

# A Cladistic analysis and reclassification of the Genus “*Dasybasis*” Macquart in the Neotropical Region (Diptera: Tabanidae)

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## Abstract

The genus “*Dasybasis*” Macquart is revised and the phylogenetic relationships among their species, based on external morphology and female and male genitalia, are presented. The cladistics analysis, using xx terminal species (xx ingroup species and xx outgroup species) and 64 characters, produced a single cladogram under **implied weighting**. The results of these analyses did not reflect the classification of the genus. The tree shows that Neotropical “*Dasybasis*” is a paraphyletic taxon without a clear synapomorphies to define it, *Haematopotina* species, *Scaptiodes* Enderlein, and *Stenotabanus* (*Stenotabanus*) *sandyi* Gorayeb are placed in the “*Dasybasis*” clade. The resulting cladogram shows that species treated as “*Dasybasis*”, distributed in the Australasian/Oceanian and Neotropical Regions, constitute two distinct monophyletic groups. Therefore, “*Dasybasis*” s.str. would be restricted only to the Australasian/Oceanian region, leaving the neotropical species assigned to different monophyletic taxa. We name as “Group of Genera” the recovered clades, whose species were previously treated as “*Dasybasis*” by Coscarón & Philip (1967). The sister group of this “Group of Genera” is constituted by “*Dasybasis*” + *Stenotabanus* (*S.*) *incipiens* + “*D.*” *belenensis* + “*D.*” *shannoni* + “*D.*” *schineri* + “*D.*” *cumelafquen*”, at the first clade, supported by two synapomorphies; frontal callus quadrangular (20:0), basal callus without dorsal-median prolongation (24:1), and six transformations median

occipital sclerite wide (3:0), eyes black (4:0), ocular pilosity long (6:2), basal callus touching the eyes, abdominal terga without median band (55:1), and sternite VIII base convex (58:0). We propose the creation of four new genera and the revalidation of two taxa (*Archiplatius* Enderlein and *Pseudoselasoma* Brethes), to include those Neotropical species previously treated as “*Dasybasis*”. Thus, we propose the extension of the *Haematopotina* Coscarón & Philip concept and, therefore, the inclusion of *H. nigrifrons* (Philippi) *comb.n.* previously treated as “*Dasybasis*”, which form a monophyletic group.

**Key words:** systematics, taxonomy, phylogenetics, Diachlorini

## Introduction

The tabanid genus “*Dasybasis*” Macquart is represented in southern Neotropical and Australasian/Oceanian regions (Daniels, 1989; Fairchild & Burger, 1994). In the Neotropical region it is distributed from Venezuela to southern South America (Chile and Argentina) (Coscarón & González, 1991) most of which are found in the Andean region, especially in the Subantarctic, Patagonia, Central Chile subregions of Chile and Argentina, and in the Páramo Puneña subregion (Morrone, 2015). The tabanid genus *Dasybasis* Macquart, 1847, constitutes one of the most abundant and speciose components of the southern Neotropical fauna, with 70 taxa considered valid (Coscarón & Papavero 2009). “*Dasybasis*” also occurs in Australia and New Zealand, with 73 species described in two subgenera (Daniels, 1989), in New Caledonia (Trojan, 1991), and in Fiji Archipelago (Burger, 2006). It is very well represented in southern Chile and Argentina with 34 and 47 species, respectively. It is part of the most basal group within the tribe Diachlorini, occurring predominantly in the colder zones of the Neotropics in specialized habitats (Mackerras, 1954; Fairchild, 1969).

Coscarón & Philip (1967) defined “*Dasybasis*” using, among others, the following combination of characters: general color of the body grayish, medium size between 9.0 and 14.0 mm; eyes with sparsely pilose and without bands; frons wide, with frontal index rarely exceeding to 3.0, rarely convergent at the base; basal callus of similar width as frons and wider than taller, quadrangular. Ocelli and ocellar triangle with variably developed; subcallus pilose laterally; maxillary palpi stout and short; scape variable in shape, pedicel with dorsal projection; first flagellomere slightly angulate and without dorsal projection; maxillary palpi short and stout, and with pilosity of variable length. Mesonotum with longitudinal stripes; wing hyaline to smoky, often with clouds on the veins, with appendix on R<sub>4</sub>. Abdomen with median longitudinal band or stripes delimiting short triangles; cerci subcircular, genital fork without basal branches.

Different “*Dasybasis*” species are polymorphic and show morphological variation in some of these characters. Some of these characters are represented in taxa other than “*Dasybasis*”, which might convert them in symplesiomorphic characters that could be used to support this genus classification. For example, ocular pilosity is also found in *Eristalotabanus* Kröber, *Scaptia* Walker, *Protodasyapha* Enderlein, basal callus as wide as the frons in *Acanthocera* (*Polistimima*) Fairchild, *Dichelacera* (*Dichelacera*) Macquart, *Stenotabanus* (*Stenotabanus*) Lutz, the scape is globose also in *Bolbodimyia* Bigot and *Querbetia* Fairchild. Pedicel with dorsal prolongation occurs in *Cryptotylus* Lutz, *Stibasoma* Schiner, *Phaeotabanus* Lutz, first flagellomere slightly angulate in *Pachyschelomyia* Barreto, *Erioneura* Barreto, *Stenotabanus* Lutz, *Leucotabanus* Lutz, maxillary palpi short and stout as in *Oopelma* Enderlein, *Stibasoma* Schiner, *Stenotabanus* Lutz, mesonotum with longitudinal stripes as *Haematopotina* Coscarón &

Philip, *Eutabanus* Kröber, and *Diachlorus* Osten Sacken. Wing hyaline and smoke-colored as in *Stenotabanus* Lutz, *Agelanius* Rondani, *Dicladocera* Lutz, appendix on R<sub>4</sub> as in *Phaetabanus* Lutz, *Dichelacera* (*Orthostyloceras*) Lutz, *Apatolestes* Williston, abdomen with median longitudinal band as in *Stenotabanus* Lutz, *Haematopotina* Coscarón & Philip, *Nubiloides* Coscarón & Philip.

The Neotropical species of “*Dasybasis*” were monographed by Coscarón & Philip (1967) who recognized five subgenera and 80 species: *Dasybasis* s.str. *Agelanius* Rondani, *Haematopotina* Coscarón & Philip, *Nubiloides* Coscarón & Philip and *Scaptiodes* Enderlein. Coscarón (1961, 1962a, 1962b, 1969, 1972, 1974, 1989) has described additional species from Argentina and Chile. Recently, González (2000) described a new species from Chile. Additional species have been described by Rondani (1863), Surcouf (1919), Hine (1920), Enderlein (1925), and Kröber (1930) to yield a total number of 69 valid species (Fairchild & Burger 1994).

There are no other studies for “*Dasybasis*” in the countries where the genus also occurs, only lists of species. Bequaert & Renjifo (1946) listed *Agelanius columbianus* (Enderlein) (= *D. montium* (Surcouf)) for Colombia. Wilkerson (1979) listed only 2 species in his work from two Departments in Colombia. Wilkerson & Fairchild (1984) listed 20 species for the Tambopata Reservation in Perú. In Ecuador, Fairchild & León (1986) listed 5 species. Coscarón & González (1991) listed 51 species in five subgenera in Chile. Finally, Chainey *et al.* (1994) listed nine species of “*Dasybasis*” in two subgenera for the Department of Santa Cruz, in Bolivia.

