A REVISION OF THE NEARCTIC SPECIES OF JENKINSHELEA MACFIE
(DIPTERA: CERATOPOGONIDAE)

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ABSTRACT—The 4 species of Jenkineshelea Macfie known to inhabit North America are described and illustrated, and a key is provided for identification. Two species are new, J. stonei and J. blantoni, and 2 species groups are recognized, the albaria group and magnipennis group.

Jenkinshelea Macfie is a small genus of biting midges presently known from 8 species in Africa, Asia, New Guinea, and North America. Wirth (1962a) reviewed the North American species and (1962b) provided some interesting biological data on the pupae of J. albaria (Coquillett). Recent collecting in Florida and Texas has resulted in many additional specimens including 2 new species here described.

In the present paper we provide illustrations and keys for the 4 known Nearctic species and recognize 2 species groups. We have found that males of each Nearctic species have distinctive genitalia that facilitate their identification. Females are less distinct, being easy to key to the species group level but much more difficult to determine to species, especially where the ranges of two closely related species overlap. In these instances, we have been able to separate them by differences in size only, making determination of pinned specimens difficult if not impossible.

MATERIALS AND METHODS

Unless otherwise indicated all specimens examined are on slides and are part of the collection of the National Museum of Natural History (USNM) in Washington, where the types of the new species will be deposited. Paratypes will be deposited in the British Museum (Natural History), London; the Canadian National Collection (CNC), Ottawa; the California Academy of Sciences (CAS), San Francisco; and Cornell University (CU), Ithaca, New York.

For general terminology of Ceratopogonidae see Wirth (1952); terms dealing with male genitalia follow Snodgrass (1957). Unless otherwise indicated measurements and other data are based on specimens mounted on slides in the manner of Wirth and Marston (1968). When possible 10 females of each species were measured and the data presented in the following manner: mean (minimum value–maximum value, n = number of measurements); for new


126
species actual values are given for the allotype, and the mean, minimum—maximum, and sample size are given in the variation section. The following special terms are used in the description of females: wing length is measured from the basal arculus to the wing tip; antennal proportions (AP) are the relative lengths of the flagellomeres and antennal ratio (AR) is the value obtained by dividing the combined lengths of the proximal 8 flagellomeres into the combined lengths of the distal 5 flagellomeres.

Genus Jenkinshelea Macfie


Diagnosis: A genus of large, usually grayish pollinose Sphaeromiine biting midges that can be distinguished from other ceratopogonid genera by the following combination of characters: Anal angle of female wing greatly expanded; wing with 2 radial cells, in the female the 2nd radial cell elongated with the costa nearly reaching wing tip, in males 2nd radial cell extending to 0.75 of wing length; aedeagus of males lacking well-developed basal arms and the anterior margin usually truncate or rounded.

Description: Body slender, usually pollinose, nearly bare. Eyes broadly separated, bare. Palpus slender, 5 segmented; 3rd segment with scattered sensilla but lacking well-defined pit. Female antenna with proximal 8 flagellomeres elongate, distal 5 more elongate; male antenna with distal 3 flagellomeres elongate, plumule moderately developed. Scutum without anterior spine or tubercle, broadly rounded anteriorly. Legs slender, unarmed; 4th tarsomere cordiform; 5th tarsomere slender, in female armed ventrally with several stout batoments, in male unarmed; claws of female equal, each with blunt basal external tooth; claws of male small, equal, with bifid tips, and lacking basal tooth. Wing broad in female with greatly expanded anal angle, narrower in male with anal angle normal; surface with microtrichia only; 2 radial cells present, 2nd greatly elongated in female, nearly reaching wing tip, in male extending to 0.75 of wing length; r-m crossvein long, perpendicular, usually infuscated; media broadly sessile. Female abdomen with sterna and terga fused on segments 8 and 9, forming subcylindrical structures; venter of segment 8 deeply cleft posteriorly with apical dense long setae; 10th sternum with apical pair of large setae; 2 well-developed spermathecae present. Male genitalia elongate; 9th tergum slender, tapering distally with pubescent short cercus; basimere extremely long and slender, telomere long and curved distally; aedeagus fairly short, rounded or truncate on anterior margin, apex usually rounded, lacking well-developed basal arms; claspettes fused, basal arms well developed, distal portion divided, the tips usually slender and bent ventrad.

