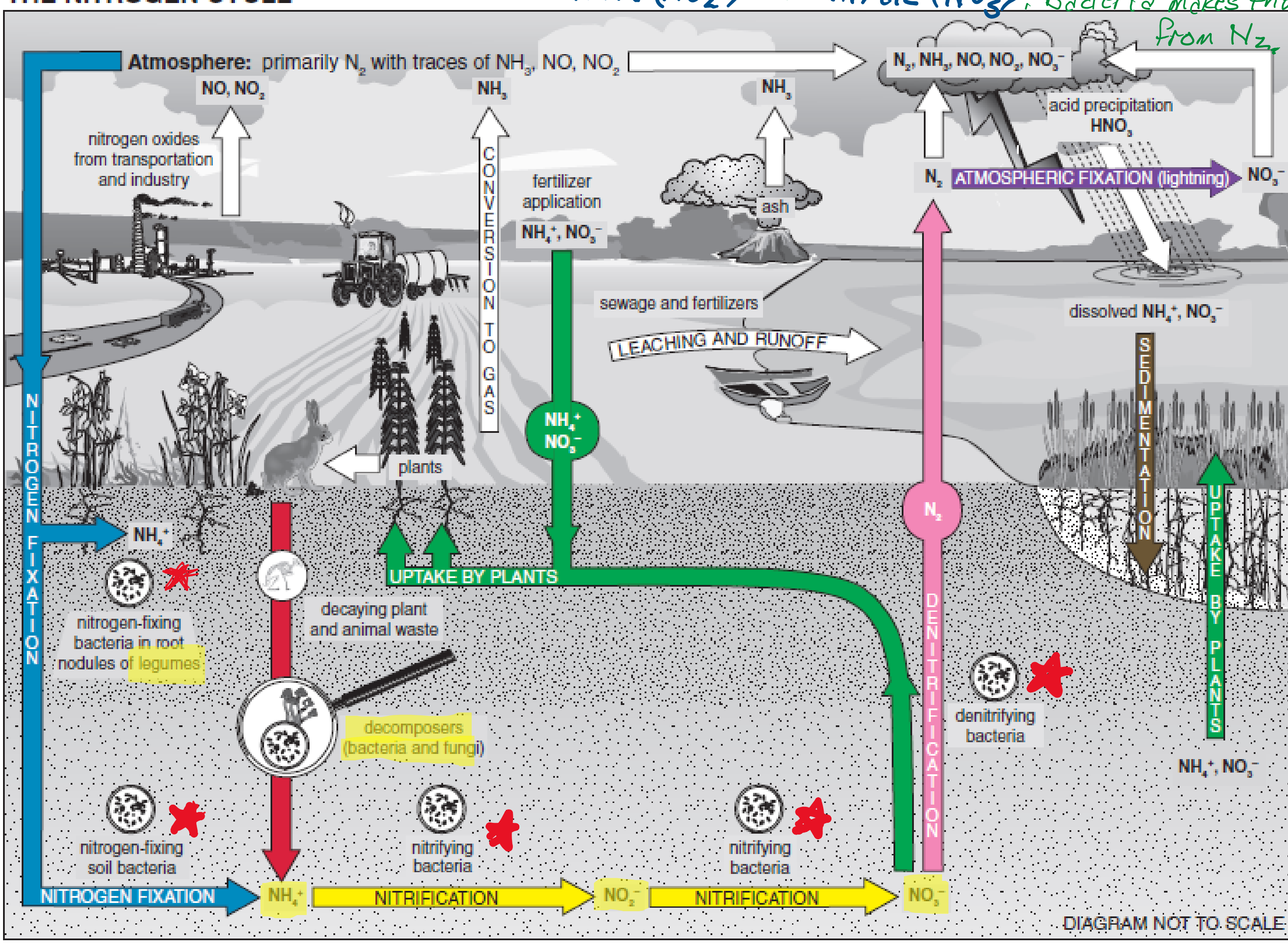
Name:_________________________

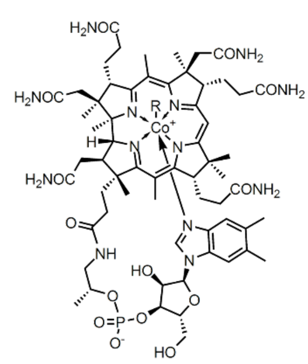
Bacteria Now

The most important role Bacteria has now, is in Nitrogen Fixation. All proteins are made of **amino acids**, with the general formula $H_2NCHRCOOH$, where the R represents a side branch. All proteins require Nitrogen. The atmosphere is 78% **nitrogen gas (N_2)**. However biological entities require nitrogen in the form of **nitrite (NO_2^-)** or **nitrate (NO_3^-)**. Bacteria makes those from N_2,

THE NITROGEN CYCLE



Vitamin B, Insulin, Somatotropin, etc.



R = 5'-deoxyadenosyl, Me, OH, CN

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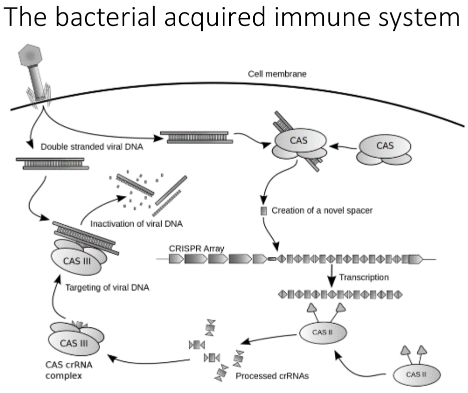
Since all life is descended from the LUCA (Last Universal Common Ancestor) who had DNA and transcription/translation which was inherited by all life, genes from other organisms can be inserted into bacteria to make organic compounds we need, such as vitamin B12, Insulin and Somatotropin (Growth hormones). The products are exactly like those made in humans.

In 2005, researchers reported on a discovery in bacteria that rewrites what textbooks say about immune systems. They found an **acquired immune system** in bacteria that snips out with incredible specificity viral DNA from their chromosome. Acquired immune systems were considered to be unique to vertebrates. It consists of T lymphocytes that recognize pathogens and creates antibodies to mark them for destruction. The bacterial acquired immune system consists of genes in their chromosome.



CRISPR is an acronym for Clustered Regularly Interspaced Short Palindromic Repeats.
CRISPR is now used for solving genetic problems and fixing some genetic diseases like Sickle-cell anemia.