Kröber (1934) cataloged the species of “*Dasybasis*” for the first time as *Tabanus* L., subgenus *Agelanius* Rondani. Kröber (*op. cit.*) synonymized *Archiplatius* Enderlein

with *Agelanius*. Kröber (1930), described some species of “*Dasybasis*” in *Tabanus* L., *Stypommisa* Enderlein, *Therioplectes* Zeller, and *Agelanius* Rondani. Fairchild (1971) catalogued the Neotropical species of “*Dasybasis*”. Fairchild & Burger (1994), in a new catalog for the Neotropical species of Tabanidae, proposed some taxonomic changes for the genus. Recently, González (1999) revised the taxon included as subgeneric units of “*Dasybasis*” by Coscarón and Philip (1967) and raised to generic status the taxon *Agelanius* Rondani, *Haematopotina* Coscarón & Philip, *Nubiloides* Coscarón & Philip and *Scaptiodes* Enderlein, based on their morphological differences from “*Dasybasis*”, s.str. Four species formerly included in the genus *Agelanius* Rondani were transferred to the genus *Acellomyia* González.

There are few published phylogenies of the genera within the subfamilies of Tabanidae; Tian-qi (1988) presented a phylogenetic analysis of the subfamilies of Tabanidae. Fanq *et al.* (1999) presented a phylogeny of the family using a characteristics of the mouthparts, Morita (2008) presents the first comprehensive phylogenetic hypothesis for *Philoliche* and Tabanidae based on molecular data. Results of four analyses (Kluge and Farris Method, Nelson & Platnick method, Hennig Method and Farris-Wagner Method) and only analyzed 10 characters of external morphology of adults where after using Stratiomyiidae as the outgroup, he concluded that Pangoniinae plus Chrysopsinae should be treated as a new family, Pangoniidae. This is because categories within the family are not appropriate, leaving then the Tabanidae represented by only three subfamilies; Diachlorinae, Haematopotinae, and Tabaninae. Fang *et al.* (1999) presented a cladistic analysis using mouthpart characters derived from scanning electron microscope studies. More studies using molecular data has been recently published, Weigmann *et al.*, (2000) demonstrate the monophyly of the Tabanidae with each

subfamily recovering as monophyletic. Recently, Lessard et al (2013) proposed the first phylogenetic hypothesis for the tribe Scionini and completing the systematic placement of all tribes in the subfamily Pangoniinae.

The monophyly of the family is not in doubt and have strong support, based on morphological characters (Mackerras 1954; Woodley 1989; Yeates 2002 and molecular evidence (Morita 2008; Weigmann et al., 2000, 2003, 2011).

Sinclair *et al.* (1994) checked male terminalia homologies in lower Brachycera and their implications in the phylogenetic relationships among these groups highlighting, also, the Athericidae + Tabanidae group monophyly, supported by the elongated gonocoxal apodeme and the fusion of the gonocoxites and the hypandrium.

Yeates & Wiegmann (1999) stated that Tabanidae, Pelecorhynchidae, Rhagionidae, Athericidae, and Vermileonidae have been included in the Infraorder Tabanomorpha by the following characters: apomorphic presence of cephalic brush in the larval mandible, retractile larval head, and adults with bulbous and convex clypeus. Stuckenberg (2001) remarked that Tabanidae and Athericidae constitute a highly derived clade.

The relationships within the genus “*Dasybasis*”, as well as those “*Dasybasis*” relative to other genera, are unknown or has been only postulated (Coscarón & Philip 1967), but never subjected to a cladistic analysis. So, an analysis of the groupings within “*Dasybasis*” is presented. The goals of this study were to evaluate the monophyly of “*Dasybasis*”, to redefine this taxon, to establish major monophyletic groups within the genus “*Dasybasis*”, and to determine the phylogenetic relationships among those groups and propose changes to the existing classification of “*Dasybasis*” that more

accurately reflect purported natural affinities.

## Material and Methods

### *Material examined*

Material from the following individuals were examined: Museo de La Plata (MLP, La Plata, Argentina), Instituto de Entomología de Salta (IES, Salta, Argentina), Canadian National Collection (CNC, Ottawa, Canada), Museo Nacional de Historia Natural (MNHN, Santiago, Chile), Museo de Zoología (MZC, Concepción, Chile), Instituto de Agronomía, (IA, Arica, Chile), Instituto de Entomología, Universidad Metropolitana de Ciencias de la Educación (IEUMCE, Santiago, Chile), Colección Miguel Cerda (CMC, Santiago, Chile), Field Museum of Natural History (FMNH, Chicago, USA), Department of Zoology, University of New Hampshire (DZUNH, Durham, USA), Collection Dr. Jaime Buestán (Ecuador), Dr. Alejandro Vera (Chile).

The external morphology was studied from dry pinned specimens, females and males (when available), for characters circumscription. Terminalia were macerated in 10% KOH at approx. 95°C for 6 h to remove soft tissue, then rinsed in distilled water and dilute glacial acetic acid, and dissected in water. Photographs of the flies were taken using a Nikon trinocular stereomicroscope SMZ 1500 and digital camera DS-Fi2. Depth of field was enhanced by Nikon<sup>TD</sup> ACT-2U software stacking multiple images.

### *Terminals*

We used Ninety-two species of “*Dasybasis*” (Neotropical and Australasian). As outgroups, we choose at least one species of *Tabanus* Linnaeus, *Stenotabanus* Lutz, *Agelanius* Rondani, *Haematopotina* Coscarón & Philip, and *Acellomyia* González. five

undescribed species were included in this study to set their generic position. The table with all species analysed, additional material examined, and geographical distribution are in Appendix 1.

### *Morphological Characters*

Sixty-four morphological external and female and male genitalia characters from studied species, were analyzed. Character definitions and morphological data matrix are available in [Appendix 2 and 3](#). Most characters were treated as binary, but some present more than two states (multistate characters). The characters matrix was constructed in Delta (Dalwitz 19XX). Those terminals with unobserved states were scored with “?”.

All characters were treated as nonadditive.

### *Cladistic Analysis*

The search for the most parsimonious trees was carried out in [TNT 1.0 \(Goloboff \*et al.\*, 2008\)](#). We made a cladistic analysis under homoplasy weight using implied weights (Goloboff, 1993). To evaluate the best concavity value a sensitivity analysis was performed (sensu Wheeler, 1995). A Jackknife analysis was performed using character, taxon, and taxon/character deletion with a fix cut value of 36%. Following Goloboff (1997) and Ramirez (2003), we used a reference tree (for further details see , Goloboff *et al.* 2008, and Pinto-Sanchez *et al.*, 2005). The k-values tested range from 1 to 60 in the initial fast search and from 0 to 27 in a most exhaustive search. The initial fast search strategy was a search using RAS+wagner trees+TBR holding 10 trees, with 100 replicates and keeping the best trees for replicates. For the exhaustive search, we changed the number of trees hold to 10 and the number of replicates to 10000. The best value was defined to be the values that recover the most of the groups after the jackknife



(see Ramirez, 2003). Given the best value, the most complete search was made holding 100 trees per replicate, using tree drifting- tree fusing (Goloboff & Farris, 2001), with 1000 replicates.

## Results and discussion

The resolution might imply the value selected using a scaled measure, we prefer to use the raw node count as the measure of stability (contra Ramírez, 2003). As previously reported in other works, concavity parsimony recovers more groups than lineal parsimony (Goloboff, 1997, Ramírez, 2003, Lopardo, 2005, Pinto-Sanchez *et al.*, 2005) (table 1). This behavior is driven from the low number of nodes recovered (Goloboff, *et al* 2008). In the lineal parsimony analysis, the resolution is as low as 30 nodes, while under concavity parsimony the lowest number of recovered nodes is 81 and the most common value is 89 nodes.

The value that recovers most groups after the jackknife is a K value of three. Using this concavity value, we got 27 trees with an of 33.66 (715 steps), the consensus is shown in fig XXX. Given the topology the proposed classification for the species previously treated as “*Dasybasis*” we consider the revalidation of two new genera.

