

## **Types and Additional Specimens of Ephemeroptera Studied by Longinos Navás in the Museo de Zoología del Ayuntamiento, Barcelona, Spain**

by

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J. ALBA-TERCEDOR and W. L. PETERS: Types and Additional Specimens of Ephemeroptera studied by Longinos Navás in the Museo de Zoología del Ayuntamiento, Barcelona, Spain.

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The types and additional specimens of Ephemeroptera which were studied by Longinos Navás and now deposited in the Museo de Zoología del Ayuntamiento, Barcelona, are listed. For each of 97 species, full bibliographical references, collection localities, number of specimens, and type status are given.

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### **INTRODUCTION**

The Spanish Jesuit Longinos Navás described many species of Ephemeroptera from all over the world, but unfortunately many of Navás' papers are in journals not commonly found in most libraries. Further, few types of the Ephemeroptera species described by Navás have ever been located, and even fewer types have ever been restudied by specialists.

Originally, Navás' personal insect collection was in the Jesuit school "El Salvador" in Zaragoza, Spain; however, some years ago this collection was transferred to the Museo de Zoología del Ayuntamiento in Barcelona, Spain. Navás did return types and additional specimens to many different museum collections, but no list of all his depositions is presently available. Many of his types in other institutions may no longer exist. Prof. Y.-C. Hsu (pers. com.) recently told us that Navás types of Ephemeroptera which were originally

returned to the Musée Heude in the People's Republic of China can no longer be found either in Shanghai or Peking.

One of us (JAT) recently studied Navas' types and additional specimens of Ephemeroptera now housed in the Museo de Zoología del Ayuntamiento. This collection of 97 mayfly species incorporates both those specimens originally in Navas' personal collection and those specimens returned to the museum by Navas. Below is a list of all specimens. Those persons interested in studying any of these mayflies should contact Dr. Olaguer Escolá, Director de Entomología, Museo de Zoología del Ayuntamiento de Barcelona, Aptdo. 593, Parque de la Ciudadela, Barcelona-3, Spain. However, all specimens are fragile, on pins, and many are badly damaged. Placing any of these specimens in the mail is not advisable.

The list below is in alphabetical order and scientific names are given as originally applied by Navas. Citation of the original description by Navas is also given.

With each species the following information is given: (1) any taxonomic changes made by subsequent authors, (2) the locality and date as given on the specimen label and verified in the appropriate Navas paper (if label and paper do not agree, this is noted), (3) total number of specimens and sex (imagines are not indicated as such in list), (4) any indication of type status, (5) condition of specimens if damaged, (6) additional labels on pin, and (7) discussion of specimens and redescriptions by subsequent authors.

Navas' locality labels seldom included the country name. Therefore, in the list the country name is given in English for each locality. As country names have frequently changed, we have used country names in use during the time of Navas' studies (i.e., Belgian Congo, Fernando Po, Indochina).

The following abbreviations are used in the list: S = subimagine; MRCB = Musée Royal du Congo Belge, Tervueren; MNHN = Museo Nacional de Historia Natural, Santiago, Chile; ZSZM = Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg; MP = Museo de la Plata, Buenos Aires; MHNP = Museum d'Histoire Naturelle de Paris; DEI = Deutsches Entomologisches Institut, Berlin; and MNBA = Museo Nacional de Buenos Aires.

Four species in the list appear to be manuscript names as no published description or indication by Navas or any other author can be found. These four names are *Atalonella stigmatis*, *Atalophlebia picta*, *Ephemera loza*, and *Rhithrogena stigmatis*. Surprisingly, the one specimen of *Atalonella stigmatis* bears a "Typus" label.

Many of the additional specimens (without type status) listed herein were included in subsequent papers by Navas; however, such papers are not cited in the list. Other additional specimens listed herein appear never to have been recorded in the literature by Navas.

A clarification of type status must be made for each species given in the list. Based on the list several general sets of circumstances exist:

1. A species was described based on one specimen and the specimen possesses a red "Typus" label (i.e., *Baetis aculeatus*). In these cases, the specimen

is the "Typus" and therefore

2. A species was described with specimens each possess a red "Typus" label. In these cases, all the specimens are "Typus" and the lectotype from the original series should be compared to the description, as some of the specimens are not part of the original series (below.)

3. A species was described with "Typus" labels and additional specimens (i.e., "Typus" labels) are included in the original series (i.e., *ludiera*). Caution should be taken in the selection of additional specimens.

