Electrochemistry

The (Accidental) Discovery of Cisplatin Anti-Cancer Drugs

Electrochemistry

Enrichment – The Discovery of Cisplatin

What interesting discoveries have been made when performing electrolysis using metal electrodes?

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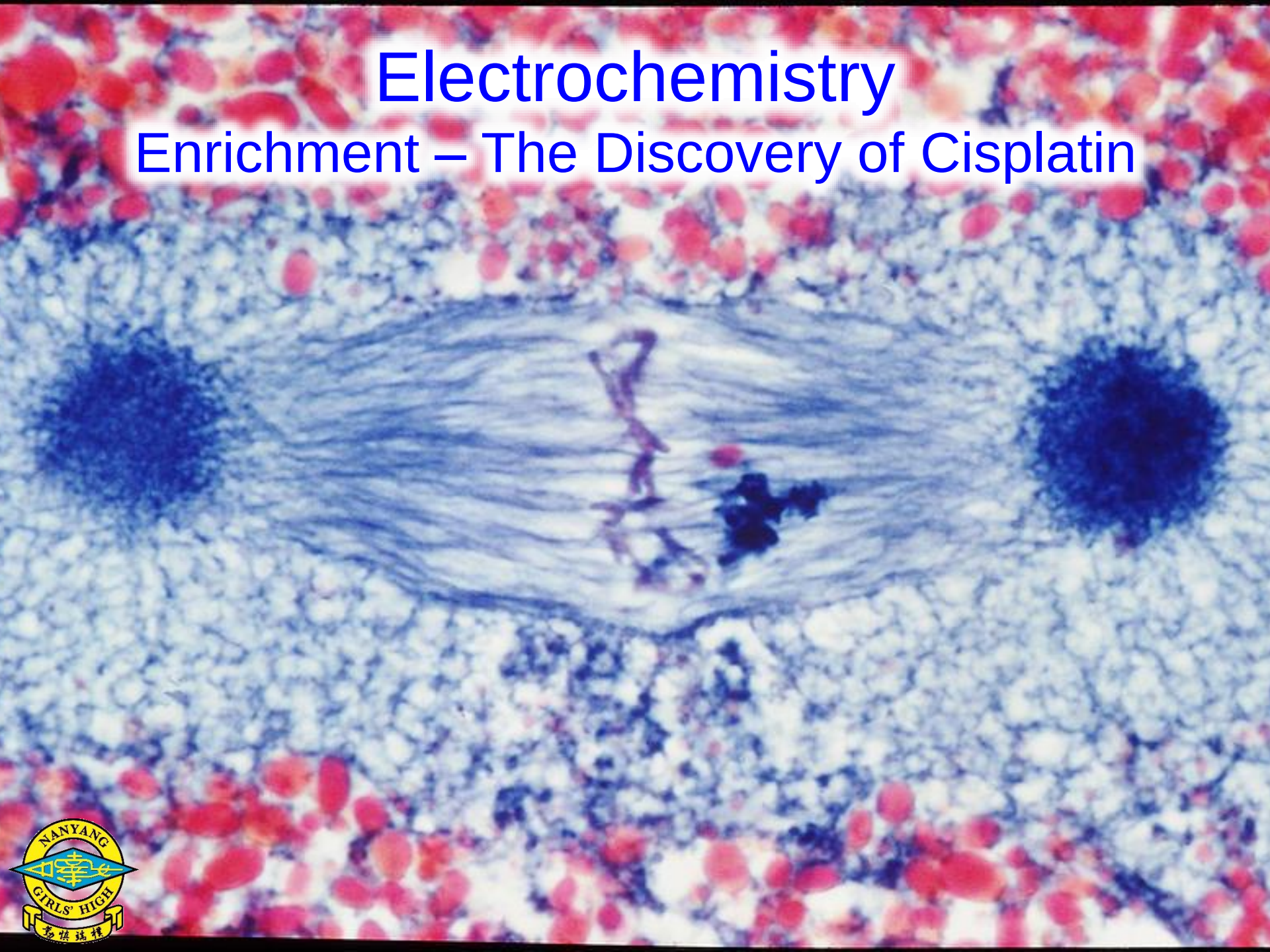
Enrichment – The Discovery of Cisplatin



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- Dr. Barnett Rosenberg (1926 – 2009) was a research scientist at Michigan State University.

- In 1965, Dr. Rosenberg saw a photograph, taken under an electron microscope, of a cell undergoing *mitosis* (cell division).

