# luSummary of 4 Pathogens

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| Pathogen group | Diseases | Structural features | Reproduction & other unique features | Diagram |
| Virus | InfluenzaRoss River virusViral diseases of honeybeesAustralian bat lyssavirus | Nucleic acid – DNA or RNA – enclosed in a protein coat (capsid)Contains proteins which can recognise and bind to receptors on a host cellVery small – 30-300 nm in lengthno cell organellescan be enveloped – phospholipid bilayer surrounds virus 🡪 infects eukaryotes | Metabolically inert – no cellular machinery* Requires taking control of a host cell to be able to replicate – obligate parasite
 | General structure of a virusEnveloped virus |
| Bacteria | TuberculosisTetanusCrown gall of plants | ProkaryoticUnicellularNo membrane-bound organellesOrganelles present include ribosomesNo nucleus – singular circular chromosome found in nucleoid region, can have plasmidsMicroscopic – 1 to 10 um longCell wall and plasma membrane is made of peptidoglycan (amino acids and sugars) | Reproduces asexually by binary fission |  |
| Fungi | Chytridiomycosis | EukaryoticMembrane-bound organellesDNA enclosed in nucleusCell wall is made of chitinCan be unicellular or multicellular | Reproduction via spores |  |
| Protist | MalariaPhytophthora dieback | EukaryoticMostly unicellularMembrane-bound organellesDNA enclosed in nucleusSome have cell walls – if they do they are made of cellulose | Can reproduce asexually or sexually, depending on the protist |  |

# Summary of 10 Diseases

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| Disease | Pathogen Type | Pathogen Name | Incubation period of Disease | Symptoms of Disease | Mode/s of Transmission | Life Cycle Specifications[portal of entry, site(s) of replication (sexual/asexual reproduction), reservoir(s), portal of exit] |
| Influenza | Enveloped RNA virus | Influenza A, B or C | 1-4 days | Symptoms last for up to 2 weeksHigh feverCoughingMuscle aches and painsSore throatRunny noseSevere fatigueVomiting and diarrhoea (in children) | Direct via close contact to airborne droplets containing influenza virusdirect via direct contact of infected host’s bodily fluidsIndirect via fomites, aerosols | Reservoir: Human hostEntry and exit via respiratory system – coughing, sneezingReplicates inside epithelial cells of the respiratory tract |
| Ross River virus | Enveloped RNA virus | Ross River virusGenus: alphavirus | 1-3 weeks | Most people recover completely within 3-6 months, but some people can have symptoms lasting for more than a year, or reoccurring symptomsRash on limbs for 5-10 daysPainful and swollen joints lasting for monthsFever and headacheFatigue | Indirect via vector – pregnant female mosquito containing the Alphavirus* Aedes vigilax
* Aedes Camptorhynchus
* Culex annulirostris
 | Reservoir: marsupials eg. wallabies* Preganant female mosquitoes feed on marsupial reservoir and take in Alphavirus

Replicates in the epithelial cells of the mosquito vector Entry to human via skin –virus migrates to mosquito salivary glands and is injected into human bloodstream when mosquito feedsReplication in muscle cells of human hostSymptoms occur when virus re-enters bloodstreamNo exist from human host unless mosquito bites infected human |
| Honey bee viruses: deformed wing virus | Virus | Deformed wing virus |  | Deformed wingsEarly death of pupaeInfected bees can also be asymptomatic | Indirect via varroa mite vectorDirect via vertical transmission from queen bee to offspring | Entry and exit via skin – blood feeds from varroa mite vectorsReplicates in bee |
| Honey bee viruses:Sacbrood Disease | Enveloped RNA virus | Sacbrood virusGenus: Ifavirus |  | Adult bees stop eating pollen and become foragers, collecting nectar insteadLarvae display unusual behaviour – turn onto backs and lie stretched out with their heads liftedSkin hardens and fills with fluid | Indirect via foodborne* If infect adult honeybees collect pollen, it is contaminated
* Vector nurse bees bring contaminated food to larvae – hypopharyngeal glands (produces food) are infected