Immature Stages: Larvae are unknown but are presumed to inhabit the substrate of aquatic situations where they are probably predaceous. Pupae float in water and can be collected along the margins
of streams and ponds where emergence of the adults occurs. Known pupae have membranous ventral adhesive discs on abdominal segments 6 and 7. Just prior to eclosion, pupae climb up emergent vegetation or other available objects to above the water line and attach themselves to these objects with an adhesive fluid from these discs.

Adult Habits: Adults can be collected on vegetation bordering aquatic habitats and are attracted to light traps. Adult feeding habits are unknown but by analogy from related genera females are presumed to prey upon small nematocerans.

Relationships: Jenkinshelea is most closely related to the genus Crispomyia Debenham (1974) from Australia. Males of Crispomyia are unknown but females can be differentiated from those of Jenkinshelea on the basis of the following characters:

<table>
<thead>
<tr>
<th>Jenkinshelea</th>
<th>Crispomyia</th>
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<tbody>
<tr>
<td>Eyes broadly separated</td>
<td>Eyes contiguous</td>
</tr>
<tr>
<td>Palpus 5-segmented</td>
<td>Palpus 4-segmented (4 &amp; 5 fused)</td>
</tr>
<tr>
<td>Fourth tarsomeres cordiform</td>
<td>Fourth tarsomeres cylindrical</td>
</tr>
<tr>
<td>Wing with 2 radial cells</td>
<td>Wing with 1 radial cell</td>
</tr>
<tr>
<td>Costal ratio 0.98</td>
<td>Costal ratio 0.84-0.89</td>
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</tbody>
</table>

**Key to the Nearctic Species of Jenkinshelea Macfie**

1. Females ................................................................. 2
   — Males ......................................................................... 5
2. Abdominal segments 8 and 9 each with a pair of ventrolateral spinelike sclerotized tubercles; tibiae usually extensively yellowish (albaria group) .... 3
   — Abdominal segments 8 and 9 without a pair of ventrolateral spinelike sclerotized tubercles; tibiae blackish (magnipennis group) ......................... 4
3. Wing length 2.7-3.5 (mean 3.08) mm; antennal ratio 1.27-1.40 (mean 1.34) .............................. albaria (Coquillett)
   — Wing length 2.1-2.8 (mean 2.56) mm; antennal ratio 1.20-1.28 (mean 1.24) .............................. stonei new species
4. Wing length 3.6-4.0 (mean 3.84) mm; northeastern U.S. and southern Canada ........................................ magnipennis (Johannsen)
   — Wing length 2.5-3.3 (mean 3.07) mm; Florida only ............ blantoni new species
5. Aedeagus twice as long as broad (albaria group) .................................................. 6
   — Aedeagus 1.5 times as long as broad (magnipennis group) .................................................. 7
6. Distal portion of claspettes with long, slender, divergent tips .......................................................... albaria (Coquillett)
   — Distal portion of claspettes with short, blunt, greatly appressed tips ................................. stonei new species
7. Aedeagus with rounded tip; distal portion of claspettes with very long, straight, slender, greatly divergent tips ...................... magnipennis (Johannsen)
   — Aedeagus with pointed, bifid tip; distal portion of claspettes with apex bent 90 degrees ................ blantoni new species
Fig. 1, genitalia of female *Jenkinshelea* spp. A, *J. albaria*. B, *J. blantoni*.

**Albaria Group**

Females with abdominal segments 8 and 9 each with a pair of ventrolateral spinelike sclerotized tubercles; tibiae usually extensively yellowish. Males with aedeagus twice as long as broad, base truncate or slightly rounded, basal arms reduced or absent.

*Jenkinshelea albara* (Coquillett)

fig. 1A, 2, 3A, 7A–D

*Ceratopogon albarius* Coquillett (as *albaria*), 1895:308 (female; Florida).

*Johannsenomyia albaria* (Coquillett); Malloch, 1915:335 (Illinois; synonym of *Johannsenomyia magnipennis* (Johannsen).

*Jenkinshelea albaria* (Coquillett); Johannsen, 1943:783 (combination; listed from e. U.S.); Wirth, 1962a:1 (redescription; key; fig. male genitalia); Wirth, 1965: 137 (distribution).

