Daniel Cornelius Danielssen was born in Bergen, Norway. He became a pharmacist's apprentice at the age of thirteen but after a few years had to give up this profession because of tuberculosis. He recovered, but the infection continued to interfere periodically with his ability to work during the rest of his life. On recovering his health he continued his education and in 1835 went to Christiania (Oslo) where he qualified as a physician in 1838. He spent the remainder of his life in Bergen where he was appointed head of staff at the new hospital, Lungsogarden, for leprosy when it was opened in 1849. Danielssen had already established his interest and expertise in leprosy, for in 1847, together with C. W. Boeck, he had published two outstanding books on the disease: Om Spedalskhed and Atlas Colorid de Spedalsked. These works reflect his interest in post-mortem as well as clinical study of the disease and it is reported that he acquired a horrified awe in the minds of his patients by his passion for such examinations.

Danielssen sought an understanding of the cause of leprosy and repeatedly inoculated himself and members of his staff with leprous tissue obtained from patients, but never succeeded in transmitting the infection. This confirmed him in his firm opinion that leprosy was a congenital dyscrasia and not an infectious disease. When his son-in-law discovered the leprosy bacillus in 1873 Danielssen refused to accept this as the pathogen for leprosy. His resistance to the concept may not have been as firm as is commonly assumed for he apparently showed some annoyance with his son-in-law for not being adequately vigorous in his discovery claims. Also, when the renowned pathologist, Rudolf Virchow, visited him in 1859 he demonstrated to the latter the "brown nodules" which he regarded as characteristic of leprosy and which Hansen later showed to contain masses of bacilli. Virchow dismissed any idea of a casual relationship between these nodules and the disease, venturing instead the opinion that they were clumps of degenerated fat. It is said that Danielssen fretted to his dying day over having deferred to Virchow on this point.

Danielssen also made many contributions to zoology, contributing to Michael Sars's famous work, Fauna Littoralis Norvegiae and holding the chairmanship of the Bergen Museum from 1864 to his death. He joined several expeditions to the Arctic Ocean as part of his studies that contributed to the needs of the Norwegian fisheries. Additionally, he took an active part in politics, and as a member of the liberal party represented his native city in the Norwegian parliament for several years.