Life Sciences 11
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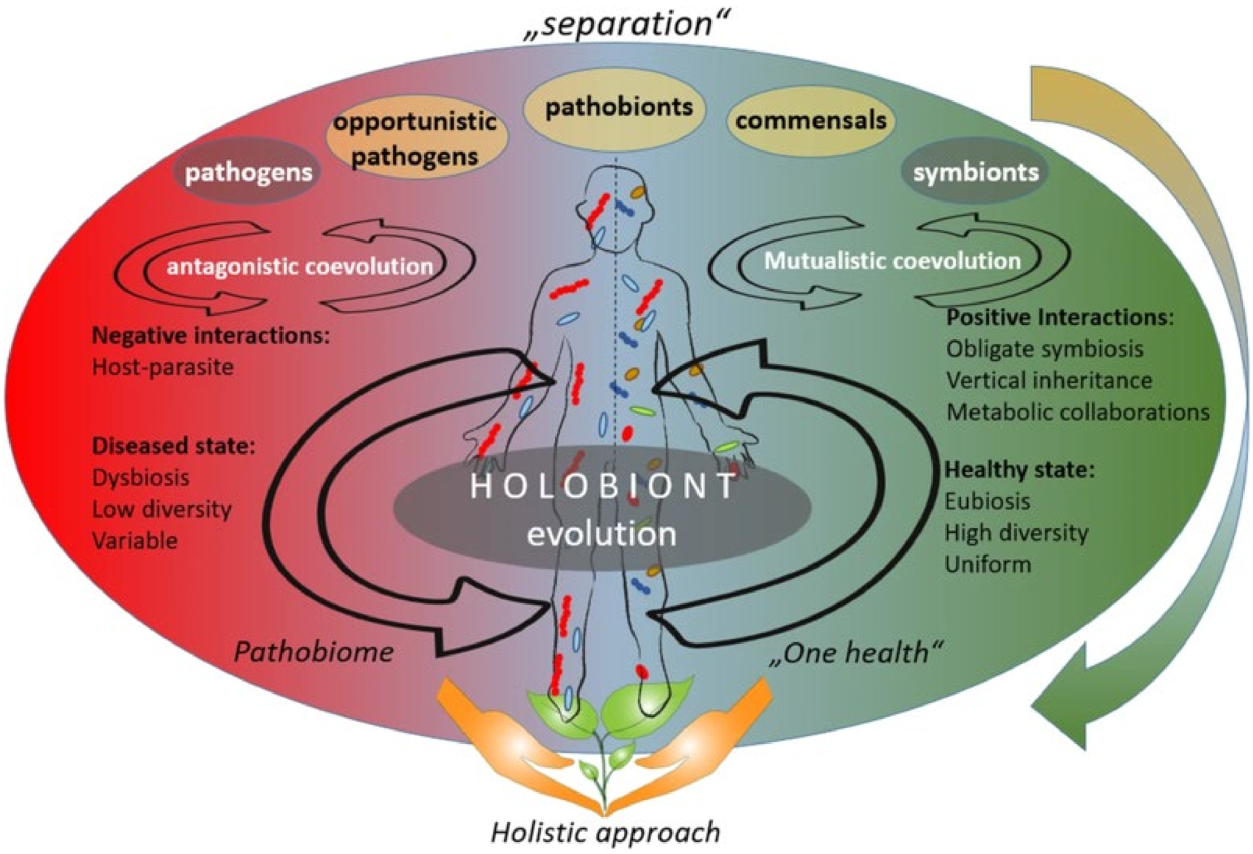
The Microbiome



A shift in the understanding of the microbial-host coevolution from the "separation" theories to the holistic approach.
The hosts and their associated microbiota are assumed to have coevolved with each other, whereby different approaches are considered to describe the coevolution theory. According to the “separation” approach (upper part of the figure), the microorganisms can be divided into pathogens, neutral, and symbionts, depending on their interaction with their host. The coevolution between host and its associated microbiota may be accordingly described as antagonistic (based on negative interactions) or mutualistic (based on positive interactions). The recent emerge in publications about opportunistic pathogens and pathobionts gave a shift towards holistic approach in the coevolutions theory (lower part of the figure). The holistic approach sees the host and its associated microbiota as one unit (so-called holobiont), that coevolves as one entity. According to the holistic approach, holobiont’s disease state is linked to dysbiosis, low diversity of the associated microbiota, and their variability: a so-called “pathobiome” state. The healthy state, on the other hand, is accompanied with eubiosis, high diversity, and uniformity of the respective microbiota. The dynamic flow of microorganisms from one host to another and to the environment, described by the One Health concept, underpins the holistic approach in the coevolution.

Uploaded a work by Gabriele Berg, Daria Rybakova and 33 others from [https://microbiomejournal.biomedcentral.com/articles/10.1186/s40168-020-00875-0] {{doi|10.1186/s40168-020-00875-0}} with UploadWizard

Our microbiome is the collection of bacteria, archea and yeasts (Fungi), that live in us and on us. Our microbiomes are surprisingly stable throughout our lives and are similar to our family members.

We first get our microbiome from passing through our mother's birth canal. We also get some while our mothers breast feed us

Our life style plays a role in the development of our microbiome. Statistically, children brought up in households with two or more different species have a lower incidence of allergies and other auto-immune conditions.

Our microbiomes include organisms, like Clostridium dificile, that can cause disease.

There is statistical evidence that the microbiome affects our weight management, mood, personality and mental health. Diet is important in maintaining your microbiome. Eat food, not too much, mostly plants.