4. One to several specimens of a species are present but none of the specimens are "Typus" (i.e., *Ephemera schoutedeni*, *ludiera*). These are additional specimens submitted by Navas. Navas may have placed a "Typus" label on one of the specimens. The original series of these species is not known.

5. One to several specimens of a species are present but none possess a "Typus" label (i.e., *ludiera*). These specimens must compare these specimens to the original series. The specimens are types or additional specimens.

6. One to several specimens of a species are present but one or more other museums possess specimens of the type series (i.e., *Adenophlebia picta*). Navas returned part of the original series to the original type series. Navas returned all specimens of an original type series to the original type series. Camousseight (1980) lists the original series in the MNHN; however, one additional specimen is present below.

The importance of this discussion is the Navas collection in Barcelona and redescriptions of mayflies. For example, Demoulin (1955a, 1955b) described by Navas from the Bel collection. The specimens (part of the original series) in the MRCB. Apparently the original type series were in Spain, and the specimens only from the series in the MRCB have been designated by De

is the "Typus" and therefore can be considered the holotype.

2. A species was described based on two or more specimens and the specimens each possess a red "Typus" label (i.e., *Atalophlebia hyalina*). In these cases, all the specimens are syntypes and a "reviser" can select a lectotype from the original series at a later time. However, all syntypes in a series should be compared to the localities given by Navas in the original description, as some of the specimens with "Typus" labels could be additional specimens and not part of the actual type series. (See further discussion below.)

3. A species was described based on one, two, or more specimens (all with "Typus" labels) and additional specimens identified by Navas (without "Typus" labels) are included in the collection (i.e., *Atafophlebia fenestrata*, *Caenis ludiera*). Caution should be taken if the series includes a holotype, syntypes, and additional specimens.

4. One to several specimens constituting a series all have "Typus" labels, but none of the specimens are recorded by Navas in the original description (i.e., *Ephemera schoutedeni*, *Ecdyonurus rivulorum*). All of these specimens are additional specimens subsequently identified by Navas, and later Navas may have placed a "Typus" label on the pins. They cannot be considered types. The original series of these species were probably returned to another institution.

5. One to several specimens constitute a series and none of the specimens possess a "Typus" label (i.e., *Andromina grisea*, *Baetis inops*). Again a reviser must compare these specimens with Navas' original description to determine if the specimens are types or additional specimens.

6. One to several specimens constitute a series (all with "Typus" labels) and one or more other museums have also reported holding part of the original type series (i.e., *Adenophlebia collarti*, *Atalophlebia anastasii*). Obviously, Navas returned part of the original type series to various institutions; however, all specimens of an original type series in other museums should be verified. Camousseight (1980) lists the "holotipo" of *A. anastasii* in the collections of MNHN; however, one additional specimen marked "Typus" is given in the list below.

The importance of this discussion on type status and the existence of the Navas collection in Barcelona is shown when reviewing subsequent reviews and redescrptions of mayfly species originally described by Navas. For example, Demoulin (1955a, 1956, 1957) redescrbed the mayfly species described by Navas from the Belgian Congo. These redescrptions were based on specimens (part of the original type series) studies by Navas and returned to the MRCB. Apparently Demoulin did not know other parts of the original type series were in Spain, and in most cases he designated a holotype for each species only from the series in the MRCB. In these cases a lectotype should have been designated by Demoulin and not a holotype.

*Adenophlebia collarti* Navás, 1930d:316.

Transferred to *Afronurus* by Demoulin (1956); Stanleyville, Belgian Congo- 11-II-28, 1 ♂, Typus, type without caudal filaments; Stanleyville, 20-IV-28, 1 ♂, Typus, type very damaged; labels read "Mus. Congo"; Demoulin (1956) lists "holotype" and "allotype" in MRCB; see Demoulin (1956) for redescription.

*Adenophlebia decora* Navás, 1931d:137.

*A. decora* = *A. decorata* Navás by Demoulin (1955); *A. decorata* transferred to *Adenophlebiodes* by Demoulin (1955); Hauf-Lopori, Belgian Congo, V-VI-27, 1S ♂, Typus, type label read "Mus. Congo"; Demoulin (1955) lists "holotype" in MRCB; see Demoulin (1955) for redescription.

*Adenophlebia eatoni* Navás, 1931c:271.

*A. eatoni* = *A. bequaerti* Navás by Demoulin (1956); *A. bequaerti* transferred to *Compsoneriella* by Gillies (1963); Bukama, Belgian Congo, 27-II-26, 1 ♀, Typus; Demoulin (1956) lists "types" in MRCB; see Demoulin (1956) for redescription.

