Rhynchospora leptocarpa

Slender-fruit Beaked Rush

Cyperaceae

Rhynchospora leptocarpa by Claire Ciafre, 2020

***Rhynchospora leptocarpa* Rare Plant Profile**

New Jersey Department of Environmental Protection
State Parks, Forests & Historic Sites
State Forest Fire Service & Forestry
Office of Natural Lands Management
New Jersey Natural Heritage Program

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Life History

Rhynchospora leptocarpa (Slender-fruit Beaked Rush) is a perennial, fibrous-rooted, tussock-forming sedge. The pale green leaves are 1.5–2.5 mm wide and shorter than the inflorescence, typically 10–30 cm in length. The lower leaves tend to curl and become lighter as they age. Flowering and fruiting occurs from July through September. The slender flowering stems can be up to a meter long and are usually lax, arching gently or resting parallel to the ground. Each stem has 4–8 clusters of pale brown spikelets that are borne on short peduncles and subtended by narrow bracts. The spikelets are two-flowered and the scales are 1.5–3 mm long and 1 mm wide. The smooth, pale achenes are elevated on short stipes. Each achene is capped by a thin triangular tubercle and surrounded by 6 retrorsely-barbed bristles that usually extend beyond the end of the tubercle by 0.3–1.0 mm. (See Britton 1892, Small 1933, Weakley 2015, Sorrie 2000, Moyer and Naczi 2017, de la Paz 2021, LeGrand et al. 2022). *R. leptocarpa* does not appear in popular northeastern floras such as those by Britton and Brown, Fernald, or Gleason and Cronquist because it was not known to occur in the region prior to 2014 (Moyer and Naczi 2017).

Twenty-four native species of *Rhynchospora* have been documented in New Jersey, but the majority of them (71%) occur only rarely in the state (Kartesz 2015, NJNHP 2022). *Rhynchospora leptocarpa* is most similar to *R. capitellata* and *R. glomerata*. In fact, the earliest descriptions of *R. leptocarpa* treated it as a variety of *R. glomerata* (Britton 1892) or *R. capitellata* (Blake 1918), and a number of authors still regard *R. leptocarpa* as a synonym for *R. capitellata* (see Synonyms and Taxonomy section). *Rhynchospora glomerata* can be distinguished from the other two species by its more numerous spikelet clusters (usually 20+) and larger spikelets and fruits (Weakley 2015, Kral 2020). In contrast with *Rhynchospora leptocarpa*, *R. capitellata* does not form tussocks and it has medium to dark green leaves, erect flowering stems with 3–5 clusters of dark brown spikelets, and achene bristles that are shorter than the tubercle or do not exceed it by more than 0.3 mm (Naczi and Moyer 2017, Sorrie 2000, LeGrand et al. 2022).

Alan Weakley, 2021.

Claire Ciafre, 2020.

Pollinator Dynamics

Most species in the Cyperaceae are wind-pollinated, but insect pollination has also been documented in several sedge genera including *Rhynchospora*. Nearly all of the insect-pollinated sedges are also pollinated by wind (Goetghebeur 1998). Wind is the prevailing pollination mechanism for the majority of *Rhynchospora* plants except for species in the section *Dichromena*: The flowers of those plants have pale, leafy involucral bracts, white glumes, and sticky pollen and use insects as the primary means of cross-fertilization (Lucero et al. 2014). Some New Jersey *Rhynchosporas*, including *R. alba* and *R. pallida*, utilize a combination of insect and wind pollination. However, the floral morphology of *Rhynchospora leptocarpa*, exemplified by inconspicuous brown spikelets arranged in open panicles, is indicative of wind pollination (da Costa et al. 2021).

Seed Dispersal

Many *Rhynchospora leptocarpa* seeds are probably dispersed by gravity, but the bending of the lengthy stems can help to deposit the seeds at some distance from the parent plants. The long bristles on the achenes of Slender-fruit Beaked Rush are likely to aid in farther dispersal of the propagules. Seeds of *Rhynchospora* species that have barbed perianth bristles are frequently transported to new locations by attachment to birds or mammals (Leck and Schütz 2005). Entanglement of the long bristles could also confer buoyancy to clusters of achenes even if the individual seeds are unable to float on their own (Mossman 2009).

