

A REVISION OF THE EUROPEAN SPECIES OF THE GENUS BAETIS LEACH,  
1815 DESCRIBED BY REVEREND LONGINOS NAVÁS (BAETIDAE)

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**Abstract.** After studying the collection of Navás in the Museo de Zoología del Ayuntamiento de Zoología, Barcelona, Spain, the following conclusions have been reached on the basis of the type specimens and other specimens classified by Navás: /1/ Baetis andalusicus Navás, 1911 is a synonym of B. fuscatus /Linné, 1761/; /2/ B. neglectus Navás, 1913 is a valid species close to B. atrebatinus Eaton, 1870 and B. balcanicus Müller-Liebenau and Soldán, 1981 and characters to distinguish it are given; /3/ B. iberi Navás, 1913 is a synonym of B. rhodani /Pictet, 1843 - 1845/; /4/ B. hispanus Navás, 1915 = B. scambus Eaton, 1870; /5/ The remnant of type of B. longinervis Navás, 1917 agree with the tenax-vernus group but it is not possible to assign this species to any of the species-group without data on genitalia; /6/ B. nexus Navás, 1918 is very close to B. pentapleobodes Ujhélyi, 1966, probably a conspecific species, but it has been preferred to study the subimago male before making a definitive conclusion; /7/ Both B. furcatus Navás, 1924 and B. pumilus var. dissimilis Navás, 1924 are synonyms of B. muticus /Linné, 1758/.

Taxonomy, type material, adults

The jesuit Longinos Navás described nine European species of genus Baetis: B. andalusicus Nav., 1911; B. neglectus Nav., 1913; B. iberi Nav., 1913; B. hispanus Nav., 1915; B. aculeatus Nav., 1915; B. longinervis Nav., 1917; B. nexus Nav., 1918; B. nigrescens Nav., 1932; B. furcatus Nav., 1933 and one variety of B. muticus (L.)(subnom. B. pumilus var. dissimilis Nav., 1924).

The only species whose taxonomical status is clear is B. nigrescens, which was considered a valid species by Müller-Liebenau (1971) who provided good descriptions of both nymphs

and adults. The remaining species are considered as nomina dubia by Müller-Liebenau (1969) and Puthz (1978).

However, Müller-Liebenau (1969) suggests that the characters used by Navás to describe a variety and new species close to B. muticus (L.) (subnom. B. pumilus var. dissimilis) and B. furcatus respectively are not valid; because Navás supports these either by the lack of relative position of cross-veinlets in the hind wings and the variability of this character is well known.

Originally the most specimens of the Navás collection were deposited in the "Museo del Colegio el Salvador" in Zaragoza (Spain) but some years ago all specimens of the Navás collection were transferred to Barcelona, to "Museo de Zoología del Ayuntamiento" also in Spain. After visiting this museum and recording all specimens existing there, I have not found any specimens classified as B. pumilus var. dissimilis (Alba-Tercedor and Peters, in litt.) so that I assumed that the type of this variety was lost.

I consider it important and very urgent to study the specimens belonging to the species described by Navás and to clarify the proper taxonomical position of these species. This is the objective of the present paper.

#### Baetis andalusicus Navás, 1911

Navás, 1911: 206, Lám. 4<sup>a</sup>, Fig. 1.

Navás supported the description of this species by a single specimen, a female adult caught in the south of Spain, in Granada on 24.VI.1911. This species was never caught again by Navás.