*Andromina grisea* Navás, 1912d:416.

*Andromina* = *Siphonurus* by Edmunds (1960); Okeanskaja, près de Vladivostok, Russia, 29-VII-10, 2S ♀, specimens without type labels.

*Atalonella stigmatis*

No known species described by Navás; Angol, Chile, 3-IX-34, 1 ♂, Typus, type without legs, hind wings, or abdomen.

*Atalophlebia anastasii* Navás, 1930c:357.

Perales, Chile, 1-28, 1 ♂, Typus, type without legs; Camousseight (1980) lists "Holotipo No. 3326" in MNHN.

*Atalophlebia athanasii* Navás, 1930c:356.

Panguipulli, Chile, 14-XII-29, 1 ♂, Typus, type without hind legs or caudal filaments; Panguipulli, 9-I-30, 1 ♂, specimen without fore legs or caudal filaments.

*Atalophlebia discolor* Navás, 1928a:125.

Longuimay, Chile, 1925, 1 ♀, Typus, type without legs; Angol, 7-IX-32, 1 ♂, Cotypus, cotypus without legs; Marga-Marga- II-31, 1 ♀; Perales, 1-28, 1S ♀; Camousseight (1980) lists "Síntipos No. 3331-3334 (destruidos)" in MNHN.

*Atalophlebia fenestrata* Navás, 1930c:358.

Long-Long, Chile, 1-I-30, 1S ♂, Typus, type without fore legs or caudal filaments; Marga-Marga, IX-27, 1S ♂, specimen without fore legs; Perales, 1926, 1 ♀, specimen without head, fore or middle legs.

*Atalophlebia hyalina* Navás, 1930c:358.

Long-Long, Chile, 1-I-30, 1 ♂, 1 ♀, both specimens labeled as Typus ♂ without fore legs, ♀ without fore legs or caudal filaments.

*Atalophlebia picta*

No known species described by Navás; Chile, 1-X-34, 1S ♀, specimen without type label.

*Baetis aculeatus* Navás, 1915c:54.

Declared *Nomen dubium* by Müller-Liebenau (1970); Figaró, Spain, 16-VII-12, 1 ♀, Typus, type without caudal filaments.

*Baetis andalusicus* Navás, 1911b: 206.

Declared *nomen dubium* by Müller-Liebenau (1970); but after Alba-Tercedor (1984) *B. andalusicus* = *B. fuscatus* L., Granada, Spain, 24-VI-11, 1 ♀, Typus, type without head or legs.

*Baetis angolinus* Navás, 1933a: 233.

Angol, Chile, 28-VIII-32, 1S ♂, Typus.

*Baetis comes* Navás, 1912a(1912-1913):194.

San Pablo, Brazil, 8-IV-10, 1S ♂, Typus, type without hind wings; San Pablo, 8-IV-10, 1S ♂, specimen without hind wings.

*Baetis furcatus* Navás, 1943a: 155.

Declared *nomen dubium* by Müller-Liebenau (1970) but after Alba-Tercedor (1984) *B. furcatus* = *B. muticus* L.; Bollengo, Italy. 11-IV-33, 1 ♀, Typus, type without head.

*Baetis gloriosus* Navás, 1923a: 2.

Marga-Marga, Chile, 1-19, 1S ♀, Typus.

*Baetis hispanus* Navás, 1915c: 41.

Declared *nomen dubium* by Müller-Liebenau (1970) later Alba-Tercedor (1984) proposed *B. hispanus*? *B. scamus* Etn.; Hostalés, Spain, 9-VII-14, 1S♂, Typus, type without hind wings or caudal filaments.

*Baetis iberi* Navás, 1913a: 63.

Declared *nomen dubium* by Müller-Liebenau (1970); but after Alba-Tercedor (1984) *B. iberi* = *B. rhodani* (Pict.); Zaragoza, Spain, 28-III-12, 1S♂, Typus.

*Baetis inops* Navás, 1912a(1912-1913):195.

Sierra Ventana, Argentina, 1S♂, this specimen reported by Navás (1918c), specimen without apex of abdomen; type in Munich Museum and redescribed by Ulmer (1943); Pescador (pers. com.) reports "1 S♀ Tipo" in MNBA.

*Baetis longinervis* Navás, 1917b: 740.