*Johannsenomyia aequalis* Malloch, 1915:336 (male; Illinois); Johannsen, 1943: 378 (listed from New York); Wirth, 1962a:2 (synonym of *J. albaria*).

Diagnosis: Males distinguished from all other Nearctic *Jenkinshelea* by their clasperpets with long, slender, divergent tips and aedeagus nearly twice as long as broad. Females distinguished from all other *Jenkinshelea* except *J. stonei* by the pair of ventrolateral spinelike
sclerotized tubercles on abdominal segments 8 and 9; from *J. stonei* by their larger size, wing length 2.75–3.53 (mean 3.08) mm, and greater antennal ratio, 1.27–1.40 (mean 1.34).

Female: Wing length 3.08 (2.75–3.53, n = 14) mm; breadth 1.38 (1.15–1.60, n = 12) mm. *Head*: Brown; palpus light brown; vertex grayish pollinose in pinned specimens. Antennal pedicel dark brown; AP 19-10-10-11-11-11-11-11-21-23-24-25-33; AR 1.34 (1.27–1.40, n = 13). Mandible with 7, rarely 8 teeth. *Thorax*: Scutum, scutellum, postscutellum, and pleuron brown; grayish pollinose in pinned specimens. Legs with 2 usual color patterns; a dark form with coxae, trochanters, femora, mid and hind tibiae brown, fore tibia lighter brown; the more common form with fore coxa, trochanters, fore femur, proximal 3/4 of mid and hind femora, fore tibia, and broad subapical bands on mid and hind tibia yellowish to light brown; dark brown on mid and hind coxae, fore femorotibial joint, distal 1/4 of mid and hind femora, and proximal 1/2 and apex of mid and hind tibiae; tarsi of both forms pale on tarsomeres 1 and 2, brown on 3–5. Wing as in *J. magnipennis* (fig. 5D). Halter stem pale to light brown; knob white. *Abdomen*: Dorsum whitish except segments 8 and 9 brown; venter reddish brown. Genitalia as in fig. 1A. Eighth segment with pair of large ventrolateral spine-like sclerotized tubercles at midlength; anterior margin truncate, posterior margin with deep cleft. Ninth segment with pair of smaller ventrolateral spine-like sclerotized tubercles at midlength; anterior margin cleft, lobes directed
slightly anterad. Tenth sternum with pair of large apical setae. Spermathecae ovoid, subequal with short necks.

Male: Smaller, similar to female with following differences: Femora and tibiae entirely brown; halter brown. Genitalia as in fig. 3A. Ninth sternum about twice as broad as long, base nearly straight with a deep caudomedian excavation; 9th tergum tapering gradually on proximal 1/2, distal 1/2 tapering slightly with round tip; cercus short, not reaching apex of basimere. Basimere very slightly curved, about 4 times longer than broad; telomere slightly more than 1/2 the length of basimere, tapering slightly distally with distal 1/2 greatly curved, nearly hooked. Aedeagus nearly twice as long as broad; base truncate; proximal portion with transverse wrinkles distally; distal portion with distinct peglike sclerotization and with prominent lateral sclerotized lobes. Claspettes fused; basal arm heavily sclerotized, tip curved mesally; distal portion divided, more lightly sclerotized, tips long, slender, divergent, and bent ventrad.

Pupa: Brown. Female operculum (fig. 7A) about as long as broad, surface covered with small rounded tubercles; anterior end rounded, tip pointed; central portion with raised areas bearing pair of tubercles, posterior 1 with single long seta; lateral margins greatly elevated; posterior margin attached. Male operculum similar to that of female but slightly narrower. Respiratory organ (fig. 7B) about 2.5 times longer than broad; surface smooth; apex with double row of 5–8 spiracles. Female terminal segment (fig. 7C) about twice as long as broad; dorsum covered with small pointed tubercles; venter covered with small pointed tubercles except for small circular central area; apicolateral processes moderately divergent, covered with small pointed tubercles. Male terminal segment (fig. 7D) about 1.7 times longer than broad; dorsum covered with small pointed tubercles; venter covered with small pointed tubercles on distal 1/2, genital processes tightly appressed and very slightly wrinkled; apicolateral processes greatly divergent, covered with small pointed tubercles.
Distribution: Ontario south to Florida, west to Texas and Illinois (locality records plotted in fig. 6).


