case the synonymy with C. zonae-lius stands. A further specimen in MES (alene discarded) was found to consist of a fragment of tissue on a pin, labelled in Nave's hand "Callichthyes wittei Nov. 4. 6. Petrop. (Salinip). 13.30."

Callichthyes willimi Nava

Callichthyes willimi Nava, 1932: 115.

Callichthyes aglae Traver, 1944: 46. (syn. nov.)

This species was described from a single male collected in San Miguel, Provincia Buenos Aires and now held in the collection in NEAMT. The specimen, a male imago, is in good condition and has leg markings characteristic of C. zonae-lius as described by Traver for C. alveus. The stigmatic area of the wing tip is clear, without any tinting of the membrane, as in C. alveus. The ventral surface is not easily examined owing to distortion, but it is possible to make out traces of the median dark streak on the sterns that very described by Traver as characteristic of C. alveus. The compulsion of the two therefore seems established and, as shown above, the name alveus falls as a synonym of willi- mi.
Callibaetis zonalis Navés


Beatis opacus Navés, 1915a: 13. (syn. nov.).

Beatis virilissimus Navés, 1915b: 119. (syn. nov.).

Callibaetis vitreus Navés, 1915b: 121. (syn. nov.).

Callibaetis scherzi Navés, 1915: 61. (syn. nov.).

Callibaetis spectabilis Navés, 1917: 190. (syn. nov.).

Callibaetis vitreus Navés, 1919: 81 (nec vitreus Navés, 1915). (syn. nov.).

Callibaetis depressus Navés, 1922: 59. (syn. nov.).

Callibaetis amoenus Navés, 1930a: 131. (syn. nov.).

I have been unable to locate the type of C. zonalis, which was collected in La Plata, March 1913 and preserved in alcohol. However, there are numerous pinned specimens collected at later dates and determined as C. zonalis by Navés in all three major collections, distributed as follows: MNR & females from prov. Buenos Aires, in MLP 1 female from Prov. Buenos Aires. I also have a series of males and females recently collected in Provins Buenos Aires and Departamento Maldonado, Uruguay.

Apart from the five species and one synonym of Callibaetis described by Navés and synonymised here with C. zonalis, two of his species of Beatis also need to be considered. In the same paper in which the description of C. zonalis appeared, Navés described Beatis opacus from an imperfect female subisago in alcohol from La Plata, III.13. I was not able to locate the specimen. However, there is a pinned female subisago in MLP determined by Navés as B. opacus from Prov. Buenos Aires, no date. It carries a label with the inscription "Callibaetis zonalis Navés. G.F. Edmunds, 1943. synonymy". The fact that the very inadequate description of B. opacus has page priority over C. zonalis is of secondary importance compared with the well-established concept of C. zonalis that Navés left us. I therefore agree with Edmunds's conclusion and list B. opacus as a synonym of C. zonalis.

Beatis virilissimus Navés was also described from Prov. Buenos Aires, no date. A female subisago, labelled Typus, is present in MACH, which may well be the holotype. The specimen is clearly a species of Callibaetis with the hind wings stuck down onto the thorax, and it seems likely that Navés's figure was drawn from one of these edgily obscured hind wings. The fore wings, the markings on the abdomen and the one remaining leg are typical of C. zonalis, and I am treating B. virilissimus as another synonym of this species.

The separation of this species from C. millimaris has been discussed above. Further study of the species-pair, zonalis-millimaris, would be desirable, for example, I have a series of males caught swimming at Burlington, Prov. Buenos Aires in April, 1944, which shows a highly variable degree of pigmentation of the stigma, ranging from complete absence to most of the spiral part of the costa and subcostal area being lightly pigmented to blackish-grey and sometimes overlapping lightly onto the area.
posterior to vein R1. The sternal markings on the abdomen are as in the females of C. zonatus and I am referring them to this species.

*Callibacteris* zonatus Naváš

*Callibacteris* zonatus Naváš, 1959b: 224.

The type of *C. zonatus* is in MBM with a red Tymus label and the provenance given as Alta Orcaia (B. Arg.). 17.11.29. The actual year written on the label is probably a lapse, as since the date of collection in the description is given as 8 and 17.11.27. Another female, dated 8.11.27 Alta Orcaia, is in NHM, together with two other specimens from the Cordova hills caught at a later date. A wing of the co-type is shown in figs. 8, 9, and is clearly within the range of variation of *C. guttatus*, with which it is synonymous.

ABSENCE OF CLOEON BRANCH FROM SOUTH AMERICA

The transfer of *Cloeon gonzalezii* to *Callibacteris* leaves two taxa, originally placed in *Cloeon*, on the South American list. As shown above, one of these, *Cloeon priscus*, is a common nimphal applied to a species of *Callibacteris*. The position of the other, *Cloeon peregrini* Hubbard, is more problematical. I have not seen the type. Yet Huebner-Petersen's figure of the male forewings of his *Cloeon brunneum* from Mendoza, renamed by Hubbard, strongly suggests that it belongs in some other genus, possibly *Pseudo-* cloeon. On these grounds, it seems reasonable to conclude that no species of *Cloeon* is known to occur in South America.

ACKNOWLEDGMENTS

I am greatly indebted to Dr. A.O. Buchmann for providing every facility for me to work on the insect collection in the Museo Argentino de Ciencias Naturales in Buenos Aires. I am also grateful to Dr. R.A. Zondervan for extending the same privilege to me at the Museo de la Ciencia Natural in La Plata. I greatly appreciated the kindness of Dr. M.A. Fritz for sending me on loan the Naváš types of *Callibacteris* held in the collection of the Instituto de Investigaciones Entomológicas Salta in Rosario de Lerma. I have to thank Dr. C. Roelof of the Museo de Zoología in Barcelona for permission to study the rich collection of Naváš types in the museum. Since the Ephemeraptera in this collection have not yet been fully sorted, I as particularly grateful to Dr. J. Alper-Federow of the Museo de Zoología in Barcelona for his friendly instructions as to where particular genera were to be found. In the connection, I am indebted to Alper-Federow to Dr. W.L. Peters for an advance copy of their manuscript on the Naváš types held in the collections. Lastly, I would like to thank Dr. Legrande of the Muséum National d'Histoire Naturelle in Paris for permission to examine the Naváš types held there.
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Recibido: 30-VIII-1987
Aceptado: 14-V-1988
Figs. 6-11, wings of Group II females. 6-7. C. guttata (type). 8-9. C. guttata (type of C. zamata) to show variation; 10-11. C. jarcus (co-type of C. strictiventer), hind wing partly obscured.
pasó su hibernación en el último periodo ninfa, evitándose así la pérdida de continuidad entre la generación de un año y la del siguiente.

Sería conveniente ampliar estas observaciones y obtener mayor número de datos acerca de este hecho poco conocido.


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