Declared *nomen dubium* by Müller-Liebenau (1970); Les Lérida, Valle de Arán, Spain, 21-VII-15, 1♂, Typus, type very damaged, with only head, thorax and 1 hind wing remaining; see Alba-Tercedor (1984) for further discussion.

*Baetis neglectus* Navás, 1913a: 62

Declared *nomen dubium* by Müller-Liebenau (1970); later declared good species and figured (Alba-Tercedor, 1984); Zaragoza, Spain, 3-VI-07, 1♂, Typus, type very damaged, with only head, thorax and a few abdominal segments; Zaragoza, 3-VI-07, 8♂, 4 of these specimens well conserved, 31-VIII-15, 1♂, 19-VII-17, 2♂, 27-VI-06, 1♀, 10-IX-11, 1♀, 21-VIII-17, 1S♀, 13-IX-11, 2S♀; Grisén (Zaragoza), 20-IX-15, 1♀, 1S♀.

*Baetis nexus* Navás, 1918d: 38.

Declared *nomen dubium* by Müller-Liebenau (1970), Sant Joan de l'Erm, Lérida, Spain, 15-VII-17, 1S♂, Typus; see Alba-Tercedor (1984) for further discussion.

*Baetis nigrescens* Navás, 1931b:125.

Declared *nomen dubium* by Müller-Liebenau (1970); later declared good species and redescribed (Müller-Liebenau, 1971); Los Tilos, Canary Islands, 7-IV-31, 1♂, Typus, type without apex of abdomen; Weidner (1962) lists "3 Syntypen" in ZSZM.

*Baetis nocturnus* Navás, 1923c: 180.

Alta Gracia, Argentina, 23-II-22, 1 specimen, Typus, type very damaged with only head and thorax remaining.

*Caenis aethiopica* Navás, 1935b: 70.

Nanoropus, Bords du Rodolphe, 565 m, Ethiopia, 1932-33, 1♀, Typus, type without fore legs; Nanoropus, 1932-33, 7♂, 5♀; labels read "Mus. Paris".

*Caenis annulata* Navás, 1923a: 1.

Vigan, Luzón, Philippines, 1917, 1♂, Typus, 7♂ additional specimens without type label.

*Caenis argentina* Navás, 1915a: 12.

La Plata, Argentina, 1914, 1♂, Typus, thorax of type damaged; La Plata, 1916, 1 specimen, specimen without apex of abdomen; Edmunds (pers. com.) reports "additional types" in MP.

*Caenis axillata* Navás, 1930c: 359.

Perales, Chile, 1926, 1 specimen, Typus, type very damaged.

*Caenis collarti* Navás, 1933c: 316.

*C. collarti* = *Tricorythus longus* Ulmer by Demoulin (1954); Stanleyville, Belgian Congo, 29-I-28, 1♂, Typus; type label reads "Mus. Congo".

*Caenis ludiera* Navás, 1920b: 54.

Spelling corrected to *C. ludicra* by Navás (1924a), and all labels with *C. ludicra*; Alta Gracia, Córdoba, Argentina, 3-IV-20, 6♂, all labeled as Typus; Alta Gracia, 7-I-26, 2♂, 20-I-21, 1♂; La Paz, Dept. S. Javier, Córdoba, 7-I-29, 4♂, 5 pins without specimens; Edmunds (pers. com.) reports "♂ Typus" in MP.

*Caenis nigrostrigata* Navás, 1931e: 20.

Bandra, Bombay, India, 20-IX-29, 1♀, Typus, type very damaged with only upper portion of thorax and wings remaining.

*Caenis pumila* Navás, 1923: 1.

Vigan, Luzon, Philippines, 1918, 1♂, Typus, type very damaged and without head; Vigan, 1919, 1S♀, Typus; Vigan, 1919, 2♂, 1♀.

*Caenis pusilla* Navás, 1913a: 63.