Seed banking has been documented in a number of *Rhynchospora* species (Leck and Schütz 2005) although it was not specifically reported for *R. leptocarpa*. No information was found regarding the germination and establishment requirements of the rare sedge. Many sedges are known to form mycorrhizal associations, including some species of *Rhynchospora* (Wang and Qiu 2006).

Habitat

Small (1933) reported *Rhynchospora leptocarpa* habitat as "wet woods and low pinelands," a succinct description that effectively encapsulates the moist and shady nature of the communities where the sedge is likely to occur. Slender-fruit Beaked Rush is most often observed growing in sphagnum mosses in forested seepage areas near the headwaters of streams (Anderson 1995, Sorrie et al. 1997, McMillan et al. 2002, Carter et al. 2009, Weakley 2015, McNair et al. 2016, LeGrand et al. 2022). Atlantic White Cedar (*Chamaecyparis thyoides*) is characteristic at many locations. Well developed layers of trees and shrubs are usually present, but *R. leptocarpa* establishes in small gaps along with a few other herbaceous species (Sorrie et al. 2006). The species can continue to grow along the upper portion of a stream but is absent from lower portions where standing water may be present for more than a few hours at a time (Sorrie 1999). In areas with suitable habitat *R. leptocarpa* may be locally common (Carter et al. 2009), and once established it can become the dominant graminoid species in the community (Moyer and Naczi 2017). Other habitats where *Rhynchospora leptocarpa* has occasionally been found

include boggy pond margins, on a floating vegetation mat in a pond, alongside a swift stream, and at the upper edge of a tidal marsh (Anderson 1995, Sorrie et al. 1997, McMillan et al. 2002, de la Paz 2021).

The New Jersey populations of *Rhynchospora leptocarpa* are located in Atlantic White Cedar swamps. Some colonies are in areas where continuous seepage creates pools or small, sluggish streams and others are growing in saturated *Sphagnum* alongside more active streams. The plants may be rooted in organic soil or peat, and they are generally located in areas where at least some sunlight is able to penetrate the canopy (Moyer and Naczi 2017, NJNHP 2022).

Wetland Indicator Status

Rhynchospora leptocarpa is an obligate wetland species, meaning that it almost always occurs in wetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2022)

RHLE2

Coefficient of Conservatism (Walz et al. 2018)

CoC = 10. Criteria for a value of 9 to 10: Native with a narrow range of ecological tolerances, high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance (Faber-Langendoen 2018).

Distribution and Range

The global range of *Rhynchospora leptocarpa* is restricted to the United States, where it occurs in southeastern coastal states from North Carolina to Texas with a disjunct occurrence in New Jersey (POWO 2022). The map in Figure 1 depicts the extent of *R. leptocarpa* in North America. New Jersey is not included in the map because the species was only recently reported in the state (Moyer and Naczi 2017).

In the states where it occurs, *Rhynchospora leptocarpa* is limited to the coastal plain (Sorrie 2000, LeGrand et al. 2022). The physiographic province comprising the Atlantic and Gulf coastal plain extends from southern New England to Texas, and disjunct patterns of species distribution are not uncommon in the region (Sorrie and Weakley 2001).

