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Stenostoma albifrons WAGLER, 1824 (Squamata: Leptotyphlopidae): a name with two neotypes?

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The difficulties of finding diagnostic characters and large samples of specimens in scientific collections are the main reason of taxonomic problems in Scolecophidia (e.g. WALLACH 2003, FRANCISCO et al. 2012, PINTO & CURCIO 2011, PINTO & FERNANDES 2017). Also, older species are often based on a single type or few specimens and descriptions generally are short and do not meet the standards used today. Because of this, several taxonomic revisions have been made in the present century, with the objective to secure the stability of specific names (PINTO et al. 2010, PINTO & CURCIO 2011, FRANCISCO et al., 2012, PINTO & FERNANDES 2012, PINTO & FERNANDES 2017). In this context, *Stenostoma albifrons* WAGLER, 1824 (= *Epictia albifrons*) was considered a nomen dubium by some authors (SMITH & LIST 1958, WILSON & HAHN 1973, FRANCO & PINTO 2009), or considered identical to *Epictia tenella* (KLAUBER, 1939), and therefore recognized as an older synonym by HOOGMOED & GRUBER (1983).

Until FRANCO & PINTO (2009), the name proposed by WAGLER (1824) according to some authors (SMITH & LIST 1958, WILSON & HAHN 1973) could not be assigned to a unique natural population, because (1) the original description was very succinct, (2) the illustration did not allow to access some diagnostic characters, (3) the holotype is lost (SMITH & LIST 1958, WILSON & HAHN 1973, HAHN 1980, HOOGMOED & GRUBER 1983, FRANZEN & GLAW 2007) and (4) the type locality was not very precise “habitat rarum in adjacentibus Urbis Para” (WAGLER 1824), making the identification of this population difficult. JAN (1859) analyzed WAGLER’s type but added no additional information. No subsequent authors analyzed the type in the

Munich collection until it was destroyed during the Second World War (HOOGMOED & GRUBER 1983, FRANZEN & GLAW 2007). Several researchers connected to the Museu Paraense Emílio Goeldi collected over a period of more than 100 years (CUNHA & NASCIMENTO 1978, 1993, FRANCO & PINTO 2009, ÁVILA-PIRES et al. 2010) in a wide continental region around Belém south of the Amazon river, and not a single specimen of this species was collected.

Several authors used the absence of supraocular–supralabial contact as a diagnostic character of *E. albifrons* to separate this species from other congeneric species (e.g. KLAUBER 1939, OREJAS-MIRANDA 1961, 1967, VANZOLINI 1996, ARREDONDO & ZAHER 2010). DUMÉRIL & BIBRON (1844) were the first to cite the absence of supraocular–supralabial contact, since no information was mentioned in *E. albifrons* original’s description. However, these authors did not analyze the holotype, and possibly based themselves on the D’ORBIGNY’s (1847) illustrations of specimens from Santa Cruz de la Sierra, Samaipata and San José de Chiquitos, Bolivia. These Bolivian specimens were recently attributed to *Epictia undecimstriatus* (SCHLEGEL, 1839) by ESQUEDA et al. (2015), therefore DUMÉRIL & BIBRON’s observation could not be attributed to *E. albifrons*. Since 1844, 41 populations from Mexico to Argentina have been assigned to *Epictia albifrons* according to WALLACH (2016) causing taxonomic confusion.

Leptotyphlops tenellus (= *Epictia tenella*) described by KLAUBER (1939) from Kartabo, British Guiana (= Guyana) was distinguished from *E. albifrons* especially by the presence of supraocular–supralabial contact. THOMAS (1965) suggested that *E. tenella* could be the same taxon as

