

THE MACROSCOPIC CYANOBACTERIUM *NOSTOC PARMELIOIDES* IN SWIFT CURRENT CREEK, SK, CANADA

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Although cyanobacteria or “bluegreen algae” are diverse and very common in Saskatchewan lakes, ponds and rivers they are for the most part only apparent when they form visible blooms, scums or large colonies. This is the case for a variety of common types of these photosynthetic bacteria – including *Aphanizomenon* spp., which may form characteristic colonies with the appearance of grass clippings or *Microcystis* spp., which typically form macroaggregates with gas vesicles allowing them to float and be visible in the open water.

However, several cyanobacteria can form colonies in streams large enough to be considered macroalgae. In general, these colonies are attached to substrata such as cobbles or large rocks and

form structures easily visible to the naked eye^{1, 2}. Several members of the cyanobacterial genus *Nostoc* form a variety of types and shapes of macrocolonies in freshwaters including: *N. caeruleum*, *N. commune*, *N. microscopium*, *N. pruniforme*, *N. verrucosum* and *N. zetterstedtii*.³

One common macrocolony former is *Nostoc parmelioides* which was first described in 1830 growing attached to rocks in fast flowing, acidic (pH <7), cold (4-5 °C) streams in Germany and northern Europe.³ *Nostoc parmelioides* is differentiated

from the other macroscopic members of this genus based on its discoid or spherical smooth surfaced thallus, which is variously described as ranging from 5 to 15 mm in diameter, or up to 350-700 mm, which is consistent with observations at Swift Current Creek.^{3, 4, 5}

Microscopic examination of the thallus revealed the presence of akinetes and vegetative cells typical of *Nostoc parmelioides*⁶ (subsequently it has been described from a wide variety of habitats, including streams of the tundra, coastal plains, coniferous forest,



FIGURE 1. Rock from Swift Current River, showing a typical array of macrocolonies with a range of coloration from near black to dark blue-green, less than 1 cm in diameter and frequently arranged in tight masses. Photo credit: Julie L. Roy.

hardwood forest, tropical rain forest, boreal forest, and desert chaparral¹). In North America, *N. parmelioides* has been found in fast flowing streams that are seasonally warm (+20 °C), alkaline (pH >8.3) and more nutrient rich.¹ Although *N. parmelioides* appears widely distributed, it has not been described from streams in the northern prairie grasslands.

In their survey, Sheath and Cole (1992) did not sample grasslands since they considered the habitat to have a “high degree of disturbance”.¹ The genus forms typical “spherical” structures anchored to the rock surface, generally dark blue green in colour and up to 1 cm in diameter but range, depending upon age and habitat, from microscopic initial colonies to large masses of colonies on the rock surface.

Figure 1 illustrates a typical array of colonies that are in general much less than 1 cm in diameter and frequently appear as tightly arranged masses. The site in Swift Current Creek (50°36'4.41 "N,

107°43'28.80"W -Hwy 738) was typical of many North American habitats in terms of high light levels, rapid water flow, pH 8.4, summer temperatures exceeding 20 °C and the presence of large rocks (Figure 2).

At some locations in North America, *N. parmelioides* has an interesting relationship with the fly larvae *Cricotopus* spp. that lives inside the macrocolony structure, tunneling through it and creating a colony type described as an ear-shaped flattened structure compared to the spherical ball typical of the colony.⁷ We did not observe this phenomenon in Swift Current Creek, although it has been reported in streams in Oregon.⁸

In conclusion, these observations provide a record of this species in a grassland biome with a range extension into southern Saskatchewan.

References

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FIGURE 2. The site in Swift Current Creek (50°36'4.41 "N, 107°43'28.80"W -Hwy 738) illustrating the habitat with high light levels, rapid water flow and the presence of large rocks. Stream width at this point was 12 m and flow rates may occasionally be as high as 100 m³/sec more typically they are < 5 m³/sec. Arrow indicates same location in each image. Photo credit: John R. Lawrence