Discussion: Wirth (1962b) noted the ventral adhesive discs on segments 6 and 7 of the pupa of this species. He observed that pupae placed in glass vials would climb up the sides of the vials and postulated that pupae would similarly climb up emergent vegetation before
eclosion. All of the pupae examined from Virginia, Florida, and Texas had adhesive discs present.

*Jenkinshelea stonei* Grögan and Wirth, new species
fig. 3B, 4

*Jenkinshelea albaria* (Coquillett); Wirth, 1962a:1 (in part; Texas records).

Diagnosis: Males distinguished from all other Nearctic *Jenkinshelea* by their claspettes with short, blunt, greatly appressed tips and aedeagus nearly twice as long as broad. Females distinguished from all other Nearctic *Jenkinshelea* except *J. albaria* by the pair of ventrolateral spine-like sclerotized tubercles on abdominal segments 8 and 9; from *J. albaria* by their smaller size, wing length, 2.13-2.79 (mean 2.56) mm and small antennal ratio, 1.20-1.28 (mean 1.24).

Allotype Female: Wing length 2.79 mm; breadth 1.27 mm. *Head*: Reddish brown; palpus light brown. Antennal pedicel dark brown; flagellum brown; AP 19-10-11-12-11-12-13-21-22-25-25-32; AR 1.28. Mandible with 6 large teeth. *Thorax*: Scutum, scutellum, postscutellum, and pleuron dark brown. Fore coxa, trochanters, fore femur, proximal 2/3 of mid femur, proximal 1/2 of hind femur, fore tibia, broad subapical band on mid and hind femora, and proximal 2 tarsomeres of tarsi yellowish to light brown; mid and hind coxae, fore femorotibial joint, distal 1/3 of mid femur and distal 1/2 of hind femur dark brown; distal 3 tarsomeres brown. Wing as in *J. magnipennis* (fig. 5D). Halter pale; knob brown. *Abdomen*: Light brown; segments 8 and 9 dark brown. Genitalia as in *J. albaria* (fig. 1A).

Holotype Male: Smaller, similar to allotype female with the following differences: *Head* dark brown; thorax darker brown; femora and tibiae dark brown; halter brown. Genitalia as in fig. 3B. Ninth sternum about 2.7 times broader than long, base nearly straight with deep caudomedian excavation; 9th tergum tapering gradually distally on proximal 1/2, distal 1/4 tapering slightly with round tip; cercus short, nearly reaching apex of basimere. Basimere very slightly curved, about 4 times longer than broad; telomere about 0.6 as long as basimere, tapering slightly distally with distal 1/2 greatly curved, nearly hooked. Aedeagus about twice as long as broad, base nearly truncate; proximal portion with transverse wrinkles proximally, then longitudinal wrinkles distally; distal portion more or less quadrate with prominent lateral sclerotized lobes. Claspettes fused; basal arm heavily sclerotized, tip curved mesally; distal portion divided, more lightly sclerotized with tips short, blunt, greatly appressed and bent ventrad.

Variation: Females: Wing length 2.56 (2.13-2.79, n = 10) mm; breadth 1.15 (0.90-1.23, n = 10) mm. AR 1.24 (1.20-1.28, n = 9). Mandibular teeth 6-9. All of the female paratypes agree with the allotype in form and coloration. All the male paratypes agree with the holotype in form and coloration.

Etymology: This species is dedicated to Alan Stone in recognition of his outstanding leadership in the field of Dipterology in North America.

Distribution: Florida and Texas (locality records plotted in fig. 4).

Discussion: Wirth (1962a) considered the 2 male paratypes from Kerr Co., Texas, as atypical J. albaria because of their obvious differences in the tips of their claspettes. He recognized that a possible new species was represented by those specimens but declined to name and describe them at the time because of limited material.

Present records indicate that the ranges of J. stonei and J. albaria overlap in the extreme southeastern U. S. and they have been taken in the same light trap from Kerr Co., Texas. However, further collections are necessary to determine the degree of sympathy that exists between these 2 closely related species.