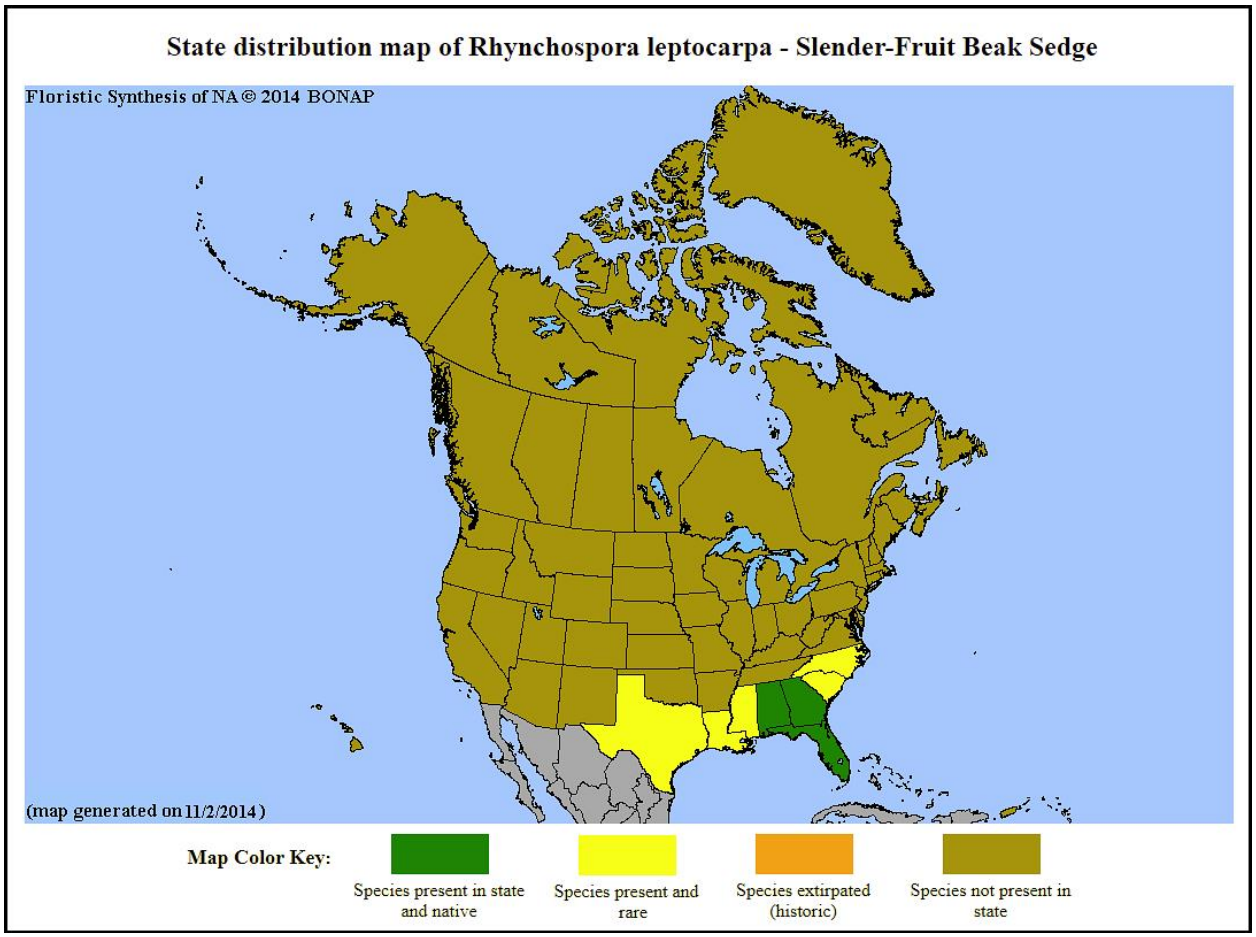

Figure 1. Distribution of R. leptocarpa in North America, adapted from BONAP (Kartesz 2015).

The USDA PLANTS Database (2022) did not show a record for *Rhynchospora leptocarpa* in New Jersey. The map in Figure 2 (below) includes records for Atlantic, Burlington, and Ocean counties based on information from Moyer and Naczi (2017). Several populations were found in Burlington and Ocean counties by Moyer in 2014. The Atlantic County record is based on a herbarium specimen from 1985 originally labeled as *R. capitellata* but determined to be *R. leptocarpa* by Moyer and Naczi. The exact location from which the Atlantic County specimen was collected has not been determined (Moyer and Naczi 2017, NJNHP 2022).