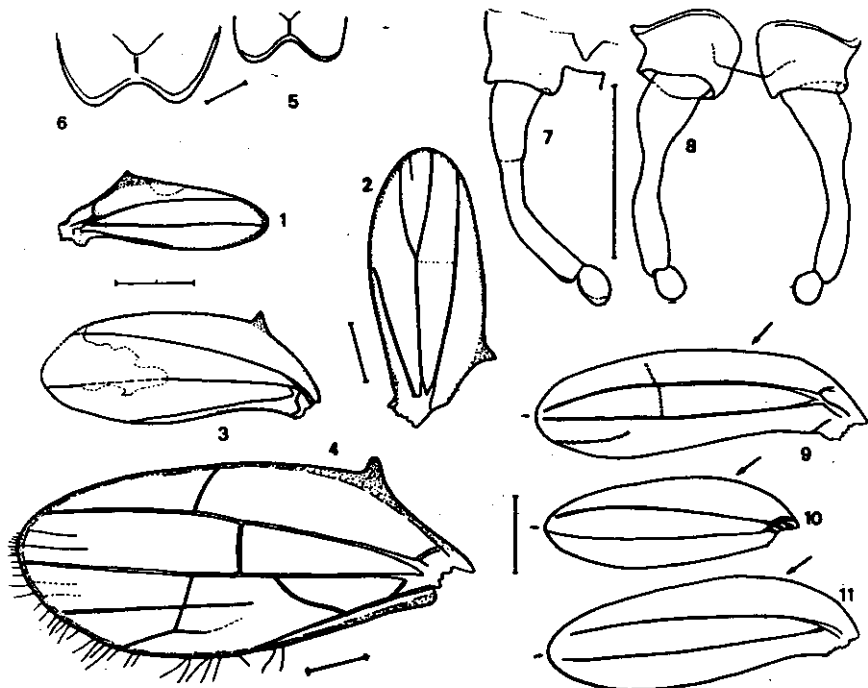
The type specimen is very damaged; without head, legs and cerci and only with one fore-wing and one hind-wing.

This species is a very small one (after Navás' own description 2.5 mm in length). However, as the pinned type without head is 2.68 mm long the fresh specimen together with its head was certainly longer.

Navás' description was in general brief ("Minor, testaceo-aurantiacus. Cerci albi, corpore longiores, articulis apice fusco-rufo annulatis.") but included a good description and drawing of the hind-wing.

I have mounted the hind wing of type on a slide (Fig. 1). There are pronounced differences from the original drawing. Navás drew only two longitudinal veins but there is other one which is not well visible because it is very close to the hind margin. Navás' drawing also showed a very marked step after the costal projection (the type had little fold in the fore margin near of projection so that I believe that when Navás drew the wing he saw this step).

After study the type and comparing it with other small species and with the literature I saw that the type colour was



Figs. 1 - 11. 1 - B. andalusicus, hind wing. 2 - B. furcatus, hind wing. 3 - B. longinervis, hind wing. 4 - B. nexus, hind wing. 5 - B. neglectus, first abdominal tergite of male. 6 - B. atrebatinus, the same. 7 - B. neglectus, genitalia from natural. 8 - the same, genitalia mounted on slide. 9 - B. atrebatinus, hind wing. 10, 11 - B. neglectus, hind wing. Scale 0.25 mm.

similar to the description made by Eaton (1883 - 1888) for B. fuscatus (L.) (subnom. B. venustulus Etn.), the hind wing was very close to that drawn by Bogoescu (1958) for B. fuscatus (L.) (subnom. B. venustulus Etn.). Moreover, I observed, after slide mounting the paraprocts of type specimen, that they had a gradually sharply pointed prolongation at the apex similar to those drawn by Bogoescu (1958) for B. fuscatus (L.) (subnom. B. venustulus Etn.) and also similar to those described for B. fuscatus (L.) by Müller-Liebenau (1969).

According to Grandi (1960), B. fuscatus (L.) (subnom. B. venustulus Etn.) is sometimes very small (3.5 mm long).

I have sampled the rivers and streams of the type locality for several years and I caught nymphs of B. fuscatus (L.). This fact coupled to the evidence given above, I concluded that it is very probable that the specimen described by Navás as B. andalusicus is really a small one of B. fuscatus (L.). As the Navás' description is so poor and the species is based on a female type specimen actually very damaged, I think that we must consider B. andalusicus Navás, 1911 as a synonym of B. fuscatus (Linné, 1761) in the future.

Baetis neglectus Navás, 1913

Navás, 1913: 62 - 63, Lám. 5<sup>a</sup>, Fig. 2.

I found a badly damaged specimen labelled as *typus*, caught in the N.E. of Spain, in Zaragoza on 3. VII. 1907 (in the original description another date was noted: 3. VI. 1907). There are some other specimens from the type-locality so that I could study a series of ten specimens.