### *Phylogenetics relationships within Dasybasis*

We have decided to designate as “Group of Genera” the monophyletic clades recovered after the analysis, and whose species were previously treated as “Australian *Dasybasis*” by Coscarón & Philip (1967). The sister group of this “Group of Genera” is constituted by “Australian *Dasybasis*” + *Stenotabanus* (*S.*) *incipiens* + “*D.*” *belenensis* + “*D.*” *shannoni* + “*D.*” *schineri* + “*D.*” *cumelafquen*”, in the clade base, supported by two

synapomorphies; basal callus quadrangular (20:0), basal callus without dorsal-median prolongation (24: 1), and six transformations median occipital sclerite wide (3:0), eyes black (4:0), ocular pilosity long (6:2), basal callus touching the eyes, abdominal terga without median band (55:1), and sternite VIII base convex (58:0). Results do not reflect the current classification of “*Dasybasis*”, *Haematopotina* Coscarón & Philip, *Scaptiodes* Enderlein, and *Stenotabanus* (*Stenotabanus*) *sandyi* Gorayeb is shown as member of Neotropical “*Dasybasis*” probably indicating its paraphyletic origin. The inclusion of *Stenotabanus* (*S.*) *incipiens* (Walker) within the Australian species of “*Dasybasis*” could be explained because it corresponds to a non-monophyletic taxon, or that utilized characters in the analysis have been chosen to elucidate the affinities and relationships among the “*Dasybasis*” Neotropical species. Future studies including this taxon will elucidate these questions.

*Burgermyia* gen.n. it is the sister group of remaining taxon (*Pseudoselasoma* + *Archiplatius* + *Taquile* + *Ubertamyia* + *Haematopotina* + *Caspana*), is supported by four transformations: ocular pilosity microscopic (6:0), ocular pilosity scarce (7:0), surface of basal callus smooth (23:1) (with a parallelism with *Gen 6* + *Haematopotina* + *Caspana*), and appendix on R<sub>4</sub> present (52:0) Includes 20 species

The next node shows clades *Pseudoselasoma* + *Archiplatius* + *Taquile* + *Ubertamyia* + *Hametopotina* + *Caspana*, supported by two transformations: frons sides divergent (12:0), and pilosity on the clypeus arrangement central and lateral position (30:1) The clade named as *Pseudoselasoma* is not supported xxxxxxxxx

The next recovered node includes *Archiplatius* + *Taquile* + *Ubertamyia* + *Haematopotina* + *Caspana* + is supported by one transformation: maxillary palpi pilosity long (41:1).

The next node is supported by two transformations maxillary palpi length short (39:1), and maxillary palpi curved (40:0), includes the “Group of Genera” *Archiplatius* + *Taquile* + *Ubertamyia* + *Haematopotina* + *Caspana*. The recovered monophyletic clade is named *Archiplatius* and includes 18 species, supported by two transformations: shape of frons in vertex concave (16:2), and abdominal sternum with median band (56:0).

The next node is supported by three transformations: ocular pilosity short (6:1), ocular pilosity scarce (7:0), and shape of sternite base straight (58:2) includes the “Group of Genera” *Taquile* + *Ubertamyia* + *Haematopotina* + *Caspana*. The first recovered group within this node denominated as *Taquile* is shown as monophyletic. It is supported by two transformations basal callus with dorsal-median prolongation (24:0), and scape pilosity silver-grayish. The *Taquile* is the sister group of clades including *Ubertamyia*, *Haematopotina*, and *Caspana*. It includes 3 species. The second group within this node denominated as *Ubertamyia*. The next node is supported by three transformations: ocular pilosity short (6:1), ocular pilosity scarce (7:0), and shape of sternite base straight (58:2), includes the “Group of Genera” *Taquile* + *Ubertamyia* + *Haematopotina* + *Caspana*. Shape frons sides parallel (12:2), maxillary palpi pilosity length short (41:0), mid-dorsal abdominal triangles absent (54:1), and abdominal sternum with median band (56:0). It is including 8 species.

The next node is supported by four transformations: specimens limite inferior? Y en ambos sexos? up to 10.0mm (1:0), shape of frons in vertex concave (16:2), surface of basal callus smooth (23:1), and pilosity arrangement of the clypeus only lateral (30:0), includes two “Genera” *Haematopotina* + *Caspana* in addition to a monophyletic

“group” that include five species and the genera *Stenotabanus sandyi* and *Scaptiodes gagatina*. The position of “*D. pilifer*” between *St. sandyi* and *Scaptiodes gagatina*

requiere nuevos analices y la incorporación de nuevos caracteres que justifiquen o rechacen su inclusión en este clado

mas bien que caracteres lo incluirían en este clado y cuales no los discutimos DRME

. The first group within this node denominated as *Haematopotina* and is supported by two transformations: scape pilosity whitish (34:2), and genital fork base with basal branches (60:0). The second group is denominated as *Caspana* and is supported by one transformation: basal callus with dorsal-median prolongation (24:0) (parallelism with *Taquile*)

*Taxonomy and generic description.*

### ***Gen.n.1 = Burgermyia***

**Type species:** *Burgermyia trita* (Walker) comb.n.

**Diagnosis:** ocular pilosity microscopic (6:0), ocular pilosity scarce (7:0), surface of callus smooth (23:1), and appendix on R<sub>4</sub> present (52:0). Species length 9.0-15.5 mm; ocular pilosity variable, eyes black or greenish, blueish in *B. chubutensis*, and brown in *B. subtrita* (Coscarón & Philip), basal callus without median-dorsal prolongation, present in *B. tritus*, *B. chubutensis*, *B. excelsior*, and *B. bonariensis*, touching eyes and subcallus except in *B. excelsior*, ocelli vestigial, absent in *B. trigonophora*, *B. ornatissima*, *B. arauca*, *B. boliviame*, *B. vasta*, *B. minor*, and *B. bonariensis*, subcallus pilose, bare in *B. bejeranoi*, *B. chubutensis*, *B. hepperi*, *B. minor*, and *B. bonariensis*, frontal index 1.2-2.6, except in *B. excelsior* with 4.5; antenna bicolored, unicolor in *B. canipilis*, *B. nigra*, and *B. subtrita*. Maxillary palpi elongate, and with short and abundant pilosity, except in *B. vasta*. Mesonotum with variable number of stripes (5, 3

or 2), absent in *B. trigonophora*; wings with clouds or hyaline, smoky in *B. tritus*, *B. subtrita*, and *B. vasta*,  $R_4$  with appendix absent in *B. trigonophora*, and *B. bejeranoi*, sternite VIII base, shape of female cerci, genital fork base variable.

It includes fifteen species *Burgermyia alticola* (Enderlein) comb.n., *B. trigonophora* (Macquart) comb.n., *B. antilope* (Brethes) comb.n., *B. trita* (Walker) comb.n., *B. canipilis* (Kröber) comb.n., *B. nigra* (Enderlein) comb.n., *B. bejeranoi* (Coscarón & Philip) comb.n., *B. chubutensis* (Coscarón) comb.n., *B. hepperi* (Coscarón & Philip) comb.n., *B. excelsior* (Fairchild) comb.n., *B. mendozana* (Enderlein) comb.n., *B. ornatissima* (Brethes) comb.n., *B. schnusei* (Kröber) comb.n., *B. subtrita* (Coscarón & Philip) comb.n., *B. arauca* (Coscarón & Philip) comb.n., *B. boliviame* (Coscarón & Philip) comb.n., *B. vasta* (Coscarón & Philip) comb.n., *B. bonariensis* (Macquart) comb.n., and *B. minor* (Macquart) comb.n..