E. albifrons, and was followed by some authors (OREJAS-MIRANDA 1967; VANZOLINI 1970) and it was considered as junior synonym of *L. albifrons* by HOOGMOED & GRUBER (1983). WALLACH (2016) recognized three different opinions among researchers, in which members of the “*tenella* school of thought” (SMITH & LIST 1958, WILSON & HAHN 1973, HAHN 1980, PÉREZ-SANTOS & MORENO 1990, FRANCO & PINTO 2009, FRAGA et al. 2013, STARACE 2013, KOCH et al. 2015) considered *Stenostoma albifrons* WAGLER, 1824 as nomen dubium and *Leptotyphlops tenellus* KLAUBER 1939 as a valid species as defined in the original description. Members of the “*albifrons-tenella* school of thought” (OREJAS-MIRANDA 1967, PETERS & OREJAS-MIRANDA 1970, ADALSTEINSSON et al. 2009, WALLACH et al. 2014, MCCRANIE & HEDGES 2016, WALLACH 2016, MURPHY et al. 2016) who considered both taxa as valid, and members of the “*albifrons* school of thought” (HOOGMOED & GRUBER 1983, PÉREZ-SANTOS & MORENO 1988, KORNACKER 1999, McDIARMID et al. 1999, AVILA-PIRES et al. 2010, COLE et al. 2013) who believe that taxonomic stability is best served by conserving the oldest name *Stenostoma albifrons* and considering *E. tenella* as synonym.

NATERA-MUMAW et al. (2015) did not agree with the nomen dubium designation using as justification the existence of an indirect diagnostic character, in WAGLER's original description. According to NATERA-MUMAW et al. (2015) the presence of supraocular–supralabial contact al-

ways causes the eye shield (=ocular scale) to be pentagonal, as described by WAGLER (1824). In fact, WAGLER in the original description of *Stenostoma albifrons* mentioned “scuta ocularia magna, subquingula, vix subpunctata...” (= ocular scales large, subpentagonal, slightly spotted). This would help to recognize specimens of *E. albifrons* today as *E. tenella* for which this character is typical. NATERA-MUMAW et al. (2015) found two conditions in the ocular scale based on 25 *Epictia* species that they analyzed. The first condition shows a hexagonal ocular and direct contact with five (or six) cephalic shields + mouth and no contact between supraocular and supraocular shields. The second condition shows a pentagonal ocular in direct contact with only four cephalic shields + mouth and with a suture between the first supraocular and supraocular present. However, these authors did not cite which species have the first and which have the second condition.

NATERA-MUMAW et al. (2015) consider *Leptotyphlops tenella* (MCZ 2885), from Pará, Brazil, without specific location, as topotype of *S. albifrons* and designate this specimen as its neotype. We do not applaud this designation, since the State of Pará in the northern region of Brazil has about 1,250,000 km² and several different environments, so this specimen hardly can be considered as a “topotype” (ICZN, 1999; page 120). Also, the specimen is badly damaged, making some scale counts impossible, but it is still recognizable. Moreover, there are many well preserved specimens available from the same region, with detailed locality data. However, this is just our opinion and it does not invalidate the designation made by NATERA-MUMAW et al. (2015). WALLACH (2016) found 14 specimens in the BYU collection from Belém, Pará, Brazil collected between 1946 and 1953, but without any data about collector(s). These specimens would be, according to WALLACH (2016), topotypes of *Stenostoma albifrons*. Thus, he rejects the designation of NATERA-MUMAW et al. (2015) and proposes a new neotype (BYU 11490) for the species, arguing that NATERA-MUMAW et al. (2015) did not act in agreement with the ICZN (1999) code, especially Article 75.3.3, because the specimen indicated as neotype (MCZ 2885) is broken in two pieces. The specimen is badly preserved and it is not possible to obtain some scale counts. However, WALLACH (2016) himself acts against Article 75.4 of ICZN (1999), which decides that the first neotype designation published for a nominal species-group taxon is valid and no subsequent designation, except one made by the Commission under the plenary powers (Art. 78.1), has any validity. Thus, the subsequent designation of BYU 11490 as neotype of *E. albifrons* by WALLACH (2016) is not valid at all (see ICZN article 75.4. Priority on p. 85). MURPHY et al. (2016) seem to accept WALLACH's (2016) neotype designation (against ICZN rules and based on a different species (see below), and consider the *E. tenella-albifrons* matter settled by WALLACH's (2016) neotype indication. Unfortunately these same authors, in their Fig. 1 apparently have switched the names of the species they depict. In the text they correctly state that a characteristic of *E. tenella* is the contact between supraocular and first supraocular, and that in *E. albifrons* this