- Zaragoza, Spain, 15-IX-11, 1♂, Typus; Zaragoza, 3-IX-11, 1♀, Typus; Zaragoza, 3-IX-11, 1♂, 9-IX-11, 1♂.
- Callibaetis apertus* Navás, 1917a:190.  
Prov. Buenos Aires, Argentina, 4-X-16, 1S♀, Typus, type without wings; Berthélemy (1965) lists "additional specimens without type labels" in MHNP; Edmunds (pers. com.) reports "additional specimens studied by Navás" in MP.
- Callibaetis apicatus* Navás, 1917a: 189.  
Prov. Buenos Aires, Argentina, 15-V-15, 1S♀, Typus; Gillies (pers. com.) reports "1 ♂, Typus, Prov. Buenos Aires, 6-X-15" in MNBA; Edmunds (pers. com.) reports "additional ♂ specimens studied by Navás" in MP.
- Callibaetis camposi* Navás, 1930a: 18.  
Guayaquil, Ecuador, I-30, 1♀, Typus, type without caudal filaments and some legs.
- Callibaetis depressus* Navás, 1922a: 59.  
Santiago del Estero, Argentina, 1S♀, Typus, type without hind wings.
- Callibaetis gregarius* Navás, 1930b:72.  
Ipiranga, Brazil, 14-IV-10, 1S♂, Typus, type without hind wings; Ipiranga, 19-IV-10, 1S♂, labels read "Mus. S. Paulo, 14.896"; Petersen & Gaedike (1968) list "3 Syntypen" in DEI and "5 Syntypen" in São Paulo Museum, Brazil.
- Callibaetis guttatus* Navás, 1915e: 120.  
Alta Gracia, Argentina, 27-XII-26, 1♀, specimen without type label; Gillies (pers. com.) reports one specimen labeled "Provincia de Buenos Aires, C. Bruch" in MNBA; Edmunds (pers. com.) reports "additional specimens studied by Navás" in MP.
- Callibaetis jaffueli* Navás, 1918b:214.  
Los Perales, Chile, II-1918, 1♂, Typus.
- Callibaetis jocosa* Navás, 1912a(1912-1913): 195.  
San Pablo, Brazil, 8-IV-10, 1♂, Typus, type without legs and apex of abdomen, wings damaged; San Pablo, I-26, 3♂, 1♀; San Pablo, Cajurú I-10, 2♀; labels read "Mús. S. Paulo, 14.895"; Berthélemy (1965) lists "additional specimens without type labels" in MHNP.
- Callibaetis lineatus* Navás, 1932:82.  
Marga-Marga, Chile, III-31, 1♀, specimen without type label, specimen without apex of abdomen; Berthélemy (1965) lists "additional types" in MHNP.
- Callibaetis radiatus* Navás, 1920c: 132.  
Santa Fe, Argentina, 18-VI-18, 1♂, Typus; Berthélemy (1965) lists "additional types" in MHNP.
- Callibaetis sobrius*, Navás, 1916: 61.  
San Pablo, Brazil, 8-IV-10, 1♀, specimen without hind wings, 1 pin without specimen, specimens without type labels; Berthélemy (1965) lists "additional types" in MHNP.
- Callibaetis spegazzinus* Navás, 1920a: 36.  
Asunción, Paraguay, 15-30-VII-19, 1♀, Typus, type without legs and caudal filaments, abdomen damaged; Asunción, 10-X-19, 1♀, Typus; Asunción, 1-15-X-19, 1♀, 15-30-VII-19, 1♀.
- Callibaetis stictogaster* Navás, 1915e:121.  
Prov. Buenos Aires, Argentina, 3♀; Berthélemy (1965) lists "additional specimens without type labels" in MHNP; Edmunds (pers. com.) reports "♀ Sypus" and "additional specimens studies by Navás" in MP.
- Callibaetis vitreus* Navás, 1915e: 121.  
Hubbard and Edmunds (1977) pointed out that *C. vitreus* Navás, 1918c is both a junior synonym and junior homonym of *C. vitreus* Navás, 1915d; the type listed herein is assignable as the type of *C. Vitreus* Navás, 1915d; La Plata, Argentina, 12-IV-15, 1S♂, Typus, type without hind wings and fore wings damaged; Rio Paraguay, Paraguay, II-20, 1 specimen, only thorax remains; Edmunds (pers. com.) reports an "additional specimen studied by Navás" in MP.
- Callibaetis zonalis* Navás, 1915a:13.  
Prov. Buenos Aires, Argentina, 15-V-15, 2♀, 4-X-15, 1 pin without specimen, 10-X-19, 1♀, specimens without type label; La Plata, 28-I-20, 1♀, specimen without fore legs or apex of