**Etymology:** Named in honor of Dr. J.F. Burger friend and world specialist in the family Tabanidae.

**Distribution:** ????? (la incluimos??sip y de ser posible mapita, si tienes lat long yo lo puedo dibujar)

## **Gen.2 *Pseudoselasoma* Brethes stat. n.**

*Pseudoselasoma* Brethes, 1910:475. Type-species, *Pseudoselasoma opacum* Brethes (subs. des. Enderlein, 1922:346). Ref. Trojan, 1994c: 161, fig. 72.

**Diagnosis:** Species length 11.0-14.5 mm; eyes pilose, ocular pilosity long and abundant; basal callus without median-dorsal projection, except in *P. chillan*, touching eyes, except in *P. opaca*, and subcallus; frons variable; ocelli vestigial, absent in *P. n.sp.2*; subcallus pilose, frontal index 1.7-2.3; maxillary palpi elongate and with short

and abundant pilosity, sparse in *P. n.sp.2*. Mesonotum with variable number of stripes. Wings hyaline, appendix on R<sub>4</sub> absent, sternite VIII base variable, genital fork base concave and female cerci acuminate.

It includes six species: *P. chillan* (Coscarón) comb.n., *P. opaca* (Brethes) comb.n., *P. pereirai* (Coscarón & Philip) comb.n., *P. pereirai dureti* (Coscarón & Philip) comb.n., *P. n.sp.1*, *P. n.sp.2*

### **Gen.3. Archiplatius stat. n.**

*Archiplatius* Enderlein, 1922: 348 (in key). Type-species, *Tabanus trifarius* Macquart, 1838 (orig. des.) = *Dasybasis* (*Dasybasis*) *chilensis* (Macquart, 1838). Refs. – Trojan, 1994c: 119, fig. 44.

**Diagnosis:** frons in the vertex concave (16:2), abdominal sternum with median band (56:0). Species length 7.5-16.0 mm; eyes pilose, ocular pilosity long, in *A. delpontei*, *A. adornata*, and *A. neogrisescens* short, ocular pilosity abundant, scarce in *A. poroma*; basal callus without median-dorsal projection, except in *A. adornata*, and *A. coquimbo*, touching eyes, except in *A. brethesi*, *A. coquimbo*, *A.n.sp.3*, *A. n.sp. 4*, and *A. delpontei sepiapes*, and subcallus; subcallus pilose; frontal index 1.3-2.2; maxillary palpi short, very short in *A. n.sp.5*, *A. limbativena*, *A. poroma*, *A. bulbula*, *A. fairchildi*, and *A. neogrisescens*, and with long and abundant pilosity, except in *A.n.sp.3* and *A. montium* that is short; wings hyaline, but in *A. montium* *A. penai*, *A. bulbula*, *A. fairchildi*, and *A. neogrisescens* with clouds, appendix on R<sub>4</sub> absent, except in *A. adornata*, *A. limbativena*, *A. poroma*, *A. bulbula*, *A. fairchildi*, and *A. neogrisescens*, sternite VIII base variable, genital fork base concave and female cerci subcircular, but subtrapezoidal in *A. inata*.

It includes eighteen species: *A. chilensis* (Macquart) comb.n., *A. n.sp.3*, *A. n.sp.4*, *A.*

*delpontei sepiapes* (Coscarón & Philip) comb.n. , *A. brethesi* (Coscarón & Philip) comb.n., *A. adornata* (Kröber) comb.n., *A. coquimbo* (Coscarón), comb.n., *A. andicola* (Philippi) comb.n., *A. inata* (Coscarón & Philip) comb.n., *A. montium* (Surcouf) comb.n., *A. hirsuta* (Coscarón & Philip) comb.n., *A. limbativena* (Kröber) comb.n., *A. penai* (Coscarón & Philip) comb.n., *A. poroma* (Coscarón & Philip) comb.n., *A. n.sp.5*, *A. bulbula* (Coscarón & Philip) comb.n., *A. fairchildi* (Coscarón & Philip) comb.n., and *A. neogrisescens* (Coscarón & Philip) comb.n..

#### **Gen.4. Taquile Gen.n.**

Type species: *Taquile colla* (Coscarón), 1969 comb.n.

**Diagnosis:** basal callus with dorsal-median prolongation (24:0), scape pilosity silver-grayish (34:1). Species length 10.0-12.5 mm; eyes pilose, ocular pilosity long and abundant, except in *T. geminata*; basal callus with median-dorsal projection, except *T. geminata*, touching eyes and subcallus; subcallus pilose; frontal index 1.5-1.9; ocelli absent, vestigial in *T. geminata*, maxillary palpi short and with long and abundant pilosity; wings hyaline, appendix on R<sub>4</sub> present, absent in *T. colla*, sternite VIII base variable, genital fork base straight and female cerci variable.

It includes three species: *T. geminata* (Coscarón & Philip) comb.n., *T. albotibialis* (Kröber) comb.n., and *T. colla* (Coscarón) comb.n.

Etymology: *Taquile* word quechua para nominar una de las islas del lago andino Titicaca.

#### **Gen.5. Ubertymyia Gen.n.**

Type species: *Ubertymyia testaceomaculata* (Macquart), 1838 comb.n.

**Diagnosis:** frons parallel or subparallel (12:0), maxillary palpi with short pilosity (41:0),

mid-dorsal abdominal triangles absent (54:1), abdominal sternum with median band (56:0). Species length 9.5-15.0 mm; eyes with short pilosity, absent in *U. albohirta*, *U. persignata*, *U. erynnis*, *U. caprii*, and *U. missionum*; basal callus without median-dorsal projection, present in *U. erynnis*, *U. caprii*, and *U. missionum*, touching eyes, except in *U. albohirta*, *U. persignata*, and *U. erynnis* and subcallus; subcallus bare, except in *U. testaceomaculata longifrons*, and *U. testaceomaculata molestissima*; frontal index 1.6-3.2; maxillary palpi short except in *U. erynnis*, *U. caprii*, and *U. missionum* and with variable pilosity length and abundance, wings hyaline, with clouds in *U. erynnis* appendix on R<sub>4</sub> absent, present in *U. erynnis*, *U. caprii*, and *U. missionum*, sternite VIII base straight and sinuous, genital fork base concave and female cerci quadrangular. It includes eight species: *U. testaceomaculata* (Macquart) comb.n., *U. t. longifrons*, and *U. t. molestissima*, *U. albohirta* (Walker) comb.n., *U. persignata* (Kröber) comb.n., *U. erynnis* (Brethes) comb.n., *U. caprii* (Coscarón & Philip) comb.n., and *U. missionum* (Macquart) comb.m.

Etymology: *uberta* Latin feminine for a fly abundant

## Gen 6 *Stenotabanus* + *Scaptiodes*

### ***Haematopotina* Coscarón & Philip, 1967**

**Type species:** *Chrysozona argentina* Brethes (orig. des.)

**Diagnosis:** scape pilosity whitish (34:2), genital fork base with basal branches (60:0). Species length 6.5-10.0 mm; eyes pilose, basal callus touching the eyes, rectangular, frons parallel or divergent, ocelli absent, except in *H. nigrifrons*, frontal index 0.7-1.8; antennae unicolored, except in *H. nigrifrons*; maxillary palpi short with long pilosity, except in *H. argentina*. Mesonotum with stripes, wings hyaline or with clouds, without appendix on R<sub>4</sub>, sternite VIII with concave base, genital fork with concave base, and



female cerci variable..

It includes four species: *H. nigrifrons* (Philippi) comb.n., *H. argentina* (Brethes), *H. pechumani* Coscarón & Philip.

#### **Gen.4. *Caspana* gen.nov.**

Type species: *Caspana diagueta* (Coscarón), 1989 comb.n.

