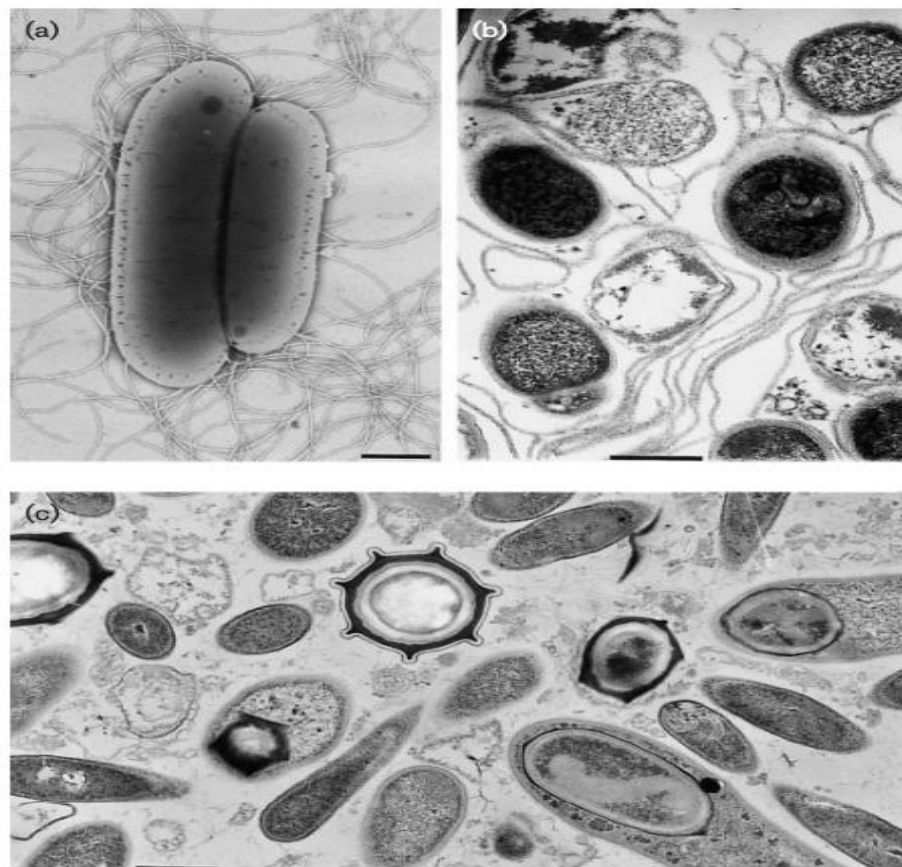


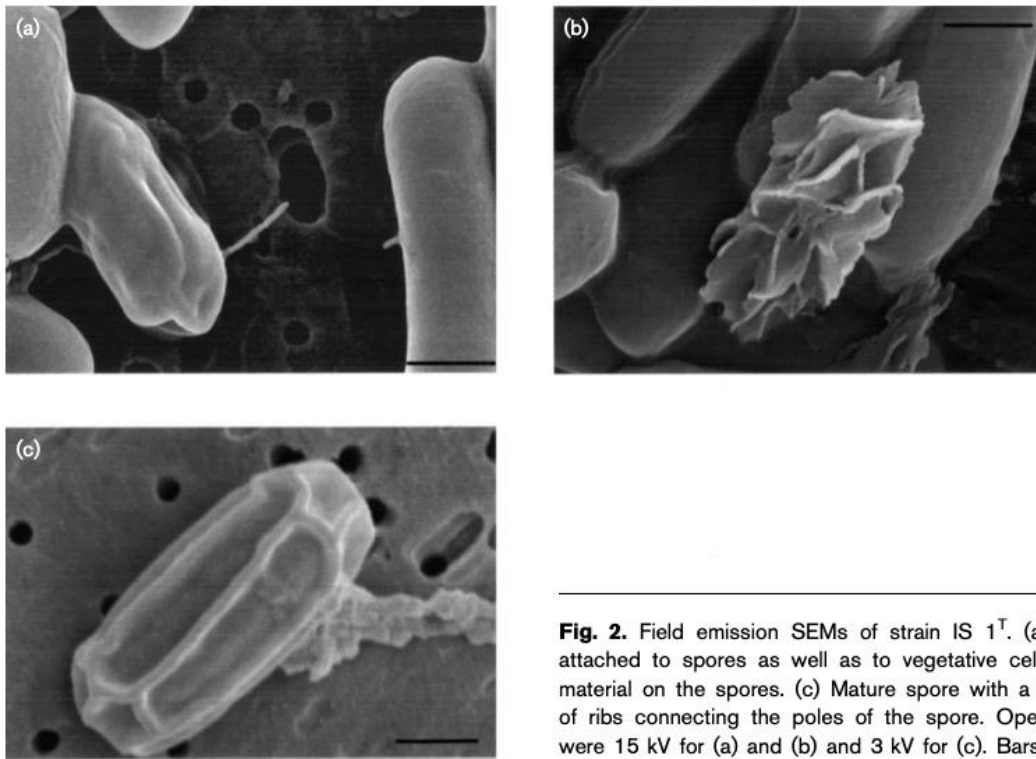
*Paenibacillus stellifer* sp. nov.