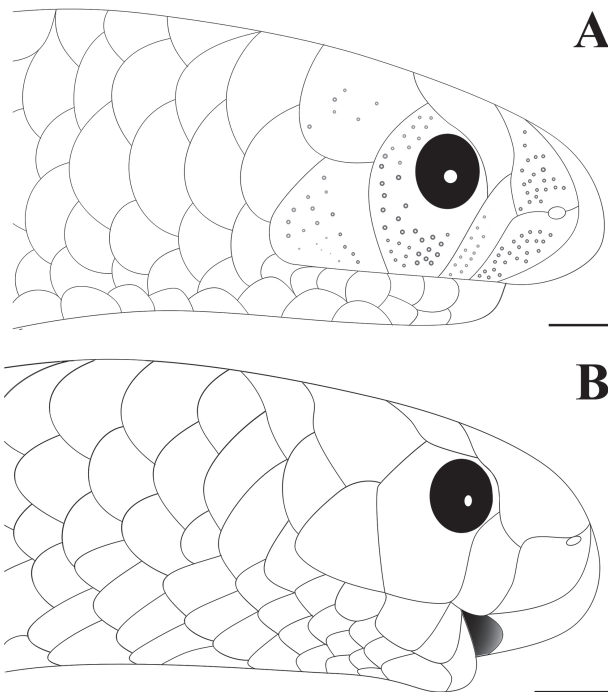


Figure 1. Scheme of ocular forms and supraocular-supralabial conditions. (A) Ocular pentagonal and presence of supraocular-supralabial contact in *Epictia albifrons* (AMNH 14269 – Holotype of *Epictia tenella*); and (B) ocular hexagonal and absence of supraocular-supralabial contact in *Epictia australis* (USNM 34599). Illustration by W. S. AZEVEDO. Scale = 1 mm.

contact is absent, but on which they base themselves here is not clear (probably WALLACH, 2016). However, in Fig. 1A a specimen with supraocular–first supralabial contact is shown and said to be *E. albifrons*, whereas Fig. 1B shows a specimen without such contact and is said to be *E. tenella*. Thus MURPHY et al. (2016) increase the confusion about the identity of the taxa here discussed. MURPHY et al. (2016) in the summary state that they have morphologically compared WALLACH's (2016) neotype (of *E. albifrons*) with their Trinidad specimens and come to the conclusion they are all *E. tenella*. However, in the text there is no discussion about morphology, and the only place where they make a morphological comparison is in Fig. 3, but the neotype of *E. albifrons* they show there is that of NATERA-MUMAW et al. (2016), not that of WALLACH (2016). Thus, MURPHY et al. (2016), despite the confusion they create, only show that *E. tenella* from Trinidad and specimens from Guyana belong to the same taxon (which already had been established) and should indeed be named *E. albifrons*.

Several authors did not mention the ocular shape and the presence or absence of a supraocular–supralabial contact (as cited in NATERA-MUMAW et al. 2015), but drawings show that in species with a hexagonal ocular there is no such contact, and inversely when the ocular is pentagonal there is contact between supraocular and infralabial (e.g. OREJAS-MIRANDA 1967, HOOGMOED 1977, PINTO et al. 2010, ARREDONDO & ZAHER, 2011, FRANCISCO et al. 2012, KOCH et al. 2015; Table 1; Fig. 1). WALLACH (2016) shows a relation of ocular shape and supraocular–supralabial contact in several *Epictia* species [*E. albifrons* (WAGLER, 1824), *E. goudotti* (DUMÉRIL & BIBRON, 1844), *E. phenops* (COPE, 1875), *E. bakewelli* (OLIVER, 1937), *E. columbi* (KLAUBER, 1939), *E. magnamaculata* (TAYLOR, 1940), *E. ater* (TAYLOR, 1940), *E. martinezi* WALLACH, 2016, *E. pauldwyeri* WALLACH, 2016, *E. resetari* WALLACH, 2016, *E. schneideri* WALLACH, 2016, *E. vindumi* WALLACH, 2016, *E. wynni* WALLACH, 2016] which he considered to have a hexagonal ocular and a small to medium anterior supralabial not contacting the supraocular, whereas he shows that *E. tenella* has a pentagonal ocular and a large first supralabial in contact with the supraocular [Table 2 (a,b), page 222–223]. As an exception, FRANCISCO et al. (2012) described a subpentagonal or subhexagonal ocular (paratype condition) for *Epictia munoai* OREJAS-MIRANDA, 1961 from Southern Brazil, Uruguay and Argentina, but the species has no supraocular–supralabial contact.