- This image shows *metaphase*, one of the stages in *mitosis*. Compare this image to the image on the next slide.

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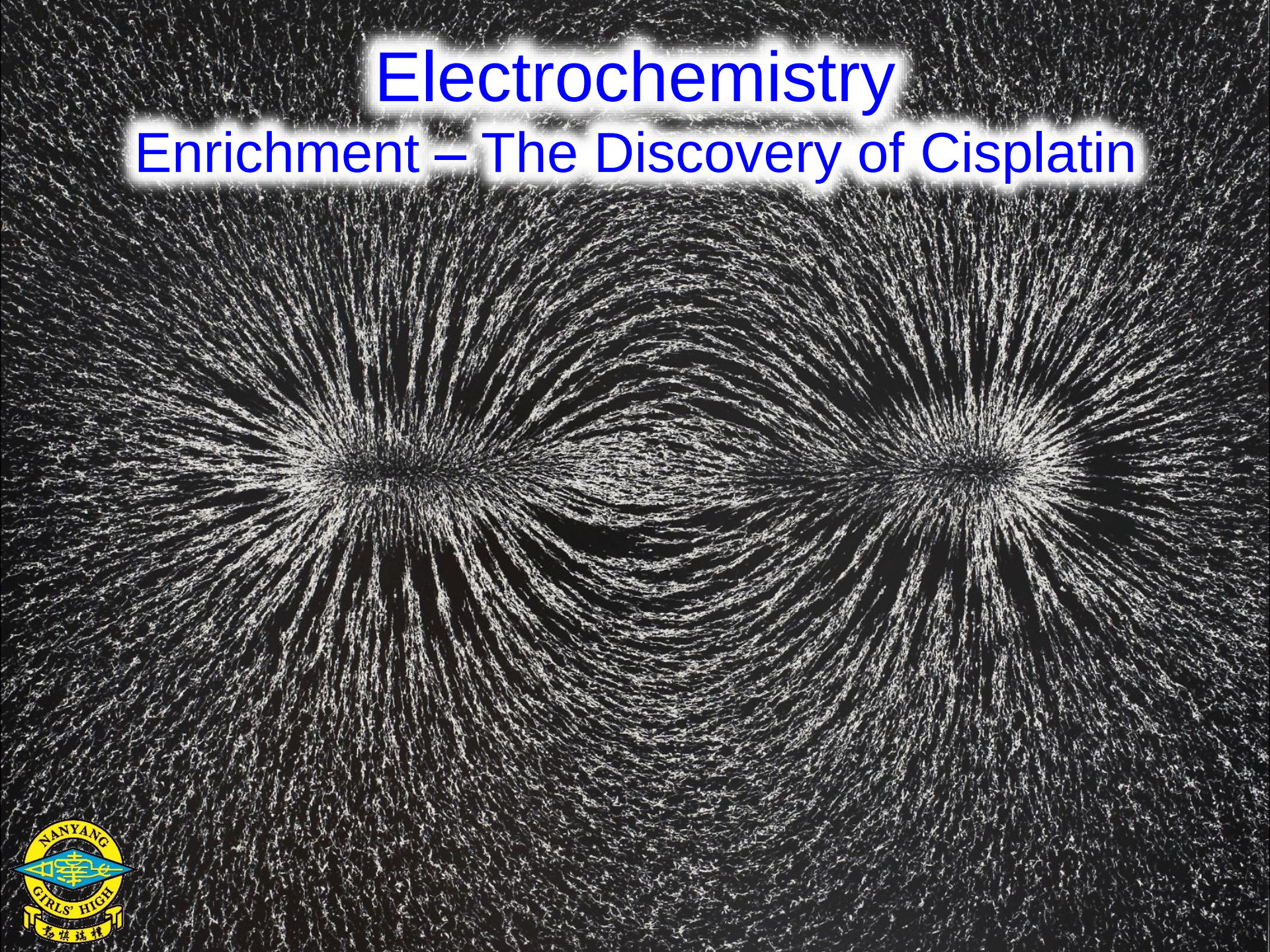

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- Dr. Rosenberg made an insightful connection. He thought that the image of a *cell dividing* resembled the shape that *iron filings* achieve when they are subjected to the *magnetic field* created by a bar magnet.

- To investigate this, Dr. Rosenberg designed an experiment in which he passed an *electric current* through a beaker of *Escherichia Coli* bacteria suspended in a nutrient medium.