**Diagnosis:** basal callus with dorsal-median prolongation (24:0). Species length 8.0-14.0 mm; eyes with short and scarce pilosity; basal callus touching eyes and subcallus; subcallus pilose, bare in *C. bruchii*; frons divergent, variable in *C. bruchii*; ocelli absent, present in *C. diagueta*; frontal index 1.6-2.3; maxillary palpi short and with short and scarce pilosity, abundant in *C. fumifrons*, wings hyaline, smoky in *C. fornesi*, appendix on R<sub>4</sub> variable, sternite VIII base variable, genital fork base concave and female cerci variable.

It includes five species: *C. fumifrons* (Coscarón & Philip) comb.n., *C. bruchii* (Brethes) comb.n., and *C. diagueta* (Coscarón) comb.n, *C. elquiensis* (González) comb.n., and *C. fornesi* (Coscarón) comb.n., ..

**Etymology:** *Caspana* palabra quechua antiguo poblado de la cordillera del norte de Chile.

NO SE SI ESTA PARTE QUIZAS PONERLA ANTES DE LA DESCRIPCION  
REDESCRIPCION DE TAXA

The classification of Neotropical species previously treated as “*Dasybasis*” is based on the work of Coscarón & Philip (1967), where they recognized 80 species in five subgenera (*Agelanius* Rondani, *Dasybasis* Macquart, *Haematopotina* Coscarón & Philip, *Nubiloides* Coscarón & Philip and *Scaptiodes* Enderlein). Later, González

(1999) raised *Agelanius* Rondani, *Haematopotina* Coscarón & Philip, *Nubiloides* Coscarón & Philip, and *Scaptiodes* Enderlein to generic rank based on morphological differences from “*Dasybasis*”, also creating a new genus, *Acellomyia*, to include four species previously in *Agelanius* Rondani.

The tree shows that Neotropical “*Dasybasis*” is a paraphyletic taxon *Haematopotina* species, *Scaptiodes* Enderlein, and *Stenotabanus* (*Stenotabanus*) *sandyi* Gorayeb are placed in the “*Dasybasis*” clade. The resulting cladogram Fig. XXXXX, shows that species treated as “*Dasybasis*”, occurring in the Australasian/Oceanian and Neotropical regions, constitute two different monophyletic groups. The clade including the Australasian/Oceanian species used in the analysis (6) is supported by two synapomorphies, apex of spermathecal ducts xxxx (61:xx), and lateral projections of spermathecal ducts (62:xx), and five transformations; subcallus pilosity xxxx (27:xx), scape pilosity xxxxx (34:xx), wings xxxxxx (48:xx), base of VIII sternite (58:xx), and spermathecal ducts xxxxxxxx (63:xx). The clade including the neotropical “*Dasybasis*” species, is considered to be monophyletic and is supported by three transformations: median occipital sclerite (3:xx), basal callus xxxxxx the eyes (22:xx), and female cerci xxxx (57:xx); species are included in different monophyletic clades.

The genus “*Dasybasis*” was erected by Macquart (1847) as a monotypic genus, to include the Australasian species *D. appendiculata* Macquart. The genus exhibits important variation in some characters such as the basicosta, basal callus and color of the integument; and without a synapomorphy defining it, suggesting that MAYBE it COULD BE a paraphyletic taxon.

Our results indicated that “*Dasybasis*” should be restricted to the Australasian/Oceanian

region, leaving the Neotropical species assigned to a different “*Dasybasis*” taxon.

It is clear that species currently included within “*Dasybasis*” need an appropriate tool that may clarify this taxon’s classification, due to the high polymorphism within it. It is also true that the group is taxonomy, and generally in all Tabanidae, is usually just descriptive and not based on cladistic methodology.

The results obtained from our analysis best portrayED the relationships among them, and the classification proposed, we think, clarifies the appropriate taxonomic treatment. However, we recognize that some relationships are not so well supported, although our hypothesis is an initial framework to work into the genus *Dasybasis* and allies. The inclusion of new information (for example, characters of immature stages) could be an acid test of our phylogenetic hypothesis, anyway it might take several years to gather this information, for example the immature stages are known only for twelve “*Dasybasis*” species (González, 2004). Probably, the use of new strategies or methodologies could well resolve appropriately and satisfactorily all our questions. However, our results and proposed hypotheses provide a basis for future investigations using this methodology and attempt to propose a new classification within Tabanidae.

Based on our results, we propose the creation of seven new genera and the revalidation of two taxa (*Archiplatius* Enderlein and *Pseudoselasoma* Brethes), to include those Neotropical species previously treated as “*Dasybasis*”. Thus, we propose the extension of the *Haematopotina* Coscarón & Philip concept and, therefore, the inclusion of *H. fumifrons* (Coscarón & Philip) *comb.n.*, and *H. nigrifrons* (Philippi) *comb.n.*, previously treated as “*Dasybasis*”, which form a monophyletic group.

This study presents the first phylogenetic analysis of “*Dasybasis*” and results show how

“conflictive” is the current classification, and it is evident that the traditional classification was only partially based on natural relationships.

The proposed classification is substantially different from what is usually found within Tabanidae, in which genera have a great number of species and in many cases, several subgenera. The recognition of these seven new genera and the expansion of the *Haematopota* Coscarón & Philip concept performed in this study could be problematic for different family specialists. However, we will have to agree that the use of cladistic hypotheses and their explicit methodology, will help to remove from the classification of the big genera that might be paraphyletic, and that as a result of cladistic analysis, new units can be created. We are aware that there is much work to be done regarding this taxonomic classification and those probably new studies may contribute to making the classification stronger and more stable.

XXXX

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**Table 1.** List of species of tabanids taxon included in this study

<b>Genus</b>	<b>Subgenus</b>	<b>Species</b>	<b>Distribution</b>
<i>"Dasybasis"</i>		<i>adornata</i> (Krober)	Perú
		<i>albohirta</i> (Walker)	Argentina
		<i>albosignata</i> (Krober)	Argentina
		<i>albotibialis</i> (Krober)	Peru
		<i>alticola</i> (Enderlein)	Argentina
		<i>andicola</i> (Philippi)	Argentina, Chile
		<i>antilope</i> (Brethes)	Argentina
		<i>arauca</i> Coscarón & Philip	Chile
		<i>arica</i> Coscarón & Philip	Chile
		<i>barbata</i> Coscarón & Philip	Chile
		<i>bejeranoi</i> Coscarón & Philip	Argentina
		<i>belenensis</i> Coscarón & Philip	Chile
		<i>bolivame</i> Coscarón & Philip	Bolivia
		<i>bonariensis</i> (Macquart)	Argentina
		<i>brethesi</i> Coscarón & Philip	Argentina
		<i>bruchii</i> (Brethes)	Argentina, Chile
		<i>bulbiscapens</i> Coscarón & Philip	Perú
		<i>bulbula</i> Coscarón & Philip	Bolivia, Chile
		<i>canipilis</i> (Krober)	Argentina
		<i>caprii</i> Coscarón & Philip	Argentina
		<i>chilensis</i> (Macquart)	Argentina, Chile
		<i>chillan</i> Coscarón	Chile
		<i>chubutensis</i> Coscarón	Argentina
		<i>colla</i> Coscarón	Argentina
		<i>coquimbo</i> Coscarón	Chile
		<i>cumelafquen</i> Coscarón	Argentina
		<i>delpontei</i> Coscarón & Philip	Argentina
		<i>delpontei sepiapes</i> Coscarón & Philip	Chile
		<i>diaguita</i> Coscarón	Argentina
		<i>elquiensis</i> González	Chile
		<i>erynnis</i> (Brethes)	Argentina
		<i>excelsior</i> Fairchild	Ecuador