- abdomen, specimen reported in Navás (1922c); Sao Pablo, I-26, 3♀, specimens without type label; Berthélemy (1965) lists "additional specimens without type labels" in MHNP; Edmunds (pers. com.) reports "additional ♂ specimens studied by Navás" in MP.
- Callibaetis zonatus* Navás, 1929: 224.  
Alta Gracia, Argentina, 17-II-29, 1♀, Typus.
- Campsurus zottai* Navás, 1920d: 11.  
Argentina, 1♀, specimen without type label, specimen without caudal filaments; Berthélemy (1965) lists "additional specimens without type labels" in MHNP; Edmunds (pers. com.) reports "additional specimens studied by Navás" in MP.
- Centroptilum obtusum* Navás, 1915c: 72.  
La Garriga, Spain, 26-VII-24, 1 specimen, specimen not a type based on locality and date.
- Chimura aetherea* Navás, 1915b: 149.  
*Chimura* = *Ameletus* by Edmunds (1960); Kyoto, Japan, 4-VI-08, 1♂, Typus, type without legs.
- Cloeon apicatum* Navás, 1933b: 17.  
*Cloeon apicatum* Navás, 1933b is a junior homonym of *Cloeon apicatum* Navás, 1931e; *C. apicatum* Navás, 1933b renamed *C. navasi* by van Bruggen (1957); Chekiang, Chusan, China, 28-VIII-31, 1S♂, 1S♀; labels read "Mus. Heude".
- Cloeon areolatum* Navás, 1930d: 320.  
Transferred to *Procloeon* by Demoulin (1957); Kayumbe-Mukulu, Belgian Congo, 26-29-XI-11, 1♂, Typus, type without legs and apex of abdomen; labels read "Mus. Congo"; Demoulin (1957) lists "holotype" in MRCB; see Demoulin (1957) for redescription.
- Cloeon bellum* Navás, 1931c: 274.  
Lac Kafakumba, Belgian Congo, 21-V-25, 1S♀, Typus, type without caudal filaments; Kafakumba, 21-V-25, 1S♂; Demoulin (1957) lists "holotype, allotype and paratypes" in MRGB; see Demoulin (1957) for redescription.
- Cloeon cambouei* Navás, 1930e: 139.  
Madagascar, 17-III-94, 2S♀, specimens without type label, one specimen without head, other specimen without caudal filaments; labels read "Mus. Paris"; Berthélemy (1965) lists "additional types" in MHNP.
- Cloeon durani* Navás, 1926a: 101.  
Tananarive, Madagascar, 13-II-21, 2♂, 4♀, all specimens labeled Typus, 1♂ and 2♀ each on a pin; labels read "Mus. Paris"; Berthélemy (1965) lists "additional types" in MHNP.
- Cloeon exiguum* Navás, 1918a: 2.  
Manila, Philippines, 1916, 1♀, Typus, type without fore and hind wings.
- Cloeon pusillum* Navás, 1930d: 321.  
*C. pusillum* = *Afrobaetodes pusillus* (Navás) by Gillies (1979); Stanleyville, Belgian Congo, 20-II-28, 1♂, Typus; Stanleyville, 20-II-28, 4♂; Demoulin (1957) lists "syntypes" in MRCB; see Demoulin (1957) for redescription.
- Cloeon rubellum* Navás, 1923a: 3.  
Vigan, Luzón, Philippines, 1918, 1♂, Typus, type very damaged with only thorax remaining; Vigan, 1918, 2♂, 1 specimen without head or caudal filaments.
- Cloeon taeniatum* Navás, 1931e: 21.  
Bandra, Bombay, India, 5-X-29, 1♂, Typus; Borivli, I. Salsette, 4-X-28, specimen without caudal filaments.
- Cloeon viridulum* Navás, 1931a: 6.  
à Zô-Sè près Shanghai, Prov. Kiangsu, China, 9-VII-30, 1♀, Typus, type without fore legs or caudal filaments; Chekiang, Chusan, 18-V-31, 1♀; labels read "Mus. Heude".
- Ecdyonurus bollenganus* Navás, 1934a: 155.  
*E. bollenganus* = *E. helveticus* Eaton by Thomas (1968); Bollengo, Aosta, Italy, 28-IV-33, 1♂, Typus, type without wings, legs, or abdomen; see Thomas (1968) for further discussion.
- Ecdyonurus codinai* Navás, 1924b: 6.  
Venta de Cárdenas, Ciudad Real, Spain, 8-VI-23, 1♂, Typus, type without head and part of thorax; see Thomas (1968) for further discussion.

*Ecdyonurus rivulorum* Navás, 1928b: 46.

*E. rivulorum* = *Heptagenia lateralis* (Curtis) by Thomas (1968) (as *Heptagenia*); Pinestras, Gerona, Spain, 10-VIII-27, 1♀, Typus, type without fore legs or caudal filaments, the locality "Pinestras" is not recorded in Navás (1928b); see Thomas (1968) for further discussion.