- It is important to note that Dr. Rosenberg chose to use *platinum electrodes* in his experiment, as platinum electrodes were understood to be biologically and chemically inert .

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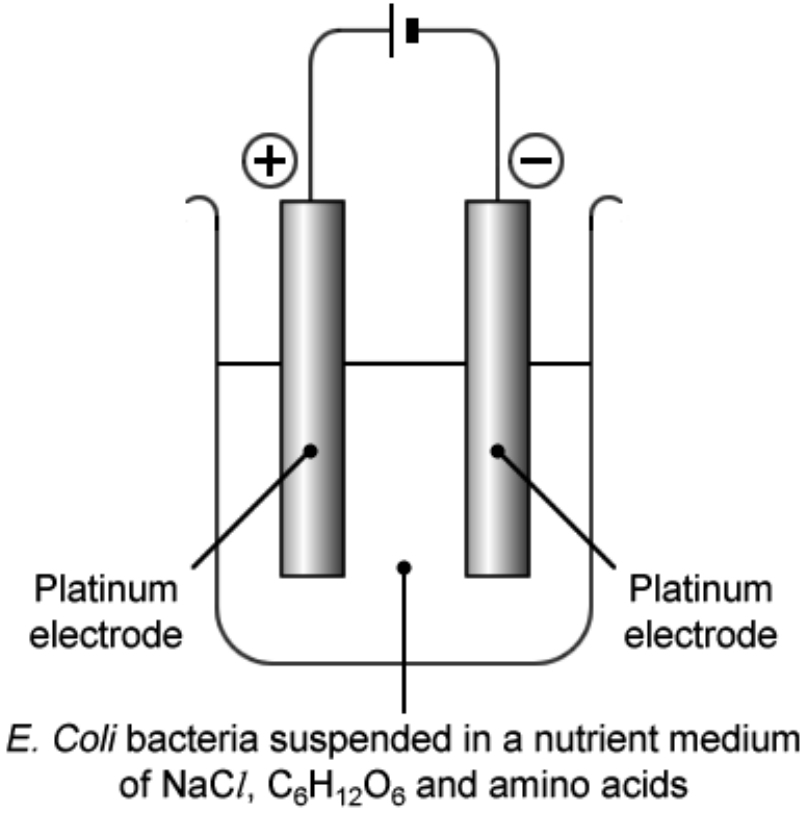

- Diagram of the experiment used by Dr. Rosenberg in 1965 to examine the effect of an electric current on cell division in *E. coli*.