		<i>fairchildi</i> Coscarón & Philip	Argentina, Perú
		<i>fornesi</i> Coscarón	Argentina
		<i>frequens</i> (Krober)	Bolivia, Perú
		<i>fumifrons</i> Coscarón & Philip	Argentina
		<i>geminata</i> Coscarón & Philip	Perú
		<i>hepperi</i> Coscarón & Philip	Argentina
		<i>hirsuta</i> Coscarón & Philip	Chile
		<i>inata</i> Coscarón & Philip	Chile, Perú
		<i>kroeberi</i> Coscarón & Philip	Chile, Perú
		<i>kroeberi picea</i> Coscarón & Philip	Chile
		<i>limbativena</i> (Krober)	Perú
		<i>maletecta</i> (Bigot)	desconocida
		<i>mendozaana</i> (Enderlein)	Argentina
		<i>minor</i> (Macquart)	Argentina, Uruguay
		<i>missionum</i> (Macquart)	Argentina, Brazil
		<i>montium</i> (Surcouf)	Bolivia, Colombia, Ecuador, Venezuela
		<i>neogrisescens</i> (Krober)	Perú
		<i>nigra</i> (Enderlein)	Argentina, Chile
		<i>nigrifemur</i> (Krober)	Chile
		<i>nigrifrons</i> (Philippi)	Argentina, Chile
		<i>opaca</i> (Brethes)	Argentina
		<i>ornatissima</i> (Brethes)	Argentina
		<i>pallipes</i> (Krober)	Argentina, Bolivia
		<i>penai</i> Coscarón & Philip	Chile
		<i>pereirai</i> Coscarón & Philip	Argentina, Chile
		<i>pereirai dureti</i> Coscarón & Philip	Argentina, Chile
		<i>persignata</i> (Krober)	Argentina, Bolivia
		<i>pilifer</i> (Krober)	Chile
		<i>poroma</i> Coscarón & Philip	Bolivia
		<i>pruinivitta</i> (Krober)	Argentina, Chile
		<i>punensis</i> (Hine)	Bolivia, Chile, Perú
		<i>schineri</i> (Krober)	Colombia, Ecuador, Venezuela
		<i>schnusei</i> (Krober)	Perú

		<i>senilis</i> (Philippi)	Chile
		<i>shannoni</i> (Krober)	Argentina, Chile
		<i>subtrita</i> Coscarón & Philip	Argentina
		<i>testaceomaculata</i> (Macquart)	Argentina, Chile
		<i>testaceomaculata longifrons</i> (Kröber)	Chile
		<i>testaceomaculata molestissima</i> (Philippi)	Chile
		<i>trigonophora</i> (Macquart)	Argentina, Uruguay
		<i>tritus</i> (Walker)	Argentina, Chile
		<i>vasta</i> Coscarón & Philip	Argentina
		<i>n.sp.1.</i>	Chile
		<i>n.sp.2.</i>	Chile
		<i>antillanca</i>	Chile
		<i>n.sp.4.</i>	Chile
		<i>collagua</i>	Chile
		<i>appendiculata</i> Macquart	Australia
		<i>dixoni</i> Ferguson	Australia
		<i>dubiosa</i> Ricardo	Australia
		<i>gentilis</i> Erichson	Australia
		<i>nemopunctata</i> Ricardo	Australia
		<i>trilinealis</i> Ferguson & Henry	Australia
<i>Stenotabanus</i> Lutz	<i>Stenotabanus</i> Lutz	<i>sandyi</i> Gorayeb	Brazil
		<i>incipiens</i> (Walker)	Guatemala to Bolivia, Argentina, Brazil
<i>Scaptiodes</i> Enderlein		<i>gagatina</i>	Argentina, Chile
<i>Tabanus</i> Linneaus		<i>importunus</i> Wiedemann	Brazil, Bolivia, Panama, Perú
<i>Agelanius</i> Rondani		<i>meridiana</i> Rondani	Argentina, Chile
<i>Haematopotina</i> Coscarón & Philip		<i>argentina</i> (Brethes)	Argentina
		<i>argentina calchaqui</i> Coscarón & Philip	Argentina, Bolivia
		<i>pechumani</i> Coscarón & Philip	Chile, Perú

**Appendix 1.** Description of characters used in the cladistics analysis of neotropical species of ??*Dasybasis* ?

**Characters and observations**

1. < Specimen length >/

- 0) Small up to 10.0
- 1) Medium 10.5 to 13.0
- 2) Large 13.5 more

2. < Pruinosity in frons, gena, and subcallus >/

- (0) present
- (1) absent

Pruinosity of the head is common in different taxa of the Diachlorini and also in Tabaninae. The plesiomorphic condition is found in all “*Dasybasis*” species. The derived state for this character, in this study, is only present in *Scaptiodes gagatina* (Philippi) and within Diachlorini, for example, in *Eristalotabanus violaceus* Kröber

3. < Median occipital sclerite >/

- (0) wide, very wide
- (1) narrow

There is no precedent in the Tabanidae literature, using of this character to separate the different groups. In the studied “*Dasybasis*” species the character is present in its plesiomorphic condition; wide occipital median sclerite (very wide). The derived state is present only in “*D.*” *excelsior* Fairchild, that (what) would support its treatment as a different “*Dasybasis*” unit and in the *Agelanius* Rondani y *Tabanus* Linnaeus outgroups.

4. < Eyes color>/

- (0) black
- (1) greenish
- (2) blueish



(3) brown

The plesiomorphic condition of the character is a transformation that supports all the groups and taxon within “*Dasybasis*”.

5. < Ocular pilosity >/

(0) absent

(1) present

This is a polymorphic character within the different genera of Diachlorini. Pilose eyes are found in the genera *Eristalotabanus* Kröber, *Dasychela* (*Dasychela*) Enderlein, *Agelanius* Rondani, *Dicladocera* Lutz; and eyes bare are in *Stenotabanus* Lutz, *Teskeyellus* Philip & Fairchild, *Anaerythrops* Barreto. “*Dasybasis*” species have both states, although the eyes pilose condition occurs in most species and bare eyes occur in eight species of “*Dasybasis*” (*albohirta* (Walker), *bejeranoi* (Coscarón & Philip), *bonariensis* (Macquart), *caprii* (Coscarón & Philip), *erynnis* (Brethes), *maletecta* (Bigot), *missionum* (Macquart) and *persignata* (Kröber))

6. < Ocular pilosity length >/

(0) microscopic

(1) short

(2) long

This character is widely polymorphic within Tabanidae, and different states can be found within the same genera, for instance *Agelanius* Rondani. Among “*Dasybasis*” species, this character is also polymorphic.

7. < Ocular pilosity abundance>/

(0) scarce

(1) abundant

Polymorphic character within Tabanidae, and in “*Dasybasis*”.

## 8. &lt; Ocular band&gt;/

(0) present

(1) absent

This character is polymorphic within all Tabanidae, varying also in its arrangement and number. Thus, for example, in *Myiotabanus barreto* Fairchild, *Phaeotabanus limpidapex* (Wiedemann) only one or more than one band occurs as in *Dichelacera (D.) transposita* (Walker), *Diachlorus flavitaenia* Lutz, and *Stenotabanus (Stenotabanus) littoralis* Coscarón. Within “*Dasybasis*” the character is also polymorphic, although the derived state ocular band absent is more frequent; in *S. boliviame* (Coscarón & Philip), the character is polymorphic.

## 9. &lt; Number of ocular bands&gt;/

(0) without bands

(1) with bands

## 10. &lt; Ocular margin in vertex&gt;/ TENGO DIBUJO CON LOS ESTADOS. OK.....fig. 5

(0) present

(1) absent

The ocular margin occurs in most “*Dasybasis*” species. Reversions and absences are present in *A. chilensis* (Macquart), “*D.*” *excelsior* Fairchild, *Nubiloides* Coscarón & Philip, *Tabanus* Linnaeus, and *Di cladocera* Lutz. Trojan (1994) and González (1999) to characterize Diachlorini taxa have used this character.