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**Fig. 1.** (a) TEM of a 1-day-old culture of strain IS 5 after negative staining with 1% phosphotungstic acid. A high degree of peritrichous flagellation is visible. (b) Thin section of strain IS 1<sup>T</sup> showing S-layer material being shed from vegetative cells. Sections were prepared from a colony cut from an TSA plate grown for 3 days at 28 °C. Shedding of S-layers may occur when cells are in contact with a solid surface. Operating voltage, 60 kV. (c) TEM of strain IS 5 from a 4-day-old culture showing vegetative cells and spores at different stages of maturation. Operating voltage, 60 kV. Bars, 500 nm.

(<https://www.microbiologyresearch.org/content/journal/ijsem/10.1099/ijms.0.02277-0#tab2>)



**Fig. 2.** Field emission SEMs of strain IS 1<sup>T</sup>. (a) Appendages attached to spores as well as to vegetative cells. (b) Layered material on the spores. (c) Mature spore with a regular pattern of ribs connecting the poles of the spore. Operating voltages were 15 kV for (a) and (b) and 3 kV for (c). Bars, 500 nm.

(<https://www.microbiologyresearch.org/content/journal/ijsem/10.1099/ijs.0.02277-0#tab2>)

### Scientific classification

Domain Bacteria

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Phylum: Firmicutes

Class: Bacilli

Order: Bacillales

Family: Paenibacillaceae

Genus: *Paenibacillus*

Species: *P. stellifer*

Binomial name
<i>Paenibacillus stellifer</i>
(Sáez-Nieto et al., 2017)

## *Paenibacillus stellifer* sp. nov.

*Paenibacillus stellifer* sp. nov is a novel Bacteria due to its prevalence in food contamination. It is found on cardboard and paper producing mills that produce gram-positive spores that produce toxins ([Pirttijärvi et al., 1996](#); [Suominen et al., 1997](#))<sup>6</sup>. First isolated and sequenced using 16s RNA sequencing showing closest relative of *P. Stellifer* is *P. Azotofixans* using bootstrap and comparison sequencing with *Bacillus/Staphylococcus*<sup>6</sup>.

- **1Morphology:**
- **2Phylogeny and Genome Evolution:**
- **3Metabolic details:**
- **4Relevance to Broader System:**
- **5References**

### **Morphology:**

*Paenibacillus Stellifer* grows in microcolonies and is isolated most often from cardboards industrial machinery paper mills and plant tissue. Bacterial systematics found straight-chain fatty acids made up 41–60% of the total cellular fatty acids ([M Rättö](#))<sup>7</sup>. The spore surface had a characteristic ribbed ornamentation<sup>7</sup>. Spores and vegetative cells frequently had pilus-like appendages. Based on phylogenetic data and phenotypic and chemotaxonomic characteristics, is proposed that the isolates represent a novel species. Sporulated forms of *P. Stellifer* show gram-positive, meaning thick peptidoglycan layer and no outer lipid membrane. Have shiny smooth colonies with high mucous secretions and irregular formations give the appearance of slime mold.

*Paenibacillus Stellifer* strains are referred to as star-bearing endospores [Suominen](#)<sup>6</sup>.

### **Phylogeny and Genome Evolution:**

*Paenibacillus stellifer* closest relative using 16 S Rna sequencings is, *Paenibacillus azotofixans* a nitrogen-fixing bacterium often found in soil and the rhizospheres of

different grasses (Grady)<sup>2</sup>. There are at least five phylogenetic lines for *Bacillus*, but *Paenibacillus Stellifer* can be quickly identified with the presence of NIFH gene probe [C Ash](#)<sup>1</sup>.

## Metabolic details:

*Paenibacillus stellifer* is a polysaccharide producing bacteria that produces heteropolysaccharides as byproducts (galactose, glucose mannose, rhamnose fucose, and uronic acids([M Rättö](#))<sup>7</sup>. The most dependent form of metabolization is through NIFH a nitrogenase supporting a high rate of N<sub>2</sub> fixation as a preferred source of energy . A vast range of *Paenibacillus* can promote the growth of plants due to nitrogen fixation and intake of phosphates through solubilization to make Acetic acid known to farmers as IAA(Roey<sup>9</sup>).

## Relevance to Broader System:

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During a study that assessed the drought tolerance of pigeon peas, *Paenibacillus stellifer* alongside *Bacillus Azotoformans* and *Bacillus Aryabhatai* were used as agents of moisture retention. *P. Stellifer* did not follow a recommended technique to improve drought tolerance [Nunna Sai Aparna Devi](#)<sup>8</sup>. *Paenibacillus Stellifer* was found inside a slime deposit as a polysaccharide-producing organism and may pose a danger due to slick surfaces on machinery and walkways.(Suihko [M Rättö](#), Suihko )<sup>6,7</sup> Studies show they also offer defense from herbivores in plants as a natural insecticide coat rich in chemicals when packed in high abundance; however larvae are the causative agents of American foulbrood, an opportunistic pathogen to honeybees, and sometimes even humans. [Elliot Nicholas Grady](#)<sup>2</sup>

## References

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