WALLACH (2016) compared *E. albifrons* with all congeneric species, and separated *Epictia tenella* from *E. albifrons* on the basis of the presence/absence of the supraocular–first supralabial contact, present in *E. tenella*, absent in *E. albifrons*. Considering that WAGLER's (1824) diagnosis included a description of the pentagonal ocular shape and the recently postulated relation between ocular shape and the presence of the supralabial–supraocular contact proposed by NATERA-MUMAW et al. (2015), we agree that in fact the type of *Stenostoma albifrons* WAGLER, 1824 has such a contact. In northern Brazil, only *E. tenella* presents this character, so it is possible to relate it directly with *E. albifrons*.

FRANCO & PINTO (2009) proposed solving the nomenclatural problem with the designation of a new neotype. WALLACH (2016) agreed with FRANCO & PINTO (2009) that it is not possible to link the original description and illustration with diagnostic features of the species. However, WALLACH (2016) disagrees with the original description by stating that *S. albifrons* (based on the BYU material he studied) has a hexagonal ocular and no contact between the supraocular and anterior supralabial shields. WALLACH (2016) based the neotype designation and species variation on 14 specimens that according to WALLACH (2016) were collected on Mormon Missions (but that information seems to be based on a supposition of the author, as it is not present in the BYU collection and could not be verified with the Mormon administration in Provo, Utah, by the curator of BYU JACK SITES (pers. comm.) and thus remains very doubtful) between 1946 and 1953 in the vicinity of Belém, Pará, Brazil. We accept that the type of *S. albifrons* showed supraocular–supralabial contact and that the BYU material studied by WALLACH (2016) does not show any contact. Thus, the BYU material cannot be considered to belong to the same taxon as *Stenostoma albifrons*, as this character indeed shows very little variation (KOCH et al. 2016). The fact that *E. albifrons* (= *tenella*) has not been found in the area of Belém (its type locality) south of the Amazon river, could be explained by incorrect, or wrong, labeling by Johann Baptist von Spix of the type material (it happened several times). It is known that Spix has visited several localities more or less close to Belém on the north bank of the Amazon where *E. albifrons* (= *tenella*) is well known.

The specimens indicated as topotypes of *S. albifrons* by WALLACH (2016) were considered by ARREDONDO & ZAHER (2011) to be *Epictia munoai*, a cisandine species restricted to southern South America. However, based on the descriptions of WALLACH (2016) and photographs in his paper it was possible to verify that the BYU material is not *E. munoai*, which has three infralabials, while *E. albifrons* sensu WALLACH (2016) has four. For different reasons neither, ARREDONDO & ZAHER (op. cit) or we believe that these specimens are from the region near Belém, Pará, considering the history of intensive collections in the region of Belém, for over 100 years, without finding other specimens. Almost certainly the specimens cited by WALLACH (2016) and ARREDONDO & ZAHER (2010) correspond to an unnamed species, but not from Belém.