## 11. &lt; Shape of ocular margin &gt;/

(0) parallel

(1) convergent

There are no antecedents of the use of this character to differentiate the Diachlorini taxon; except in the work of González (1999). However, in all “*Dasybasis*” species studied the character is displayed in its plesiomorphic condition: parallel

ocular margin. The character derived condition is shown only in *Haematopotina* Coscarón & Philip.

12. < Shape of frons sides >/

- (0) divergent/
- (1) convergent/
- (2) parallel, subparallel

13. < Frons pilosity lenght>/

- (0) long
- (1) short

14. < Frons pilosity color>/

- (0) whitish
- (1) black
- (2) brown

15. < Frons>/

- (0) with median groove/
- (1) without median groove/

The character's plesiomorphic condition, frons with median groove, occurs only in *Scaptiodes gagatina* (Philippi); the derived condition is common to all studied "*Dasybasis*" species.

16. < Shape of frons in vertex>/

- (0) convex
- (1) strait
- (2) concave

There is no precedents in the literature regarding the use of this character for the differentiation of Tabanidae. In "*Dasybasis*" species, the character is polymorphic.

17. <Band of pruinosity in frons

(0) present/

(1) absent/

Most “*Dasybasis*” species display the character’s plesiomorphic state (without pruinose band on frons). The derived condition is present only in *H. schineri* (Kröber), and in *Haematopotina* Coscarón & Philip.

18. < Frontal index>/

(0) up to 2.9

(1) 3 to 5

(2) 5.1 or more

This character is often used to characterize the different taxa within the family, and also for “*Dasybasis*” Macquart, with < 2.9 the most frequent value within the taxon. The frontal index 4.5 of “*D.*” *excelsior* is shown differently as found within “*Dasybasis*”. This character, in addition to others, its external position and association to the Australian “*Dasybasis*” species in the cladogram would support its treatment under a different taxon from “*Dasybasis*”.

19. < Frontal callus presence>/

(0) present/

(1) reduced

(2) absent/

Frontal callus present is observed in all “*Dasybasis*” species studied, although in *S. opaca* it can be reduced or absent. Within Diachlorini the frontal callus present condition is the most generalized one, although in *Chlorotabanus parviceps* (Kröber) the callus is absent.

20. < Shape of frontal callus>/

- (0) quadrangular/
- (1) triangular/
- (2) ovoid
- (3) keel-shaped

A common characteristic of tabanid flies is the presence of the frontal callus, which can be variable within the different groups of the family. In “*Dasybasis*” this character is polymorphic, and is polymorphic in some species (*Ubertamyia testaceomaculata* (Macquart), *U. testaceomaculata molestissima* (Philippi)).

21. < Frontal callus>/

- (0) touching the subcallus/
- (1) not touching the subcallus/

In most Diachlorini, and in other tribes too, the frontal callus touches the subcallus, a plesiomorphic condition that is observed in multiple times in this study

22. < Frontal callus>/

- (0) touching the eyes/
- (1) not touching the eyes/

In different Diachlorini taxa, the frontal callus occupies the whole frons width, and therefore is contiguous with the eyes. This is observed, for instance, in *Stenotabanus* (*Phorcotabanus*) *cinereus* (Wiedemann), *Stibasoma* (*Stibasoma*) *theotaenia* (Wiedemann) y *Dichelacera* (*Dichelacera*) *fuscipes* Lutz. In other taxa, *Catachlorops* (*Rhamphidommia*) *muscosus* (Enderlein), *Lepiselaga* (*Lepiselaga*) *crassipes* (Fabricius), and *Eutabanus pictus* Kröber, the frontal callus is not contiguous with the eyes. In most “*Dasybasis*” species the frontal callus occupies practically the whole frons width and reaches the eyes.

In *U. testaceomaculata* the character is polymorphic. In its plesiomorphic state, this character supports all taxa including species previously treated as

“*Dasybasis*” + *Haematopotina* Coscarón & Philip, now reunited in several genera.

23. < Surface of callus>/

(0) rugose/

(1) smooth/

This character is polymorphic within “*Dasybasis*” species and in the outgroups used in this study.

24. < Frontal callus>/

(0) with dorsal-median prolongation/

(1) without dorsal-median prolongation /

Most of “*Dasybasis*” species display a rounded frontal callus, without ornamentation or rugosity as in other Tabanidae species.

25. <Ocelli>/

(0) present/

(1) absent/

The absence of the ocelli was used by Fairchild (1969) to characterize the Neotropical Tabaninae, although it can also occur in some Diachlorini, for example *Scaptiodes gagatina* (Philippi) and *Agelanius* Rondani species. In “*Dasybasis*” species this character is highly polymorphic.

26. < Ocelli state>/

(0) vestigial/

(1) functional, developed/

In “*Dasybasis*” Macquart species, this character occurs just in the plesiomorphic state, vestigial. Functional/developed ocelli are only observed in *Scaptiodes gagatina* (Philippi).

27. < Subcallus pilosity>/

(0) present/

(1) absent/

This character is polymorphic within the different “*Dasybasis*” Macquart species; and within the outgroups used. The subcallus pilosity occurs only laterally and is sparse in the different “*Dasybasis*” species studied. In the Australasian “*Dasybasis*” pilosity on the subcallus is absent, except in “*D.*” *appendiculata* Macquart.

28. < Longitudinal suture of the subcallus>/

(0) present/

(1) absent/

There is no precedent in the literature about the use of this character within Tabanidae. In all “*Dasybasis*” species studied, the plesiomorphic condition occurs: longitudinal suture of the subcallus present; it occurs in the derived condition in one of the outgroups used (*Stenotabanus* Lutz).

29. frontoclypeal pilosity/

(0) present/

(1) absent/

30. < Pilosity arrangement of the frontoclypeus >/

(0) lateral/

(1) central and lateral/

The pilosity arrangement on the frontoclypeus has not been used as a diagnostic character within tabanid taxonomy. The centrally and laterally covered pilosity state in the frontoclypeus constitutes a transformation that supports all taxa previously treated as “*Dasybasis*” + *Haematopotina* species, now in several

genera. However, this character is polymorphic in the different “*Dasybasis*” species.

31. < Antenna color>/

(0) bicolored/

(1) unicolored/

32. < Type of scape>/

(0) globose, semiglobose/

(1) not globose/

The plesiomorphous state, globose, semiglobose scape, is polymorphic within Diachlorini and occurs in *Bolbodimyia lateralis* Kröber, *Querbetia bequaerti* Fairchild and *Holcopsis fenestrata* Enderlein. “*Dasybasis*” species show derived non-globose and semiglobose states.

33. < Scape pilosity length>/

(0) short /

(1) long/

The character is polymorphic in different “*Dasybasis*” species. It also occurs in three of the outgroups used.

34. < Scape pilosity color>/

(0)black/

(1) silver-grayish /

(2) whitish /

35. <Pedicel>/

(0) with dorsal projection/

(1) without dorsal projection/



This character, like others, is extremely polymorphic within “*Dasybasis*” species. It is also found in *Agelanius* Rondani, although the plesiomorphous condition is more frequent in the remaining outgroups used.

36. Pedicel dorsal projection length/

(0) long/

(1) short/

37. < Basal flagellomere >/

(0) with dorsal tooth/

(1) without dorsal tooth/

In “*Dasybasis*” species, the derived condition, basal flagellomere without dorsal tooth, is common to all of them. The basal flagellomere with dorsal tooth occurs in two of the outgroups used (*Tabanus* Linnaeus and *Nubiloides* Coscarón & Philip).