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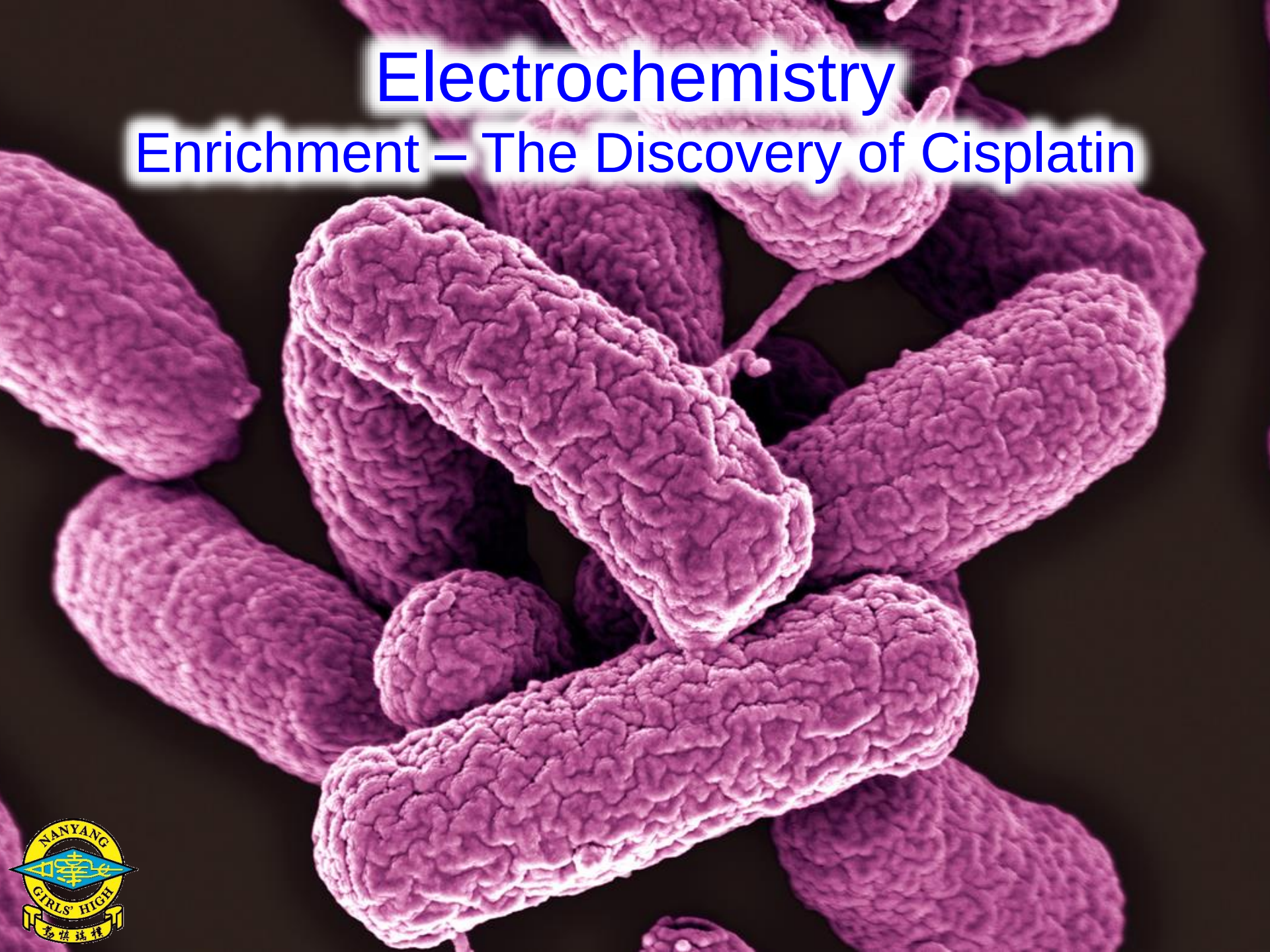

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- Dr. Rosenberg discovered that the rod shaped *E. coli* bacteria *stopped dividing*, but *continued growing* up to 300 times their normal length, when an electric current was passed through them.

- It took Dr. Rosenberg an his team several years to work out exactly why the bacteria had stopped dividing.

- The bacteria did not stop dividing due to the flow of electricity through them. Instead, the bacteria stopped dividing due to a compound called *cisplatin* that was formed when the supposedly inert platinum electrodes reacted with chemicals in the nutrient medium.

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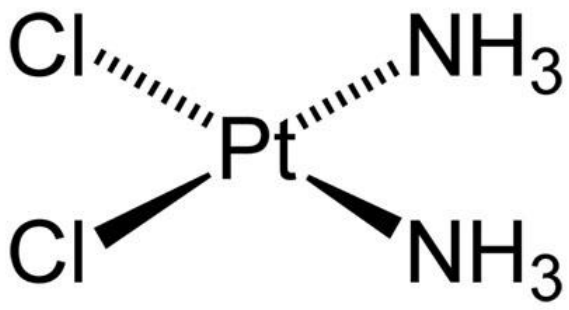

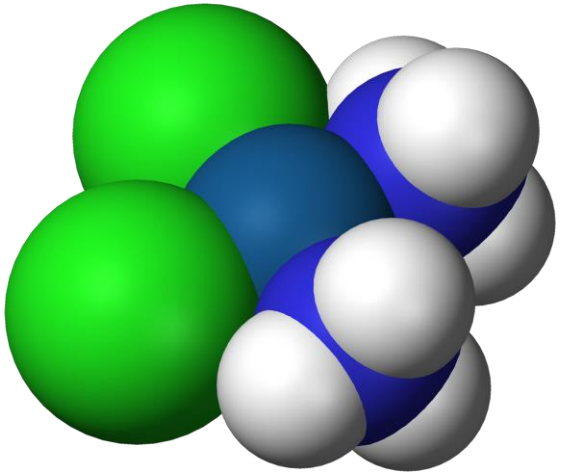

- Cisplatin, $Pt(NH_3)_2Cl_2$, inhibits cell division by cross-linking strands of DNA. This prevents DNA from replicating and hence prevents cells from dividing.

- Its ability to prevent cell division means that cisplatin is now used around the world as an *anticancer drug*.

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Presentation on

The Discovery of Cisplatin Anti-Cancer Drugs

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