This species belongs to the atrebatus - group (Müller-Liebenau, 1969) and is very close to B. atrebatus Etn. as noted by Navás (1913); It can be distinguished by the following combination of characters: (1) smaller size (body length: 3.5 - 4.5 mm, length of forewing: 4.1 - 5.1 mm, length of cerci: 7.0 - 7.7 mm.); (2) thorax generally light brown, clearly lighter than B. atrebatus Etn.; (3) emargination between the lobes of first abdominal tergite more pronounced (Figs. 5, 6); (4) hind wings with fore and hind margins more convex and apex relatively more sharply pointed and without intercalary veinlets as generally occur in B. atrebatus Etn. (see Figs. 9 - 11). On the other hand, the genitalia (Figs. 7, 8) are very close to that drawn for B. balcanicus by Müller-Liebenau and Soldán (1981) and that of B. atrebatus Etn. but it has a triangular chitinised zone in the middle of membrane of union between the ventral sclerites supporting the penis. This is similarly shaped as in B. atrebatus Etn. but less chitinised so that it is sometimes difficult to see.

I therefore conclude that B. neglectus Navás, 1913 is a valid species.

Baetis iberi Navás, 1913

Navás, 1913: 63, Lám. 5, Fig. 3.

The description of this species was based on a single male subimago (caught in the N.E. of Spain, in Movera, prov. Zaragoza on 28. III. 1912). According to the Navás' own description this species was very similar to B. rhodani (Pict.) and after study the type specimen I conclude that B. iberi Nav. is a synonym of B. rhodani (Pict.).

Baetis hispanus Navás, 1915

Navás, 1915: 41, Figs. 1a, 1b.

According to the original description this species was based on a subimago specimen and Navás gave the dimensions of a male caught in the N.E. of Spain, in Hostalets, prov. Gerona, on 9. VII. 1914. However, I found in the Navás' collection only one specimen of this species labelled by Navás as *Typus*. This is a very damaged subimago female (without hind wings and with only the first abdominal segment).

The original drawing of hind wing is very close to that drawn by Bogoescu (1958) for B. scambus Etn. Although this species has three longitudinal veins, the third one is very small

and sometimes difficult to see so that it is possible that Navás like Bogoescu did not draw the third longitudinal vein.

According to the original description and the study of the type this species probably belongs to the fuscatus-group. As Navás (1915) in the same trip caught B. fuscatus L. (subnom B. binoculatus L.), I believe that the subimago of this species was different from B. fuscatus so that perhaps B. hispanus Nav. is a synonym of B. scambus Etn. However, according to the original description and the available type it is not possible to discuss this further.

A last possible solution is the possibility of studying some eggs that attached to the fore-wings of the type. Meanwhile I propose to consider B. hispanus Navás 1915 = B. scambus Eaton 1870.

#### Baetis longinervis Navás, 1917

Navás, 1917: 740 - 741, Fig. 7.

This species was supported by a single specimen caught in the N.E. of Spain, in Lés, prov. Lérida, on 21. VII. 1915.

In the Navás' collection I found a male adult classified by Navás and labelled as Typus. This type is very damaged, only the thorax (very destroyed), the first abdominal segment, one hind wing (damaged at the apex, Fig. 3) and one hind leg remaining.

According to Navás' own words in the original paper, this species is close to B. tenax Etn. and effectively his description and the remnant of the type agree with the complex tenax-vernus. But as noted by Müller-Liebenau (1969) is it very indefinite to assign this species to the vernus-group without data on the genitalia.

#### Baetis nexus Navás, 1918

Navás, 1918: 38 - 39, Fig. 1.

Navás supported the description of this species by a subimaginal specimen. In the Navás' collection I found a male subimago labelled as Typus well conserved, caught in the N.E. of Spain, in San Joan de l'Erm, prov. Lérida, on 15. VII. 1917.

After studying the type I concluded that this species is very close to B. pentaplebodes Ujhelyi, 1966. I support my conclusion on the following characters: (1) the hind wing shape and venation (Fig. 4) is similar to that figured by Müller-Liebenau (1969: 147, Fig. 107) for B. pentaplebodes; (2) the spots still visible on the abdominal tergites are similar to those described by Ujhelyi (1966) for B. pentaplebodes and they are similarly shaped to those figured for the nymph of this species by Müller-Liebenau (1969: 141, Fig. 103); (3) the general coloration agrees with descriptions both of Ujhelyi (1966) and Müller-Liebenau (1969).

However, before I give a definitive conclusion if B. nexus Nav. and B. pentaplebodes are synonymous species I prefer to study male subimagos of B. pentaplebodes and compare them with the type of B. nexus.

Baetis furcatus Navás, 1933

Navás, 1933: 155, Fig. 2.

This species was based on a specimen caught in Bollengo, Val d'Aosta, Piemonte, Italy on 11. IV. 1933.