38. <Basal flagellomere>/

(0) not angular/

(1) angular/

This character is polymorphic in the species studied. The character state, basal flagellomere angular, is most frequent within “*Dasybasis*” species, except in “*D. excelsior*”. However, the not angular state also occurs in “*Dasybasis*” species.

39. < Maxillary palpi length>/

(0) elongated/

(1) short/

(2) very short/

The maxillary palpi short is common in an important group of “*Dasybasis*” species, the transition to state 2 (maxillary palpi very short) supports *Globulicornus*.

40. < Maxillary palpi curvature>/

(0) curved/

(1) not curved/

Within “*Dasybasis*” it is a polymorphic trait.

41. < Maxillary palpi pilosity length>/

(0) short/

(1) long/

42. < Maxillary palpi pilosity density>/

(0) sparse/

(1) dense/

43. < Maxillary palpi pilosity color >/

(1) black/

(2) whitish/

(3) yellowish/

44. < pruinose stripes on mesoscutum >/

(0) present/

(1) absent/

The presence of longitudinal pruinose stripes on the mesoscutum is the plesiomorphous condition, observed in four of the outgroups used in the analysis. The plesiomorphous condition is a transition to the state (1) that supports all groups and taxa within “*Dasybasis*”.

45. < Number of mesoscutum bands >/

(4) up to 3

(5) 4 or more

46. <Shape of prescutellum>/

- (0) triangular/
- (1) bell-shaped/

There are no precedents in the literature regarding the use of this trait within Tabanidae.

The plesiomorphous condition, prescutellum triangular, is occurs in the “*Dasybasis*” species studied, whereas the derived condition, prescutellum bell-shaped, is recognized in one of the outgroups (*Nubiloides* Coscarón & Philip) used in the analysis,.

47. <Halteres color>/

- (0) dark brown, grayish brown, brown, reddish brown, yellowish brown, light brown/
- (1) dark gray, grayish/
- (2) orange, yellowish, reddish/
- (3) whitish/

48. <Wings>/

- (0) hyaline/
- (1) with clouds/
- (2) smoky/

The transformation, wings hyaline, supports all taxa including all species previously treated as “*Dasybasis*” + *Haematopotina*, now in several genera. The transition to state 1, wings with clouds, supports *Haematopotina* + *Globulicornis*

49. <Basicosta>/

- (0) setulose/
- (1) bare/

A polymorphic trait within all Tabaninae, as pointed out by Fairchild (1969) with intermediate states between setae absent and present. In “*Dasybasis*”, most species have the derived state basicosta bare, whereas the plesiomorphous trait, basicosta setulose, is present only in *A. belenensis* Coscarón & Philip, “*D. excelsior* Fairchild (a taxon that is as basal, and far removed from all relationships with neotropical “*Dasybasis*” species), *S. ornatissima* (Brethes), *H. schineri* (Kröber)(species polymorphic for this trait), also setae present in the outgroup used, *Dicladocera* Lutz.

50. <Subcosta>/

(0) setulose

(1) bare/

This character, in its plesiomorphous state, it is found in most “*Dasybasis*” species and also in two genera from the outgroups (*Agelanius* Rondani and *Dicladocera* Lutz) included in this study. However, the derived condition is only observed in *A. brethesi* (Coscarón & Philip), *A. geminata* (Coscarón & Philip), *G. poroma* (Coscarón & Philip), and in *Haematopotina* Coscarón & Philip.

51. <Vein R<sub>1</sub>>/

(0) with several rows of setae /

(1) with only one row of setae/

This trait has not been used to differentiate Tabanidae taxa. However, González (1999) uses it to separate the genera previously included in “*Dasybasis*” by Coscarón & Philip (1967). All species studied show the plesiomorphous condition: several rows of setae on dorsal surface of R<sub>1</sub>. The derived condition is found only in *Haematopotina* Coscarón & Philip.

52. <Appendix on R<sub>4</sub>>/

(0) present/

(1) absent/

This character was often used in “*Dasybasis*” taxonomy by Coscarón & Philip (1967) and other authors to differentiate Diachlorini taxa (Trojan, 1994). It is polymorphic within the different Diachlorini genera. Within “*Dasybasis*” species the trait is polymorphic. Within outgroups used in this study the derived trait, appendix absent on R<sub>4</sub>, is common although in *Agelanius* Rondani it is polymorphic.

53. <Vein CuA<sub>2</sub>>/

(0) bare/

(1) setulose/

The plesiomorphous condition for this character is observed in all “*Dasybasis*” species, but is not present in “*D.*” *excelsior*, which supports, along with other characters, its being treated as a different entity than “*Dasybasis*”. The derived condition is observed among *Tabanus* Linnaeus and *Scaptiodes* Enderlein taxa used in this study.

54. <Mid-dorsal abdominal triangles>/

(0) present/

(1) absent/

55. <Abdominal terga>/

(0) with median band/

(1) without median band/

This character is polymorphic within the species included in “*Dasybasis*”. The derived character condition, abdominal terga without median band, is observed in *Agelanius* Rondani and *Dicladocera* Lutz.

56. <Abdominal sternum>/

(0) with median band/

(1) without median band/

There is no precedent for the use of this character in the taxonomy of Diachlorini taxa. The trait is polymorphic within the different “*Dasybasis*” species. This character in its plesiomorphous condition, abdominal sterna with median band, supports all taxa including all species previously treated as “*Dasybasis*” + *Haematopotina* Coscarón & Philip now placed in several genera.

57. <Shape of female cerci>/

- (0) quadrangular/
- (1) subcircular/
- (2) acuminate/
- (3) subtrapezoidal/
- (4) subrectangular/

58. <Shape of sternite VIII base >/

- (0) convex/
- (1) concave/
- (2) straight/
- (3) sinuous/

Different structures of female Tabanidae genitalia, have served as a basis to define and characterize the different subfamilies (Mackerras 1955). Within this study, *Agelanius* Rondani, *Nubiloides* Coscarón & Philip, and *Stenotabanus* Lutz, are polymorphic for this character.

59. <Genital fork base>/

- (0) concave or strongly concave /
- (1) convex/
- (2) straight/

It is also a polymorphic trait within “*Dasybasis*” species. It occurs in its plesiomorphous state within the different outgroups.

60. <Genital fork base>/

(0) with basal branches/

(1) without basal branches/

This character is polymorphic within the “*Dasybasis*” species studied, being more frequent in the plesiomorphous states; genital fork base with basal branches. The trait is also polymorphic in the outgroups.

61. <Apex of spermathecal ducts >/

(0) without lateral expansion/

(1) with little expansion/

(2) with developed expansion/

This character occurs in its plesiomorphous condition only in *Haematopotina* Coscarón & Philip; whereas in all “*Dasybasis*” species the derived condition occurs, with small or developed expansions of the spermathecal ducts.

62. <Lateral projections of spermathecal ducts>/

(0) presents/

(6) absent/

63. <Spermathecal ducts>/

(0) short/

(1) long/

This character was mentioned by González (1999) to characterize and differentiate taxa associated with *Dasybasis* treated by Coscarón & Philip (1967) as *Dasybasis* subgenera. The character state, short spermathecal ducts, supports all taxa including all species previously treated “*Dasybasis*” + *Haematopotina* now placed in several genera. The derived condition, long spermathecal ducts, occurs in *Agelanius* Rondani, *Nubiloides* Coscarón & Philip, *Tabanus* Linnaeus, *Scaptiodes* Enderlein, *Dicladocera* Lutz and *Stenotabanus* Lutz outgroups.

64. <Gonostyli>/

1. acuminate distally /

2. truncate distally /

**Appendix 2.** Morphological character data for the species used in the cladistic analysis of neotropical ??*Dasybasis*. ? data matrix

FALTAN DATOS