Summarizing, on the one hand we believe that the indication of MCZ 2885 as neotype of *S. albifrons* by NATERA-MUMAW et al. (2015) is valid, but unfortunately was not very adequate since the neotype is from a loosely defined area (whereas many well-preserved specimens from detailed localities are available in collections), and it is a badly preserved, fragile and fragmented specimen. NATERA-MUMAW et al. (2015) consider *Epictia tenella* a junior synonym of *E. albifrons*, as already suggested by HOOGMOED & GRUBER (1983). On the other hand, WALLACH's (2016) proposal for a new neotype for *S. albifrons* is not valid because of what is stated in ICZN article 75.4, and moreover it is based on a different species and therefore should be

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Table 1. Relation of ocular shape and presence or absence of supraocular-supralabial (SO-SL) contact in *Epictia* species. *Considered synonym of *E. albifrons* in NATERA-MUMAW et al. 2015. ** Analyzed specimens: *E. australis*: ARGENTINA: Buenos Aires, Tandil: USNM 345499; *E. borapeliotes*: BRAZIL: Paraíba, Campina Grande: IBSP 87141–143; *E. melanura*: PERU: La Libertad: FMNH 34269 (Holotype); *E. rufidorsa*: PERU: Lima, Rimac Valley: USNM 49993 (Holotype); *E. signata*: COLOMBIA: Meta, La Macarena: ICN 1224. Meta, San Juan de Arama: ICN 6535; *E. striatula*: BOLIVIA, La Paz, Sur Yungas, Yanacachi, ca. 4 km from, Hacienda Livinoso: USNM 98889 (Holotype); *E. tenella* GUYANA: Cuyuni-Mazaruni, Bartica District, Kartabo: AMNH 14269 (Holotype); *E. tessellata*: PERU: No specific locality: FMNH 35097; *E. vellardi*: BRAZIL, Mato Grosso do Sul, Corumbá: IBSP 87530.

Species	Ocular Shape	SO-SL contact	Source
<i>E. albifrons</i> (WAGLER, 1824)	Pentagonal	Present	NATERA-MUMAW et al. 2015
<i>E. albipuncta</i> (BURMEISTER, 1861)	Hexagonal	Absent	KRETZSCHMAR 2006
<i>E. alfredschmidtii</i> (LEHR, WALLACH, KÖHLER & AGUILAR, 2002)	Pentagonal	Present	LEHR et al. 2002
<i>E. amazonica</i> (OREJAS-MIRANDA, 1969)	Hexagonal	Absent	OREJAS-MIRANDA 1969, NATERA-MUMAW et al. 2015
<i>E. antoniogarciai</i> KOCH, VENEGAS & BÖHME, 2015	Pentagonal	Present	KOCH et al. 2015
<i>E. ater</i> (TAYLOR, 1940)	Hexagonal	Absent	TAYLOR 1940, WALLACH 2016
<i>E. australis</i> (FREIBERG & OREJAS-MIRANDA, 1968)	Hexagonal	Absent	CEI 1986, Our source (USNM 345499)**
<i>E. bakewelli</i> (OLIVER, 1937)	Hexagonal	Absent	WALLACH 2016
<i>E. borapeliotes</i> (VANZOLINI, 1996)	Hexagonal	Absent	VANZOLINI 1996, Our source (IBSP 87141-143)**
<i>E. clinorostris</i> ARREDONDO & ZAHER, 2010	Hexagonal	Absent	ARREDONDO & ZAHER 2010, FRANCISCO et al. 2012
<i>E. collaris</i> (HOOGMOED, 1977)	Hexagonal	Absent	HOOGMOED 1977
<i>E. columbi</i> (KLAUBER, 1939)	Hexagonal	Absent	KLAUBER 1939, WALLACH 2016
<i>E. diaplocia</i> (OREJAS-MIRANDA, 1969)	Hexagonal	Absent	OREJAS-MIRANDA 1969
<i>E. fallax</i> (PETERS, 1858)	Hexagonal	Absent	NATERA-MUMAW et al. 2015
<i>E. goudotti</i> (DUMÉRIL & BIBRON, 1844)	Hexagonal	Absent	PINTO et al. 2010, NATERA-MUMAW et al. 2015, WALLACH 2016
<i>E. hobartsmithi</i> ESQUEDA, SCHLÜTER, MACHADO, CASTELAÍN & NATERA-MUMAW, 2015	Pentagonal	Present	ESQUEDA et al. in NATERA-MUMAW 2015
<i>E. magnamaculata</i> (TAYLOR, 1940)	Hexagonal	Absent	TAYLOR 1940, PINTO et al. 2010, NATERA-MUMAW et al. 2015, WALLACH 2016
<i>E. martinezi</i> WALLACH, 2016	Hexagonal	Absent	WALLACH 2016
<i>E. melanura</i> (SCHMIDT & WALKER, 1943)	Hexagonal	Absent	SCHMIDT & WALKER 1943; holotype photos in official website (FMNH 34269)**
<i>E. munoai</i> (OREJAS-MIRANDA, 1961)	Subhexagonal or Subpentagonal	Absent	OREJAS-MIRANDA 1961, FRANCISCO et al. 2012
<i>E. pauldwyeri</i> WALLACH, 2016	Hexagonal	Absent	WALLACH 2016
<i>E. peruviana</i> (OREJAS-MIRANDA, 1969)	Hexagonal	Absent	OREJAS-MIRANDA 1969
<i>E. phenops</i> (COPE, 1875)	Hexagonal	Absent	WALLACH 2016
<i>E. resetari</i> WALLACH, 2016	Hexagonal	Absent	WALLACH 2016
<i>E. rubrolineata</i> (WERNER, 1901)	?	?	
<i>E. rufidorsa</i> (TAYLOR, 1940)	Pentagonal	Present	TAYLOR 1940, SCHMIDT & WALKER 1943; holotype photos in official website (USNM 49993)
<i>E. schneideri</i> WALLACH, 2016	Hexagonal	Absent	WALLACH 2016
<i>E. septemlineata</i> KOCH, VENEGAS & BÖHME, 2015	Pentagonal	Present	KOCH et al. 2015
<i>E. signata</i> (JAN, 1861)	Hexagonal and Subhexagonal	Absent	BOULENGER 1893, HAHN 1979, PINTO et al. 2010, NATERA-MUMAW et al. 2015, WALLACH 2016, Our source (ICN 1224, 6535)**
<i>E. striatula</i> (SMITH & LAUFE, 1945)	Hexagonal	Absent	SMITH & LAUFE 1945, holotype photos in official website (USNM 98889)**
<i>E. subcrotilla</i> (KLAUBER, 1939)	Hexagonal	Absent	KLAUBER 1939
<i>E. teaguei</i> (OREJAS-MIRANDA, 1964)	Pentagonal	Present	OREJAS-MIRANDA 1964
<i>E. tenella</i> (KLAUBER, 1939)*	Pentagonal	Present	HOOGMOED 1977, Our source (AMNH 14269)**
<i>E. tessellata</i> (Tschudi, 1845)	Pentagonal	Present	SCHMIDT & WALKER 1943, type photos in official website (FMNH 35097)**

