The fatigue fracture of a metal aggravated by a corrosive environment or the stress corrosion cracking of a metal aggravated by cyclic stress.

N.B. Fatigue fracture usually occurs at stresses below the yield point but after many cyclic applications of the stress. Fatigue-fractured material often shows most of the fracture face shiny metallic, with the final area to fracture (mechanically by brittle fracture of a reduced cross-section) having a rough crystalline appearance.

fatigue cracks would have started here, cyclic stresses would have "hammered" surfaces together

shiny - metallic

brittle fracture
If corrosion-fatigue occurs, the “shiny-metallic” area might be covered with Corrosion products; BUT normal fatigue fractures may also develop corrosion products - depends on environment, stress pattern, etc.

N.B. In normal fatigue, the frequency of the stress cycles is not important. (can do accelerated fatigue tests at high frequency - the total number of cycles determines fatigue).

BUT in corrosion fatigue, **low-cycle stresses** are more damaging than **high-frequency stresses**. Environment is important..... e.g., in seawater: Al bronzes and type 300 series SS lose 20-30% of normal fatigue resistance; high-Cr alloys lose 60-70% resistance.

N.B. Cyclic loads mean **lower** allowable stresses, this must be designed into components; if there is also a corrosive environment, the allowable stresses are **EVEN LOWER**.
**Prevention of Corrosion Fatigue**

change design so as to reduce stress and/or cycling.
reduce stress by heat treatment (for residual stress), shot peening (to change surface residual stresses to COMPRESSIVE).
use corrosion inhibitor with care!
use coatings . . . electrodeposited
  Zn;
  Cr;
  Ni;
  Cu;
  and
  nitrided layers (heating of steels in contact with N-containing material e.g., NH$_3$, NaCN, etc.).