After Navás' own words this species is very close to B. muticus (L.) (subnom. B. pumilus Burm.) but without a cross-veinlet in the hind wings.

Today it is not possible to establish a new species based in this character only, due to its great variability. However, Navás used this character several times. He also based the description of the variety B. muticus var. dissimilis Navás, 1924 (subnom. B. pumilus var. dissimilis) on the relatively different position of cross-veinlets of hind wings comparing with B. muticus (L.) (subnom. B. pumilus Burm.). Therefore Müller-Liebenau (1969, 1974) doubted the validity of both these species.

I studied a female specimen of B. furcatus Nav. classified by Navás and labelled as Typus. This specimen lacked the cross-veinlet in one hind wing but in the other it was slightly visible (Fig. 2). Moreover, paraprocts are the same as those of female of B. muticus (L.), so that I conclude that B. furcatus Nav. is a synonym of B. muticus (L.).

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REFERENCES

- Alba-Tercedor, J. and Peters, W.L. in litt. Types and additional specimens of Ephemeroptera studied by Longinos Navás in the Museo de Zoología del Ayuntamiento, Barcelona, Spain. Aquatic Insects.
- Bogoescu, C. 1958. Ephemeroptera. Fauna R.P.R., Insecta, 7, 3, 191 pp. Acad. R.P.R., Bucuresti.
- Eaton, A.E. 1883-88. A revisional monograph of recent Ephemeridae or Mayflies. Trans. Linn. Soc. Zool. 2,3: 1 - 352.

- Grandi, M. 1960. Ephemeroidea. Fauna d'Italia, 474 pp., Bologna, Calderini.
- Müller-Liebenau, I. 1969. Revision der europäischen Arten der Gattung Baetis Leach, 1815 (Insecta, Ephemeroptera). Gewäss. Abwass., 48/49: 1 - 214.
- Müller-Liebenau, I. 1971. Ephemeroptera (Insecta) von den Kanarischen Inseln. Gewäss. Abwass., 50/51: 7 - 40.
- Müller-Liebenau, I. 1974. Baetidae aus Südfrankreich, Spanien und Portugal (Insecta, Ephemeroptera). Gewäss. Abwass., 53/54: 7 - 42.
- Müller-Liebenau, I. and Soldán, T. 1981. Baetis balcanicus sp. n., a new species of the genus Baetis from Bulgaria and Greece. Spixiana, 4,3: 291 - 295.
- Navás, L. 1911. Notas entomológicas 3. Excursiones por los alrededores de Granada. Bol. Soc. Aragon. Cienc. Nat., 10: 204 - 211.
- Navás, L. 1913. Notas entomológicas 4. Excursiones por los alrededores de Zaragoza. Bol. Soc. Aragon. Cienc. Nat., 11: 61 - 69.
- Navás, L. 1915. Notas entomológicas (2ª serie) 11. Excursiones por Cataluña. Julio 1914. Bol. Soc. Aragon. Cienc. Nat., 14: 27 - 80.
- Navás, L. 1917. Neurópteros Nuevos de España. Tercera serie. Familia Efeméridos. Rev. Acad. Sci. Exact. Fis. Nat. Madrid, 15: 739 - 741.
- Navás, L. 1918. Excursiones entomológicas por el Norte de la provincia de Lérida (6 - 24 de Julio de 1917). Bull. Inst. Catalana Hist. Nat.: 38 - 39.
- Navás, L. 1924. Insectos de l'excursio de D. Ascensi Codina a Castella i Andalusia al Juny de 1923. Trab. Mus. Cienc. Nat. Barcelona, 4,11: 3 - 10.
- Navás, L. 1932. De mis últimas excursiones entomológicas (1930-1931). Bol. Soc. ent. Esp., 14: 116 - 130.
- Navás, L. 1933. Insetti neurotteri e affini del Piemonte. Mem. Soc. ent. Ital., 65: 150 - 162.
- Puthz, V. 1978. Ephemeroptera - pp. 256 - 263, in: Illies, J. (ed.), Limnofauna Europaea, 2nd ed., XVII + 532 pp. Stuttgart.
- Ujhelyi, S. 1966. The Mayflies of Hungary with the description of a new species, Baetis pentaphlebodes sp. n. (Ephemeroptera). Acta Zool. Hung., 12: 203 - 210.