*Ecdyurus fluminum* Pict. [sic] var. *speciosa* Navás, 1915d: 456.

Biel, Zaragoza, Spain, 11-VI-31, 1♀, specimen without type label, specimen without caudal filaments; see Thomas (1968) for further discussion.

*Ephemera fulvata* Navás, 1935a: 100.

Lonawla, Khandala, Bombay, India, 23-X-34, 1♀, Typus.

*Ephemera loza*

No known species described by Navás, nec *E. lota* Navás, 1934b; Kuling, China, 6-VIII-35, 1♀, specimen without type label.

*Ephemera schoutedeni* Navás, 1911a: 222.

*Eatonica* established for *E. schoutedeni* by Navás (1913b); Kasai, Belgian Congo, 25-VII-06, 1♀, Cotypus [this type not listed by Navás (1911a)]; Bokoté, Ethiopia, 23-XII-25, 1♀; Pontierville, Belgian Congo, 15-III-16, 1♀; Zambèze, Chembra, Belgian Congo, 1928, 1♀; Hebo, Belgian Congo, 14-15-VII-25, 1♂; all specimens without type label; all labels except Pontierville read "Mus. Congo"; Berthélemy (1965) lists "additional specimens without type labels" in MHNP.

*Fullea dentata* Navás, 1930d: 318.

Albertville, Belgian Congo, X-25, 1♂, Typus; Albertville, X-25, 1♂, 5♂♂.

*Haplobaetis umbratus* Navás, 1922b: 115.

*Haplobaetis* = *Centropiloides* by Lestage (1945); *C. umbratus* = *C. bifasciata* Esben-Petersen by Demoulin (1957); Santa Isabel, Fernando Po, VIII-19, 1♂, Typus, type without apex of abdomen.

*Heptagenia flavata* Navás, 1922a: 61.

Cantón, China, 1908, 1♀, Typus, type without caudal filaments; Cantón, 1908, 1♀, specimen without legs or caudal filaments.

*Heptagenia? molinai* Navás, 1930g: 331.

*H. molinai* = *Murphyella needhami* Lestage by Demoulin (1955b); Angol, Chile, 11-III-29, 1200 m, 1♀, specimen without type label; see Hubbard (in press) for further discussion.

*Hexagenia benedicta* Navás, 1922a: 55.

Jundiahy, San Pablo State, Brazil, 4-XI-21, 1♀, Typus, type very damaged by *Anthrenus*.

*Neophlebia garciai* Navás, 1912b: 746.

Transferred to *Lachlania* by Ulmer (1943); Pasto, Colombia, 2300 m, 1♀, Typus, type damaged by *Anthrenus*.

*Nirvius punctatus* Navás, 1922a: 56.

*Nirvius* = *Ephemera* and *N. punctatus* = *E. duporti* by Lestage (1922); Pakang, Indochina, 28-XI-18, 1♂, Typus, type without caudal filaments.

*Nousia delicata* Navás, 1918b: 213.

*Atalonella* = *Nousia* by Navás (1925); also see Peters and Edmunds (1972); Los Perales, Chile, I-18, 1♂, Typus, type without caudal filaments; Perales, IX-23, 1♀, Typus, type without legs; Perales, I-27, 1♂, 3♂♂, 2 pins without specimens; Marga-Marga, 27-IV-31, 3♂♂, 2♂♂, 4 pins without specimens, III-31, 1♀, Valparaíso, 6-XI-22, 1♂.

*Polymitarcys birmanus* Navás, 1933d: 87.

*Polymitarcys* = *Ephoron* by McDunnough (1926); Bhamò, Burma, VI-86, 1♂, Typus.

*Povilla adusta* Navás, 1912c: 402.

Albertville, Belgian Congo, X-25, 1♂, specimen without type label, specimen without legs or caudal filaments; Berthélemy (1965) lists "additional specimens without type labels" in MHNP.

*Pseudocloeon albinerve* Navás, 1923b: 443.

Valparaíso, Chile, 5-XI-21, 1♂, Typus, type without apex of abdomen; Valparaíso, 5-XI-21, 2♂♂, 6-XII-21, 1♂, specimen without apex of abdomen; Perales, II-17, 1♀, specimen without apex of abdomen.

*Pseudocloeon bruchi* Navás, 1926b: 34.