**Magnipennis Group**

Females with abdominal segments 8 and 9 without pairs of ventrolateral spinelike sclerotized tubercles; tibiae blackish. Males with aedeagus 1.5 times longer than broad, base with short basal arms.

*Jenkinshelea magnipennis* (Johannsen)

fig. 3C, 5, 6, 7E-G

**Johannsenicella magnipennis** Johannsen, 1908:268 (male; New York).

*Jenkinshelea magnipennis* (Johannsen); Wirth, 1962a:3 (redescription; key; fig. male genitalia); Wirth, 1965:137 (distribution).

**Diagnosis:** Males distinguished from all other Nearctic Jenkinshelea by their aedeagus 1.5 times longer than broad with round tip and short submarginal basal arms, and claspettes with very long, slender, straight, greatly divergent tips. Females distinguished from all other Nearctic Jenkinshelea except *J. blantoni* by the lack of spinelike tubercles on the venter of abdominal segments 8 and 9; from *J. blantoni* by their larger size, wing length 3.61-4.02 (mean 3.84) mm.

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Female: Wing length 3.81 (3.61–4.02, n = 10) mm; breadth 1.63 (1.56–1.68, n = 9) mm. **Head**: Brown; palpus (fig. 5E) light brown; vertex grayish pollinose in pinned specimens. Antennal pedicel dark brown; flagellum (fig. 5A) brown, lighter brown occasionally on proximal 8 flagellomeres; AP 24-13-13-13-13-14-14-14-25-27-26-30-38; AR 1.27 (1.19–1.31, n = 8). Mandible with 7, rarely 8 teeth. **Thorax**: Dark brown; grayish pollinose in pinned specimens. Legs (fig. 5C) with coxae, trochanters, femora and tibiae dark brown; tarsi pale on proximal 2 tarsomeres, distal 3 tarsomeres brown; 5th tarsomeres (fig. 5G) with several ventral batonnets, hind claws longer than mid, mid claws longer than fore. Wing (fig. 5D) hyaline; veins light brown, membrane milky whitish on proximal \( \frac{1}{2} \), pale smoky brown on distal \( \frac{3}{4} \); r-m crossvein infuscated dark brown. Halter pale to brown. **Abdomen**: Dorsum whitish except brown on segments 8 and 9; venter reddish brown. Genitalia as in *J. blantoni* (fig. 1B).

Male: Smaller, similar to female with the following differences: Flagellum (fig. 5B) entirely brown; 5th tarsomeres (fig. 5F) lacking ventral batonnets, claws small, equal, tips bifid; abdomen entirely brown. Genitalia as in fig. 3C. Ninth sternum about 2.3 times broader than long, base slightly curved with a deep caudomedian excavation; 9th tergum tapering gradually on proximal \( \frac{1}{2} \), distal \( \frac{1}{2} \) broadening slightly to rounded tip; cercus short, not quite reaching apex of basimere. Basimere straight, about 4.5 times longer than broad; telomere slightly more than \( \frac{1}{2} \) the length of basimere, tapering slightly distally with last \( \frac{1}{4} \) greatly curved. Aedeagus about 1.5 times longer than broad; base slightly rounded with short submarginal basal arms; proximal \( \frac{1}{2} \) with light wrinkles, transverse mesally, longitudinal marginally; distal \( \frac{1}{2} \) with strong longitudinal wrinkles, tip rounded. Claspers fused; basal arm heavily sclerotized, tip curved slightly mesally; distal portion divided, more lightly sclerotized, tips very long, slender, straight, greatly divergent and bent ventrad.

Pupa: Dark brown. Female and male operculum nearly identical with those of *J. albaria* (fig. 7A). Respiratory organ (fig. 7E) about 3 times longer than broad; surface smooth; apex with double row of about 15 spiracles. Female terminal segment (fig. 7F) about 1.5 times longer than broad; dorsum covered with small pointed tubercles; venter covered with small pointed tubercles except for small central area; apicolateral processes greatly divergent, covered with small pointed tubercles. Male terminal segment (fig. 7G) about twice as long as broad; dorsum covered with small pointed tubercles; venter covered with small pointed tubercles, genital processes greatly appressed and slightly wrinkled; apicolateral processes moderately divergent, covered with small pointed tubercles.