Species	Ocular Shape	SO-SL contact	Source
<i>E. tricolor</i> (OREJAS-MIRANDA & ZUG, 1974)	Pentagonal	Present	OREJAS-MIRANDA & ZUG, 1974
<i>E. undecimstriata</i> (SCHLEGEL, 1839)	Hexagonal	Absent	NATERA-MUMAW et al. 2015
<i>E. unicolor</i> (WERNER, 1913)	Subquadrate/ Subocular present	Absent	BOUDY & WALLACH, 2008
<i>E. vanwallachi</i> KOCH, VENEGAS & BÖHME, 2015	Pentagonal	Present	KOCH et al. 2015
<i>E. vellardi</i> (LAURENT, 1984)	Hexagonal	Absent	LAURENT 1984, FRANCISCO et al. 2012, Our source (IBSP 87530)**
<i>E. venegasi</i> KOCH, SANTA CRUZ & CÁRDENAS, 2016	Pentagonal	Present	KOCH et al. 2016
<i>E. vindumi</i> WALLACH, 2016	Hexagonal	Absent	WALLACH 2016
<i>E. vonmayi</i> KOCH, SANTA CRUZ & CÁRDENAS, 2016	Pentagonal	Present	KOCH et al. 2016
<i>E. wynti</i> WALLACH, 2016	Hexagonal	Absent	WALLACH 2016

neglected. We think that the best way would have been to indicate the holotype of *Leptotyphlops tenella* as the neotype for *S. albifrons*. In that way both names would be coupled forever and take away all doubts about the identity of the taxon.

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