

Synonymy of *Anopheles (Nyssorhynchus) noroestensis*
with *An. (Nys.) evansi*, with a Description of
the Male Genitalia of the Lectotype of *An.*
(Nys.) evansi (Diptera: Culicidae)¹

by

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ABSTRACT. *Anopheles (Nyssorhynchus) noroestensis* Galvao and Lane is synonymized with *An. (Nys.) evansi* (Brethes) based on the morphological comparison of the respective male genitalia of the lectotypes of these nominal species. The male genitalia of *An. evansi* is described and illustrated.

In a discussion concerning the valid name for the species currently recognized as *Anopheles (Nyssorhynchus) strodei* Root (Faran 1980:129-130), I considered *An. (Nys.) evansi* (Brethes) as a nomen dubium and no longer the senior synonym of *strodei*. I concluded after reading Brethes' descriptions (1926a,b) and papers by Davis (1928:549-550), Lima (1928:100-102), Shannon and Del Ponte (1928:54), Bejarano (1957:336), Gabaldon (1949:765) and Belkin *et al.* (1968:10), that there was considerable circumstantial evidence that *evansi* should not be considered a synonym of *strodei*, and that *evansi* was possibly the senior synonym of *An. (Nys.) noroestensis* Galvao and Lane.

Brethes (1926a) described (in French) *Cellia evansi*, based on the male genitalia from material sent to him by N. C. Davis, collected in Tucuman, Argentina. In another paper, Brethes (1926b) redescribed (in Spanish) *evansi* and included a mislabelled, poorly drawn illustration of the male genitalia. These descriptions of *evansi* are very general and pertain to characters shared by most of the species in the Albimanus Section. Based on these descriptions and on the illustration of the male genitalia, it has not been possible to correlate Brethes' male genitalia with that of any currently recognized species in the subgenus *Nyssorhynchus*. Nevertheless, in Brethes' illustration, the ninth sternum is broad, the apex of what appears to be the ventral lobe of the claspette is spiculate and not laterally expanded, and the aedeagus appears somewhat apically truncate: all of these characters are consistent with those of *noroestensis* and differ from those of *strodei*. Casal (*in* Belkin *et al.* 1968:10) designated a lectotype male genitalia for *evansi*; unfortunately, this specimen previously was unavailable to me for study.

Recently on a visit to the U.S., R. A. Ronderos kindly brought with him the lectotype male genitalia of *evansi*. O. P. Forattini also most generously

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loaned to me the lectotype male genitalia of *nordestensis*. After a careful study of these two specimens I am synonymizing *An. (Nys.) nordestensis* with *An. (Nys.) evansi*. Therefore, the valid name for what was recognized as *nordestensis* in the revision of the Albimanus Section (Faran 1980:67-75) is now *evansi*.

The terminology used to describe the lectotype male genitalia of *evansi* follows Harbach and Knight (1980) and Faran (1980).

Anopheles (Nys.) evansi (Brethes)

Fig. 1

For a more complete synonymy refer to Faran (1980:67-68) under *nordestensis*.

1926. *Cellia evansi* Brethes 1926a:106-107. TYPE: Lectotype male genitalia slide with following labels "Cellia Evansi Brethes/=tarsimaculata auct/ (nec Goeld) [in brown ink]/384 [in Del Ponte's hand in black pencil]/ LECTOTYPUS [printed on pink rectangle]/Tucuman/N.C. Davis ded./III. 1926/Pr: micr. Rn. M. [in brown ink] DP14 [in Del Ponte's hand in black pencil]//Dipt. 17 [typed on small rectangle]//DP 14/=? nordestensis G. y L. 1938 [in Del Ponte's hand in black ink]/Tipo de *evansi*/DP [signature in black pencil] DP [signature in ink]." Described from Tucuman, Argentina, ?Mar 1926, N. C. Davis [BA; designation of Casal in Belkin *et al.* 1968:10]. RESURRECTED FROM NOMEN DUBIUM.
1937. *Anopheles (Nyssorhynchus) oswaldoi* var. *nordestensis* Galvao and Lane 1937:220-221. TYPE: Lectotype male genitalia slide with following labels, "Holotipo/Anopheles (N)/oswaldoi/nordestensis/Galvao e Lane, / 1938 [in ink]//LECTOTYPE [printed]/Anopheles 37/nordestensis G. y L./ By B., S. & H., 71 [pink lectotype label, black ink in Belkin's hand]// N^o. 10.293/Lamina 2.117/Divis^o 2/Gaveta 171 [numbers in black ink on printed label]//Microf/N^o. 343/Nt. 176-2/03-227/Novo Oriente, S.P./ Galv^o e Corr^{ea}/Col. 1937 [in black ink]//Mesosoma dissecado/por A.L.A. Galv^o, peran/re J. Lane e O. Unti/em 5.12.1942/Vida Livro Registro/ [?] Ayroza Galvao [signature in ink]." Adult apparently lost (possibly syntype FMSP, 373), Novo Oriente [Pereira Barreto], near Lussanvira (Sao Paulo), Brazil [FH; designation by Belkin *et al.* 1971:6]. NEW SYNONYMY.
1937. *Anopheles (Nyssorhynchus) oswaldoi* var. *metcalfi* Galvao and Lane 1937: 218-220. TYPE: Lectotype male (96) with genitalia on slide (710210-1), Porto das Caixas (Rio de Janeiro), Brazil, 29 May 1925, F.M. Root; one of several specimens identified as *tarsimaculatus* by Root (1926:711), on which Galvao and Lane based their *metcalfi* [USNM; designation by Belkin *et al.* 1971:6]. NEW SYNONYMY.
1940. *Anopheles (Nyssorhynchus) oswaldoi* (!) var. *ayrozai* Unti 1940:379-383. TYPE: Syntypes female(s), larva(e), eggs, Vale do Rio Paraiba, Guaratingueta (Sao Paulo), Brazil, Nov 1939-Aug 1940 [NE; not in FH or SPM, Belkin *et al.* 1971:6]. Synonymy with *nordestensis* by Galvao, *et al.* (1944:39). NEW SYNONYMY.

