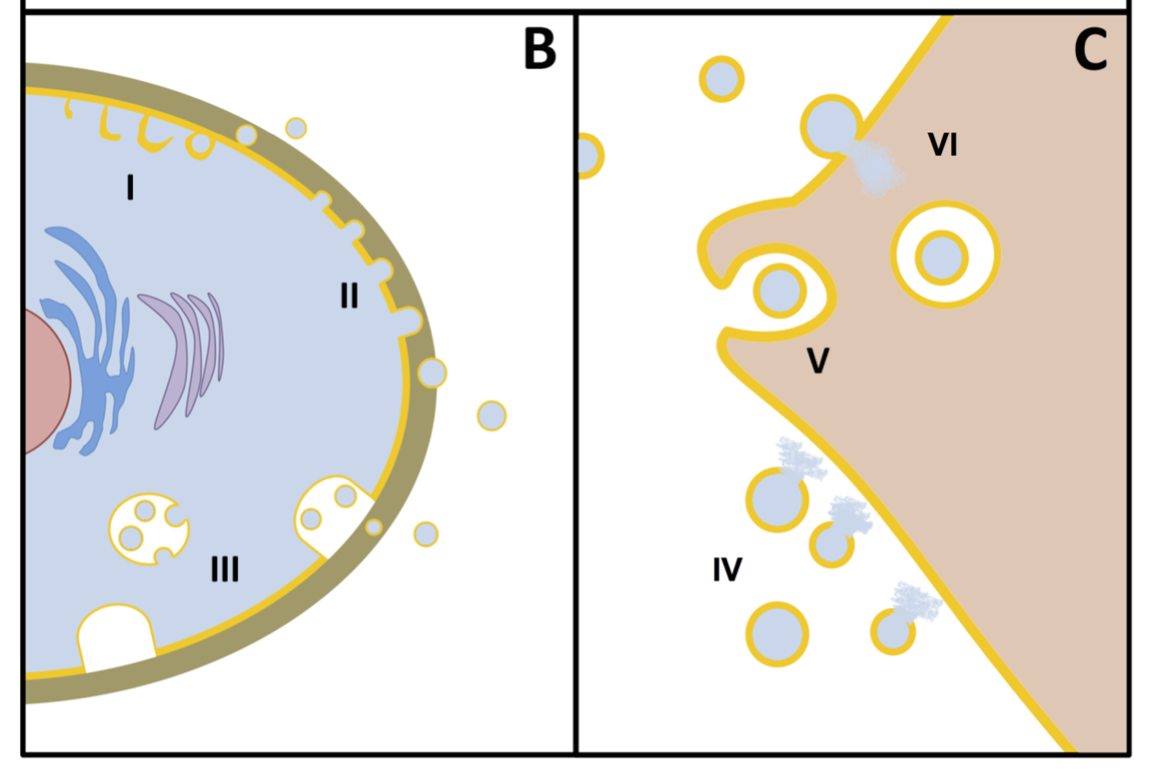
**Figures Chapter 1**





**A**

**B**

Figure 1: An overview of the practical features of fungal EVs. A: The biogenesis of fungal EVs is depicted by (I) plasma membrane remodelling (II) Development of ectosomes is caused by membrane budding. (III) Development of multivesicular bodies (MVBs), accompanied by fusion with the plasma membrane for extracellular release of exosomes. B: Internalization of fungal EVs is possible (V) or fusion with host cell plasma membrane and as result, vesicular cargo is likely to be released intracellularly (VI). Picture adopted from Rodrigues et al (2015).

**Figure 2**: Timeline of key developments in EV research

Table 1: Overview of the types of protein cargo internalized and released by EVs during cell-cell communication studies in fungi, and their effect on recipient cells/tissues.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Fungal species (Source cell)** | **Type of cargo** | **Role of EVs** | **Recipient cell/tissue** | **Effect on recipient** | **Reference** |
| *Fusarium oxysporum f. sp. vasinfectum* | Polyketide synthase; Proteases;  Naphthoquinone pigments; ribosomal proteins; HSP70 like proteins; unfolded proteins; and proteins involved in glucose metabolism, GTP binding and GTP hydrolysis | A plausible role in the infection process such as toxin production | Cotton plant cells | Discolouration of cotyledon or leaf | Bleackley et al., 2020; Garcia-Ceron et al., 2021 |
| *Penicillium digitatum* | Tryptoquialanine A; Polyketide synthases | Possibly a site of pigment biosynthesis and secondary metabolite transfer | Citrus fruit cells | Colour alteration of seeds and tissue damage | Costa et al., 2021 |
| *Sporothrix brasiliensis* | Proteins related to metabolism, transport, signalling, DNA repair and stress response; Virulence associated proteins; cytokines and serine/threonine protein kinases | Transport of fungus-produced molecules involved in virulence and immune system regulation | Human dendritic cells | nr | Ikeda et al., 2018 |
| *Saccharomyces cerevisiae* | Glucan synthase; Chitin synthase | Regulation of cell wall dynamics | ns. | ns | Zhao et al., 2019 |
| *Cryptococcus neoformans* | Glucuronoxylomannan; Chaperone proteins; ribosomal proteins | Contain major virulence factor | Macrophage cells | nr | Rodrigues et al., 2007,2008 |
| *Aspergillus fumigatus* | RNA/carbohydrate/protein binding proteins, proteins with structural activities; hydrolases; transferases; peptidases; oxidoreductases | Transport of fungus-produced proteins involved in growth and development | ns | ns | Souza et al., 2019 |
| *Aspergillus parasiticus* | Polyketide synthase | Aflatoxin biosynthesis and export | ns | ns | Chanda et al., 2009 |

nr = not reported; ns = not studied

Table 2: Overview of the types of Secondary metabolite internalized and released by EVs during cell-cell communication studies in fungi, plant and bacteria, and their effect on recipient cells/tissues.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source cell** | **EV type** | **Metabolite** | **Effect on target cell/tissue** | **Reference** |
| Fungal: *Penicillium digitatum* | nr | Tryptoquialanines | Colour alteration and tissue damage | Costa et al., 2021 |
| Plant:  *Nicotiana tabacum* and *Aconitum napellus L.* | Nanovesicles | Curcuminoids Chlorophylls | nr | Woith et al., 2021 |
| Plant:  Ginger | Nanovesicles | Shogaol | Prevent the onset of liver-related disorders | Zhuang et al., 2015 |
| Fungal: *Aspergillus parasiticus* | nr | Aflatoxin | Vesicles converts sterigmatocystin to aflatoxin B1 | Chanda et al., 2009 |
| Fungal: *Fusarium oxysporum f. sp. vasinfectum* | nr | Polyketides | Phytotoxic effect to leaves | Bleackley et al., 2020 |
| Bacterial: *Myxococcus xanthus* | OMV | DK xanthene; cittilin A, myxovirescin A, myxochelins and myxalamids | Yellow pigmented OMVs  Assist in killing of *M. xanthus* microbial prey | Evans et al., 2012;  Schwechheimer and Kuehn, 2015 |

nr = not reported