Distribution: Maine west through Quebec and Ontario to British Columbia, south to central Illinois and New York (locality records plotted in fig. 6).


25-29 August 1975, W. L. Grogan, Jr., reared from lake margin, 11 ♀ ♂, 7 ♀ ♂; Ottawa, 28 July 1939, O. Peck, 5 ♀ ♂, 1 ♂ (CNC).

Discussion: Grogan reared a large series of *J. magnipennis* from pupae at Black Lake, Ontario, during late June, 1975. Pupae were collected as they crawled up the sides of a painted wooden rowboat along the margin of the lake. Several adults were seen emerging after the pupae had secured themselves to the surface of the boat above the water line. It is suspected that pupae do not crawl out of the water until just before eclosion. Pupae placed in glass vials would climb up the sides of the vials and cement themselves to the glass with an adhesive fluid secreted by their membranous abdominal discs. This behavior is identical to that seen in *J. albaria* by Wirth (1962b). All of the pupae examined by us from Black Lake and Ottawa, Ontario had ventral discs present on abdominal segments 6 and 7.

*Jenkinshelea blantoni* Grogan and Wirth, new species

fig. 1B, 3D, 6

Diagnosis: Males distinguished from all other Nearctic *Jenkinshelea* by their aedeagus 1.5 times longer than broad with a pointed bifid tip and short marginal basal arms, and claspettes with tips bent at 90 degrees. Females distinguished from all other Nearctic *Jenkinshelea* except *J. magnipennis* by the absence of spinelike tubercles on the venter of abdominal segments 8 and 9; from *J. magnipennis* by their smaller size, wing length 2.46-3.32 (mean 3.07) mm.

Allotype Female: Wing length 3.32 mm; breadth 1.47 mm. Head: Dark brown; palpus light brown except 5th segment brown. Antennal pedicel brown; flagellum brown; AP 19-11-11-12-12-12-12-24-25-25-24-28; AR 1.25. Mandible with 7 large teeth. Thorax: Scutum, scutellum, postscutellum, and pleuron dark brown. Legs dark brown; distal ½ of fore coxa, fore and mid trochanters, bases of fore and hind femora, proximal ½ of mid femur, venter of fore tibia, sub-apical band on mid tibia, and distal 3 tarsomeres of tarsi lighter brown; proximal 2 tarsomeres of tarsi pale. Wing as in *J. magnipennis* (fig. 5D). Halter stem light brown; knob darker brown. Abdomen: Light brown except for terminal 3 segments; internally dark reddish brown. Genitalia as in fig. 1B. Venter of segments 8 and 9 lacking spinelike tubercles; venter of 8th segment with deep caudomedian notch. Ninth segment divided ventrally, each ½ with pointed, mesally directed tip. Tenth sternum with pair of large apical setae. Spermathecae ovoid, subequal with short necks.

Holotype Male: Smaller, similar to allotype female with the following differences: Coxae, trochanters, femora and tibiae entirely brown; halter brown. Genitalia as in fig. 3D. Ninth sternum about 4 times broader than long, base straight with broad shallow caudomedian excavation; 9th tergum tapering gradually distally on proximal ¾, distal ½ broadening slightly with rounded tip; cercus short, extending far short of apex of basimere. Basimere straight, about 4.5 times longer than broad; telomere about 0.4 times length of basimere,
tapering slightly distally, distal ⅔ greatly curved. Aedeagus almost 1.5 times longer than broad; base concave with short marginal basal arms; mesal portion with strong longitudinal wrinkles; distal portion with truncate margins, tip divided with each portion pointed. Claspers fused; basal arm heavily sclerotized, nearly straight; distal portion more lightly sclerotized, bent ventrad, moderately divergent with tips bent 90 degrees.

Variation: Females: Wing length 3.07 (2.46-3.32, n = 10) mm; breadth 1.31 (1.03-1.47, n = 9) mm. AR 1.29 (1.19-1.42, n = 10). All of the female paratypes agree with the allotype in form and coloration. All of the male paratypes agree with the holotype in form and coloration.

Etymology: This species is named for Franklin S. Blanton who collected the type-series and in recognition of his contributions to the study of North American Ceratopogonidae.

Distribution: Florida (locality records plotted in fig. 6).


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References