Direct via dead infected larvae and their bodily fluids – fluids in larvae skin, scales | Entry via ingestion of contaminated foodReplicates in larvae cellsExit via corpse |
| Australian Bat Lyssavirus | Enveloped RNA virus -cylindrical shape  | Australian bat lyssavirusFamily: Rhaboviridae | 27 days to 21 months | In humans: Flu-like headacheFeverFatigueParalysisDeliriumConvulsionsEncephalitis – inflammation of the brainDeathIn bats:ParalysisWeaknessTremorsSeizuresInfected bats can be asymptomatic | Direct via direct contactwith bat reservoir/vector bodily fluids, through a bite or scratch | Reservoir: flying foxes( fruit bats) and some species of microbats* Replication in bat reservoir (nervous system)

Entry via site of bite/other break in skin/mucous membranes – saliva of infected bat enters human bodyReplication in infected human host before travelling along nerves to the central nervous systemNo exit from human host |
| Tuberculosis | Rod-shaped bacteria | Mycobacterium tuberculosis | 3-9 weeksTB can stay dormant in the body for months or years as latent TB | Usually impacts the lungs, though it can cause disease in any part of the bodyCough persisting for over 3 weeks with no improvementBlood-stained sputumFeversNight sweatsUnexplained weight lossConstant fatigueLoss of appetitePain and/or swelling in the affected area | Direct via close contact to airborne droplets containing the bacteriumIndirect via aerosols, fomitesDirect via direct contact with infected host’s bodily fluids eg. phlegm | Reservoir: infected human host – can be active or domantEntry and exit via respiratory system – coughing, sneezingReplicates inside infected macrophages, lung tissue |
| Crown Gall Disease | Rod-shaped bacteria | Agrobacterium tumefaciens |  | Tumour-like growth at the crown area – around stem and rootsAffects plant growth – plant wilts, experience stunted growthdeath | Direct via direct contact with the roots of infected hostIndirect via soil-borne – bacteria spores have flagella and can move through water in soil | Reservoir: infected plants - gallEntry via wound in plant (susceptible host)Replicates in wounded plant cells whose genomes have been permanently transformed |
| Tetanus | Rod-shaped bacteria | Clostridium tetani |  | Symptoms begin 3-21 days after infectionRigidityPainful fits lasting for minutesMuscle contractions and spasms particularly in the face and neck ‘lockjaw’/trismus – muscles contract and can’t relax – can’t open mouthDifficulty swallowing and breathingHeat problems and feverdeath | Direct via direct contact with soil reservoir | Reservoir: soil, rusty nails, dog’s teeth, animal intestines and faeces, house dustEntry via deep wound in skin – hypoxic conditionsReplication in deep hypoxic wound – produces toxinsNo exit from human host |
| Chytridiomycosis/ amphibian chytrid fungus disease | Fungi | Bactrachochytrium dendrobatidis (BD) | 2-10 weeks | LethargyExtension of hind legs from bodyAbnormal behaviour eg. sitting in shade instead of sunLoss of appetiteSkin thickens, hardens and shedsDeath 2-3 days after the onset of symptoms | Indirect via waterborne zoosporesDirect via skin to skin contact with infected amphibian | Reservoir: skin of infected amphibiansEntry via skinReplicates in zoosporangia in amphibian skinExit via zoosporangia discharge tubes in amphibian skin |
| Malaria | Protist – animal-like – protozoa/ protozoan | Plasmodium falciparumPlasmodium vivaxPlasmodium ovalePlasmodium malariaePlasmodium Knowles | 7 – 18 daysPlasmodium vivax and ovale can remain dormant for up to a year | FeverHeadacheChills, shaking, shiveringSweatingVomitingAnaemiaLiver and kidneyfailureMuscle achesNauseaDeathJaundiceCerebral malaria – swelling of the brainAcidosisEnlarged spleenPulmonary oedetra | Indirect via pregnant female mosquito of genius AnophelesRare: direct via direct contact with bodily fluids of infected human host eg. blood transfusions, sharing of needles | Reservoir: mosquitoEntry via vector biting human – protist in saliva in sporozoite formReplicates in human liver cells – sporozoites develop into merozoites* Merozoites invade red blood cells
* Some merozoites can develop into gametocytes

Exit via vector biting human – mosquito takes in gametocytesReplicates in the gut of mosquitoes |
| Phytophthora dieback | Protist – plant-like | Phytophthora cinnamomi |  | Root rotDeath of plant from top down | Indirect via soil-borne – spores can remain dormant for a long time in soilDirect via root to root contact with infected plant | Reservoir: infected plants, soilEntry via rootsReplicates in mycelium in rootsExit via spore sacs or chlamydospores, depending on suitability of conditions |