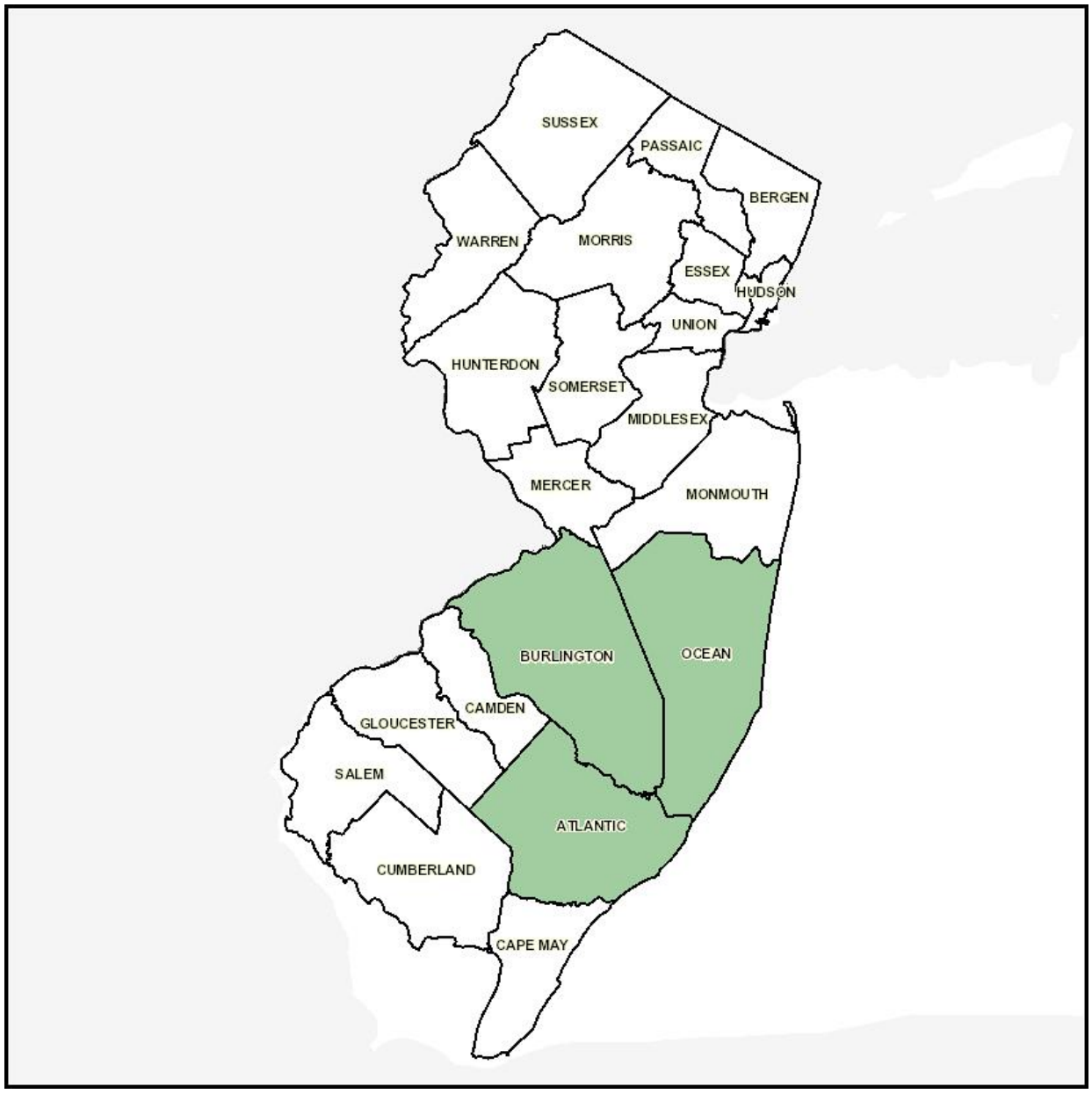

Figure 2. County records of R. leptocarpa in New Jersey.

Conservation Status

Rhynchospora leptocarpa is globally vulnerable. The G3 rank means the species has a moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors (NatureServe 2022). The map below (Figure 3) illustrates the conservation status of *R. leptocarpa* throughout its range. Slender-fruit Beak Rush is critically imperiled (very high risk of extinction) in three states, vulnerable (moderate risk of extinction) in two states, and unranked in three states.