1942. *Anopheles (Nyssorhynchus) clarki* Komp 1943:197-201. TYPE: *Holotype* dissected male genitalia mounted on slide, Monteros (Tucuman), Argentina, Jun 1940, C. A. Alvarado [USNM, 56476; male apparently lost]. NEW SYNONYMY.

MALE GENITALIA OF LECTOTYPE (fig. 1). The male genitalia of the lectotype of *evansi* is in poor condition. It is mounted on a slide in (?) balsam with the morphological dorsal surface up. *Segment VIII*: Most scales and setae missing. Tergum medially with long, narrow, lightly sclerotized obovate scales; scales along caudal and caudolateral margins broader and more strongly sclerotized than medial scales. Sternum with long, moderately broad, obovate scales, lightly to moderately strongly sclerotized. *Segment IX*: Subtriangular or subtrapezoidal, moderately long, 0.2 length of gonocoxite. Anterior apodeme long, about 0.3 length of sternum, subtrapezoidal. *Gonocoxite*: Moderately narrow and subconical, 0.35 mm long. Tergal surface with 4,5 long tergomedial setae or alveoli and (?) 1 subapicolateral seta; 3 alveoli for setae mesad of tergomedial setae. Tubercle of parabasal seta slightly less than 0.5 length of parabasal seta. Basal apodeme difficult to discern, about 0.2 length of gonocoxite. Longer, more dorsal, accessory seta about 0.5 length of gonocoxite; shorter, more ventral seta 0.77 length of dorsal seta. Internal seta slightly longer than shorter accessory seta, moderately retrorse apically. *Gonostylus*: Slightly shorter than gonocoxite. Gonostylar claw long. *Dorsal Lobe of Claspette (Dorsal Claspette)*: Pedicel (base) moderately broad, sinuous; basally rounded. Leaflets (apical setae) about 0.5 length of claspette, basomesal projection of dorsal leaflet not visible. *Ventral Lobe of Claspette (Ventral Claspette)*: Badly damaged and rotated. Roughly about 0.35-0.40 length of gonocoxite. Lateral margins appearing to taper toward apex, width at apex slightly wider than aedeagus. Basal lobule not clearly discernible. Lateral surfaces (exclusive of basal lobule) with short spicules about 0.5 width of aedeagus; spicules extending to apex. Apex with lateral margin of one side rounded; opposite side not rounded due to apparent rotation of claspette on anterior-posterior axis; shallow median sulcus weakly evident. Preapical plate distinct, almost circular, moderately large and heavily sclerotized. Transparent membranous area and refringent structure not discernible. *Phallosome*: Damaged. Aedeagus about 0.5 length of gonocoxite; apex appearing weakly rounded; leaflets absent.

DISCUSSION. The male genitalia of the lectotype of *noroestensis*, although illustrated in figure 1, is not described because it is essentially the same as that described for *noroestensis* by Faran (1980).

