The paper provides a review of habitability and is divided into

- Habitability on Earth
- Habitability of exoplanets
- Habitability of the galaxy
A few decades ago

Terrestrial environments known to harbor life

Extraterrestrial environments known to exist

Today

Habitable planets

Lineweaver CH, Chopra A. 2012.
Annu. Rev. Earth Planet. Sci. 40:597–623
Habitability on Earth

Not every place on Earth is habitable. A desert is a region where biomass is low because a requirement for life is outside the optimal range.

- Water
- Low/high temperature
- Nitrate
- Iron
Lineweaver CH, Chopra A. 2012.
Annu. Rev. Earth Planet. Sci. 40:597–623
Earth has a thin bioshell (∼10 km)

- Low temperature desert above
- High temperature desert below
  - Temperature gradient underground is around 20-30° per km. Reaching the upper limit for life (∼122°) around 5 km below.
• Biomass on Earth is divided into 55% Eukaryotes 45% prokaryotes
• 56% of the biomass is above sea level 44% below
• 99.5% of eukaryotes live on land
• 96% of prokaryotes are below sea level
The requirements for the origin of life are different than the requirements to maintain life

- The abiogenesis habitable zone depends on the characteristics of the planet
- Once life arises, habitability also depends on how well life forms can regulate the environment
  - Life adapts to the environment, but also modifies its environment. Increasing the range of habitable environments in the planet
Candidates for Early Life Forms

- **Chemolithotrophs**
  - Energy from redox reactions at hydrothermal vents or hot springs
- **Anoxygenic phototrophs**
Exoplanets

Lower limits on the percentage of stars with planets (%) 

Year 


Lineweaver CH, Chopra A. 2012. 
Annu. Rev. Earth Planet. Sci. 40:597–623
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Annu. Rev. Earth Planet. Sci. 40:597–623
Galactic Habitable Zone

- Presence of host star
- High enough metallicity for terrestrial planets
- Enough time
- Lack of nearby supernovae
Galactic Habitable Zone