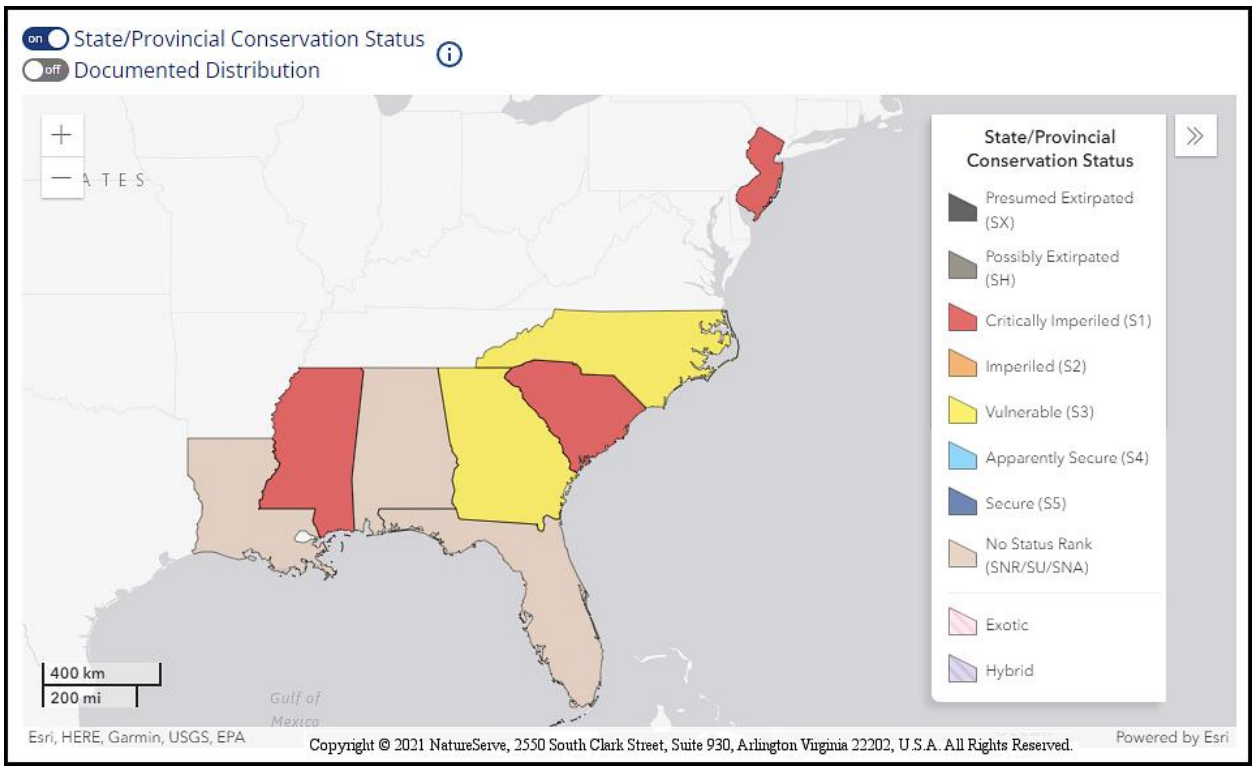

Figure 3. Conservation status of R. leptocarpa in North America (NatureServe 2022).

Rhynchospora leptocarpa is critically imperiled (S1) in New Jersey (NJNHP 2022). The rank signifies five or fewer occurrences in the state. A species with an S1 rank is typically either restricted to specialized habitats, geographically limited to a small area of the state, or significantly reduced in number from its previous status. *R. leptocarpa* is also eligible for protection in the portion of the state that falls within the Highlands Preservation Area (HL) (NJNHP 2010). Four populations are currently documented in New Jersey and two of those include more than one colony (NJNHP 2022).

