



PlasmidFactory: Lords of the rings

PlasmidFactory started life in Bielefeld, Germany, back in 2000. The century's biggest medical innovations – gene and immunotherapies – are helping the company grow at an impressive rate. It has expanded from 4 employees to 34 and has doubled its revenue every year for the past three years. Its high-grade plasmids and plasmid derivatives are needed for mRNA vaccines and CAR-T cell therapies – and are in increasing demand worldwide.

Plasmids are small rings of double-stranded DNA that bacteria use to swap genetic information or transfer into host cells. By the time Martin Schleef began studying them for his PhD, they had long served as indispensable tools in biotechnology. Their quality, though, was rarely up to scratch. Schleef investigated how to solve this problem during his time as a postdoc at the Institut Pasteur in Paris. He then went on to work at QIAGEN, where he stayed until he and three colleagues founded PlasmidFactory in 2000. Their aim was to produce plasmids of the very highest quality. Although they initially received support from Bielefeld University, they had to find their feet without any venture capital. They launched the business with two defective fermenters that they bought in the US and repaired in Bielefeld.

Schleef has been CEO of PlasmidFactory since 2000. He sees himself as a scientist who runs a business, rather than an entrepreneur who does research on the side. By adopting this angle, he has embedded the company in a vibrant network of high-level academic exchange. Its focus on research has led to the development of plasmids that are so efficient scientists can load viral gene vectors with just two plasmids instead of three (AAV 2-plasmid system). This makes it significantly cheaper to produce these vectors at scale. PlasmidFactory has also developed proprietary minicircle technology, for which it owns all relevant patents. Minicircles are plasmids without their bacterial backbone, on which (among other things) antibiotic-resistance genes are found. The minicircles contain more or less nothing but the DNA information they actually need.

Minicircles perfectly fulfil the high regulatory requirements of gene and immunotherapies. To produce CAR T cells that can recognize and destroy cancer cells, immune cells are taken from a patient, genetically modified and then infused back into the patient. Previously, modifying the T cells was only possible using viral vectors, which pose a safety risk. Minicircles circumvent that risk, which makes it easier to develop highly effective cancer therapies. PlasmidFactory

works closely on this with the Max Delbrück Center and the University Hospital of Würzburg.

Because DNA plasmids are key components of mRNA vaccines – like printing blocks, they form the mirror-image matrices for the vaccines – PlasmidFactory became one of the most in-demand contract manufacturers during the pandemic. To meet the huge demand, PlasmidFactory set up a new production facility for manufacturing extremely pure and ultramodern plasmids. The facility received financial support from the State of North Rhine-Westphalia and was finished in record time. It began operating in December 2021.

Schleef is sure that global demand for plasmids will far exceed supply in the coming years. PlasmidFactory therefore wants to strike a good balance between research and production as it grows. The company has found a well-financed international investor to help it achieve that: ArchiMed is a leading private equity fund that operates exclusively in the healthcare space. The partnership was signed and sealed in late September 2022.