Alta Gracia, Córdoba Prov., Argentina, 28-XII-21, 1♂, Typus, type without head, right



- wings, or abdomen; Alta Gracia, 13-I-27, 1♂, 18-XII-21, 1♂, specimen without wings, 28-XII-27, 1♂, specimen without apex of abdomen; Pescador (pers. com.) reports "2 additional ♀ studied by Navás" in MNBA.
- Pseudocloeon rubellum* Navás, 1931e: 22.  
Khandala, Bombay, India, 18-V-28, 1♀, Typus; Boriuli, Bombay, 3-X-19, 1 specimen without caudal filaments.
- Pseudocloeon weiseri* Navás, 1926b:34.  
Bolsón, Catamarca, Argentina, 7-III-24, 1♀, Typus; Córdoba, 25-I-27, 1♀, specimen without head, legs or caudal filaments; Alta Gracia, 14-II-27, 1 specimen, specimen with only a portion of thorax and wings; Berthélemy (1965) lists "additional specimens without type labels" in MNHP; Pescador (pers. com.) reports "Tipo and 2♀ additional specimens" in MNBA.
- Rhithrogena cincta* Navás, 1921:154.  
Montesquiu, Barcelona, Spain, 8-VII-26, 1♀, 10 pins without specimens from Ribas, Gerona, 14-VIII-19, 11-VIII-19, Camprodón, 5-VIII-19, 11-VIII-19, 6-VIII-19- Ripoll, Gerona, 13-VIII-19, all pins without type labels; see Thomas (1968) for further discussion.
- Rhithrogena diaphana* Navás, 1917b: 739.  
*R. diaphana* = *Ecdyonurus aurantiacus* (Burmeister) by Puthz (1973); Humoso, Viana del Bollo (Orense), Spain, 7-VII-15, 1♂, specimen without Typus label; see Thomas (1968) for further discussion.
- Rhithrogena ferruginea* Navás, 1905: 17.  
Tramacastilla, Spain, 13-VII-04, 7♂, 9♀, 19-VII-04, 1 pin without specimen, all specimens without type label; see Thomas (1968) for further discussion.
- Rhithrogena loyolae* Navás, 1922a:62.  
Puig Hopitalet, Ull de Ter (Gerona), Spain, 31-VII-21, 1♂, Typus; see Thomas (1968, 1970) for further discussion.
- Rhithrogena oscensis* Navás, 1927: 105.  
Benasque, Spain, VIII-26, 3 pins without specimens, pins without type labels.
- Rhithrogena soteria* Navás, 1917c:396.  
Zaragoza, Spain, 29-III-17, 1♂, Typus label missing according to Thomas (1968), specimen without caudal filaments; see Thomas (1968) for further discussion.
- Rhithrogena stigmatis*  
No known species described by Navás; Khandala, Bombay, India, 24-V-29, 1S♂, 1S♀, both specimens without type label.
- Rhithrogena* [sic] *gorrizi* Navás, 1913a: 61.  
Ebro, Zaragoza, Spain, 28-V-14, 1♂, specimen designated lectotype by Thomas (1968); see Thomas (1968) for further discussion.
- Rhoenanthus obscurus* Navás, 1922a: 58.  
Don Khona, Indochina, 17-XI-18, 1♂, Typus, type without one hind wing, other hind wing damaged.
- Rhoenanthus vitalisi* Navás, 1922a: 59.  
Ban Nam Goum, Indochina, 10-III-17, 1♂, Typus, type very damaged.
- Siphonurus pyrenaicus* Navás, 1930f:53.  
*S. pyrenaicus* = *S. lacustris* Eaton by Puthz (1977); Ribera de Cardós, Lérida, Spain, 23-VII-29, 1♀, specimen without type label, abdomen damaged by *Anthrenus*.
- Teloganodes dentata* Navás, 1931e:19.  
Khandala, Bombay, India, 14-X-27, 3♂, 20-V-28, 2♂, specimens without type label; Petersen & Gaedike (1968) list "3 Syntypen" in DEI; Berthélemy (1965) lists "additional types" in MHNP.
- Thraululus larensis* Navás, 1926b:33.  
Punta Lara, Buenos Aires Prov., Argentina, 5-XI-22, 1♂, Typus, type without fore legs; Punta Lara, 5-X-22, 1♂, 5-VI-22, 1♂, 3-XI-22, 1♂, 5-XI-22, 1♂, Petersen & Gaedike (1968) list "1 Syntypus" in DEI; Berthélemy (1965) lists "additional specimens without type labels" in MHNP.

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