Threats

All of New Jersey's known populations of *Rhynchospora leptocarpa* are located on protected properties in habitats where human disturbance is minimal (NJNHP 2022). In some southern populations the species' habitat has been threatened by conversion of the land for the establishment of pine plantations (Sorrie 1999).

Rhynchospora leptocarpa is susceptible to a smut fungus, *Cintractia farlowii*, which has also been found on *R. capitellata* and *R. glomerata* (Vánky 2010). The range of *Cintractia farlowii* extends from Massachusetts to Florida (Zundel 1939). The fungus infects the ovaries of the sedge plants, remaining completely concealed by the glumes, and eventually filling the spikelets with a powdery blackish-brown spore mass (Ling 1950, Vánky 2010). Smut fungi that attack the floral parts of graminoid species generally destroy the seeds entirely (Fischer 1953), and Clark (2003) reported that smut fungi observed on *Rhynchospora nitens* and *R. scirpoides* resulted in deformed spikelets that did not produce any achenes.

Both in New Jersey and elsewhere in its range, *Rhynchospora leptocarpa* is vulnerable to changes in hydrology. Slender-fruit Beaked Rush is intolerant of flooding that persists for more than a few hours, and the damming of stream heads to create ponds and reservoirs has been identified as a threat at some sites (Sorrie 1999). In the New Jersey Pine Barrens beaver activity could render a habitat unsuitable for the species, either by directly eliminating the sedge plants or by killing cedar trees and increasing the light levels on the forest floor (Moyer and Naczi 2017). Enhanced light availability could alter the community composition by making sites more accessible to other native or exotic species that would not normally be present in the shaded swamps.

As the climate warms, New Jersey is experiencing longer and more frequent summer droughts, a trend that is expected to continue (Hill et al. 2020). *Rhynchospora leptocarpa* occupies headwaters wetlands that are typically fed by groundwater seepage, and some of those sites may experience extended periods of drying as a result of a lowered water table and reduced precipitation. Although the climactic tolerances of *R. leptocarpa* have not been studied, it seems likely that prolonged droughts could reduce the viability of the obligate wetland species at affected locations.

Management Summary and Recommendations

Monitoring of extant *Rhynchospora leptocarpa* occurrences should focus on identification of site-specific threats, but further research on the species could provide a stronger foundation for management planning. For example, Sorrie (1999) indicated that fire suppression might threaten the species because it was apparently absent from headwaters areas that had not been burned or logged for a couple of decades, but Moyer and Naczi (2017) suggested that excessive sunlight could be harmful to the plants. Studies that could provide clarity regarding *R. leptocarpa*'s light requirements or competitive abilities would be useful. More specific knowledge about the sedge's dispersal mechanisms and requirements for germination and establishment would help to assess the severity of threats posed by changes in water levels or canopy cover. Additionally, while the harm to individual *R. leptocarpa* plants from the smut fungus has been documented, the extent of its population-wide impact is unknown.

Synonyms and Taxonomy

The accepted botanical name of the species is *Rhynchospora leptocarpa* (Chapm. ex Britton) Small. Orthographic variants, synonyms, and common names are listed below (POWO 2022, USDA NRCS 2022). Although the species name was published nearly a century ago (Small 1933) it has only come into use recently (Naczi and Moyer 2017), and a number of sources continue to include *Rhynchospora leptocarpa* as a synonym of *R. capitellata* (e.g. Godfrey and Wooten 1981, ITIS 2022). Kral (2020) also included it in *R. capitellata* but acknowledged some geographic variation in species characteristics. NatureServe (2022) has treated *R. leptocarpa* as a nonstandard species, noting that it is taxonomically questionable.

Botanical Synonyms	Common Names
Rhynchospora glomerata var. *capitellata* (Michx.) Kük.	Slender-fruit Beak Rush
Rhynchospora glomerata var. *leptocarpa* Chapm. ex Britton	Slender-fruit Beaksedge
Rhynchospora glomerata f. *leptocarpa* (Chapm. ex Britton) Kük.	
Rhynchospora glomerata var. *minor* Britton	
Rhynchospora capitellata var. *leptocarpa* (Chapm. ex Britton) S. F. Blake	

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