Intact filamentous *fd* bacteriophages (bacterial viruses) exhibit chiral nematic, smectic A and smectic C liquid crystalline properties. The viral particles are composed of DNA (a lyotropic nematic liquid crystal) and virus specific proteins. The major protein (g8p) is a bent-core protein whose optical properties have not been previously studied. The bent-core structure is a result of a 23° tilt angle located between Lys8 and Gly38, of its 50 amino acid α-helical backbone, and assists in self-assembly of the viral coat. Individual g8p peptides interact with one another through hydrophobic amino acids Val21 to Ile39 forming a helical array that surrounds the native virus' genetic material. The physiochemical properties of g8p led us to hypothesize that g8p has liquid crystalline properties, similar to other bent-core proteins. Hydrated 1.3 wt% suspensions of g8p were found to form birefringent aggregates and birefringent fibers of widths up to 17 μm and thicknesses of 12 μm, as determined by cross-polarized microscopy and profilometry. Scanning electron and atomic force microscopy revealed that g8p monomers organize to form thin sheets that wrap around a central axis to form fibers. These fibers resemble the filament structure of bent-core thermotropic B7 liquid crystals. Future research will focus upon the behavior of g8p in electric fields and the construction of nanowires using g8p as a biological template.