

# **TITLE:** METAVIROME OF CANASTRA CHEESE: COMMUNITY COMPOSITION AND A NOVEL *STAPHYLOCOCCUS* PHAGE

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## **ABSTRACT:**

Bacteriophages have been studied in widely different environments. In dairy industries, phage contaminants can affect starter and adjunct starter cultures used in cheese production, causing pH increase, loss of sensorial characteristics and even inhibition of the fermentation process. Phage community composition and dynamics of artisanal cheeses are less known than in the industrial communities. Brazil has a wide variety of artisanal cheeses being produced, such as Canastra cheese. Thus, the aim of this study is to describe the metavirome and phage-bacteria dynamics occurring within the naturally starter cultures used in the production of Brazilian Canastra cheese. We used a metagenomic approach to analyze concentrated Viral-like particles from starter and whey samples of 12 distinct cheese producers in the Canastra region (Minas Gerais state). We also isolate a novel phage and its host bacteria by plaque assay and selective media, respectively. Their genomes were sequenced and analyzed. Metavirome analysis indicated the presence of phages belonging to Siphoviridae, Myoviridae and Podoviridae families. A novel *Staphylococcus* phage (SP01) was isolated, its genome analyzed and classified within genus *P68virus* (Podoviridae: Picovirinae). *Staphylococcus aureus* genome sequence did not present CRISPR/Cas sequences or prophage insertions, which can explain its susceptibility to SP01 phage infection. Metagenome reads were mapped against phage and bacterial genomes, and we observed the presence of phage reads in producer P44 and bacterial presence in producer P39 and P44. The isolation of a novel Podoviridae phage from dairy artisanal production that infects *S. aureus* is an important achievement for understand the diversity in this environment, with potential biotechnological applications. This study is the first description of the metavirome present in the endogenous starter cultures from artisanal Canastra Cheese.

**Keywords:** metavirome, phage, Canastra cheese, metagenome, microbiome

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