In deciding if the lectotype of *evansi* and the lectotype of *noroestensis* represent the same currently recognized species, a careful comparison was made of their male genitalia. Particular attention was given to the dorsal claspette, ventral claspette and aedeagus as these structures differ among the closest relatives (depending on the species) of the latter nominal taxa. The dorsal claspette of both lectotypes were very similar. The "pedicels" (bases of dorsal claspettes) were moderately broad and sinuous, more broad and sinuous than in either *oswaldoi*, *galvaoui* or *aquasalis*. As mentioned in the above description, the ventral claspette of the lectotype of *evansi* is very badly damaged; however, the preapical plate and the

length of spicules on the lateral margins of the ventral claspette are similar to those of the lectotype of *noroestensis*. The aedeagus of this lectotype is damaged and the apex is distorted (fig. 1), and, because of this, it is difficult to determine the dimensions of the apex of the aedeagus. Notwithstanding, the apex is distinctly broader than long and is weakly rounded, which corresponds to the aedeagus of the lectotype of *noroestensis*. The latter characters are considered derived (apomorphic) and have been used to hypothesize phylogenetic relationships between *noroestensis* and its sister species *galvaoui*, and their monotypic sister group of *oswaldoi*. Because the lectotypes of *evansi* and *noroestensis* share the unique combination of these derived characters, I am considering them conspecific.

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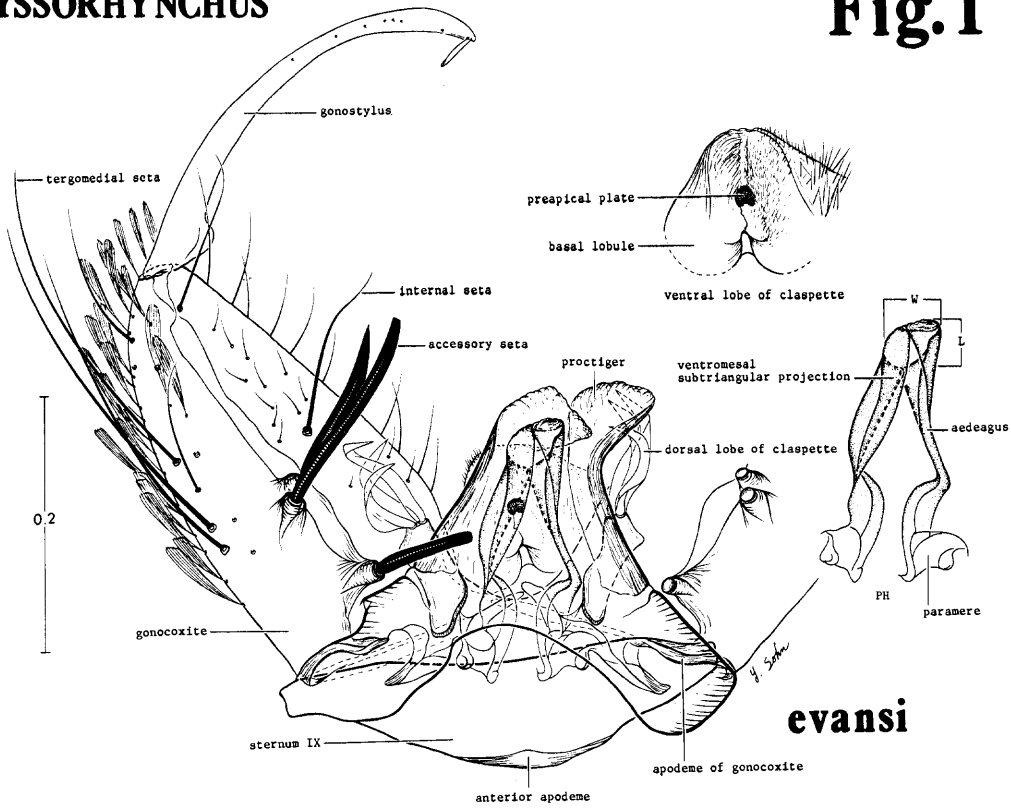
REFERENCES

- Bejarano, Juan F. R. 1957. Distribucion geografica de "Anophelini" de la republica Argentina. Rev. Sanid. Mil. Argent. 56:307-348.
- Belkin, John N., R. X. Schick and S. J. Heinemann. 1968. Mosquito studies (Diptera, Culicidae). XI. Mosquitoes originally described from Argentina, Bolivia, Chile, Paraguay, Peru, and Uruguay. Am. Entomol. Inst., Contrib. 4(1):9-29.
- _____. 1971. Mosquito studies (Diptera, Culicidae). XXV. Mosquitoes originally described from Brazil. Am. Entomol. Inst., Contrib. 7(5): 1-64.
- Brethes, Jean (Juan). 1926a. Description provisoire de deux especies nouvelles d'Anophelinae argentins. Prensa Med. Argent. 13:106-107.
- _____. 1926b. Notas sobre los anophelinos argentinos. Physis 8: 305-315.
- Davis, Nelson C. 1928. A consideration of variability in the *Nyssorhynchus* group of the genus *Anopheles*. Am. J. Hyg. 8:539-563.
- Faran, Michael E. 1980. Mosquito studies (Diptera, Culicidae). XXXIV. A revision of the Albimanus Section of the subgenus *Nyssorhynchus* of *Anopheles*. Am. Entomol. Inst., Contrib. 15(7):1-215.

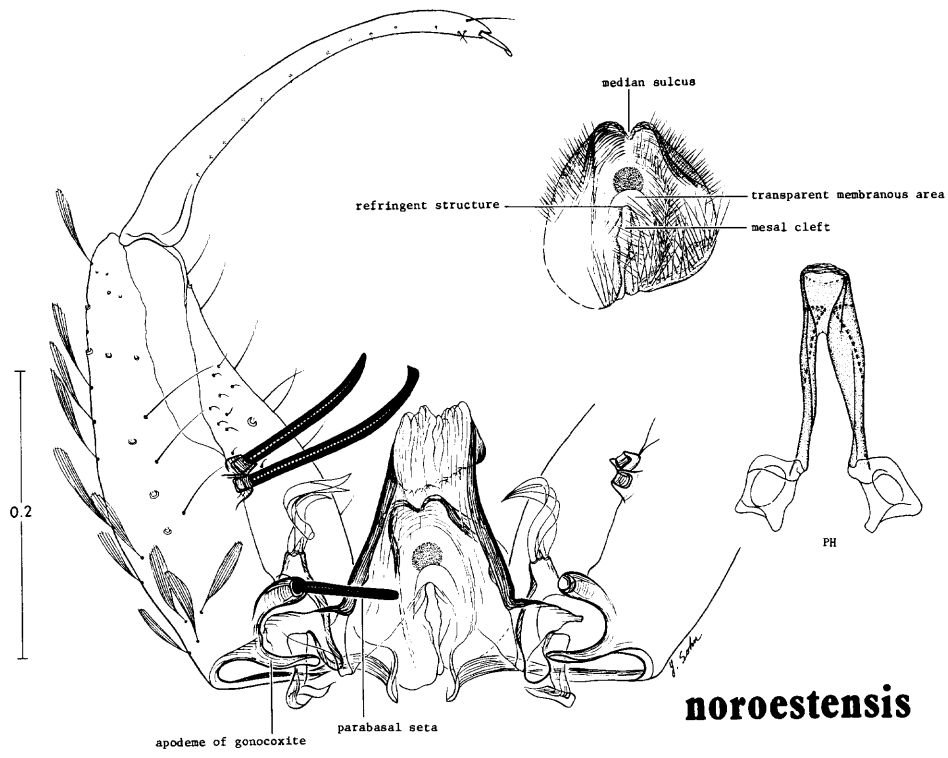
- Gabaldon, Arnaldo. 1949. Malaria incidence in the West Indies and South America. In Boyd, Mark F., edit. Malariology. Phil., W. B. Saunders Co., 1:764-787.
- Galvao, A. L. Ayroza and J. Lane. 1937. Nota sobre os *Nyssorhynchus* de S. Paulo. VII. Estudo sobre as variedades deste grupo com a descricao de *Anopheles (Nyssorhynchus) albitarsis* Arrib., 1878 var. *limai* n. var. Sao Paulo Univ. Fac. Med., Ann. 13:211-238.
- Galvao, A. L. Ayroza, J. Lane and O. Unti. 1944. Sobre o *Anopheles noroestensis* Galvao e Lane, 1938. Arg. Hig. Saude Publica 8:37-48.
- Harbach, Ralph E. and K. L. Knight. 1980. Taxonomists' glossary of mosquito anatomy. Plexus Publishing, Inc., Marlton, NJ. xi + 415 p.
- Komp, William H. W. 1943. *Anopheles clarki*, a new species of *Nyssorhynchus* of wide distribution in South America (Diptera: Culicidae). Entomol. Soc. Wash., Proc. (1942) 44:196-201.
- Lima, Angelo da Costa. 1928. Sobre algumas anophelinas encontradas no Brasil. Inst. Oswaldo Cruz, Mem. Suppl. 3:91-113.
- Root, Francis, M. 1926. Studies on Brazilian mosquitoes. I. The anophelines of the *Nyssorhynchus* group. Am. J. Hyg. Mon. Ser. 5:50-110.
- Shannon, Raymond C. and E. Del Ponte. 1928. Los culicidos en la Argentina. Inst. Bacteriol. Malbran, B. Aires, Rev. 5:29-140.
- Unti, Ovidio. 1940. Anofelinos do Vale do Paraiba. Nova variedade e ciclo evolutivo do *Anopheles (Nyssorhynchus) osvaldoi* var. *ayrozai* n. var. Ann. Paul. Med. Cir. 40:377-392.

NYSSORHYNCHUS

Fig. 1



evansi



noroestensis