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Constraints on the internal structure and evolution of Vesta and Ceres using the Dawn gravity and shape data

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Constraints on the internal structure and evolution of Vesta and Ceres using the Dawn gravity and shape data

➢ **How do size, accretion time and initial composition affect evolution of protoplanets?**

- Vesta and Ceres internal structure
- Thermal evolution
- Nonhydrostaticity
- Topography compensation state

① Formation of a nebula disk

② Settling to mid-plane

③ Dust coagulation

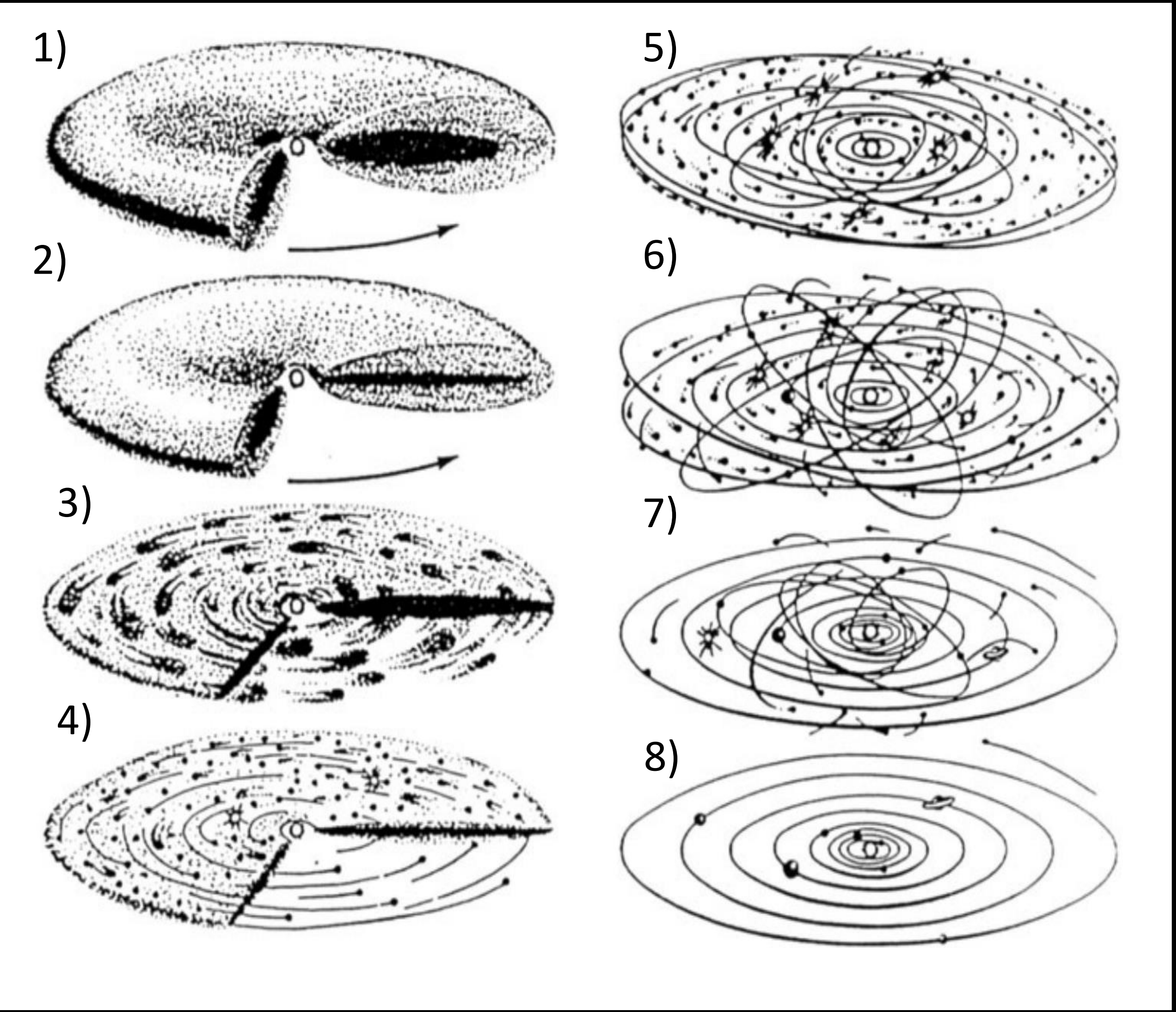
④ Orderly growth

⑤ Runaway growth

⑥ Gas dispersal

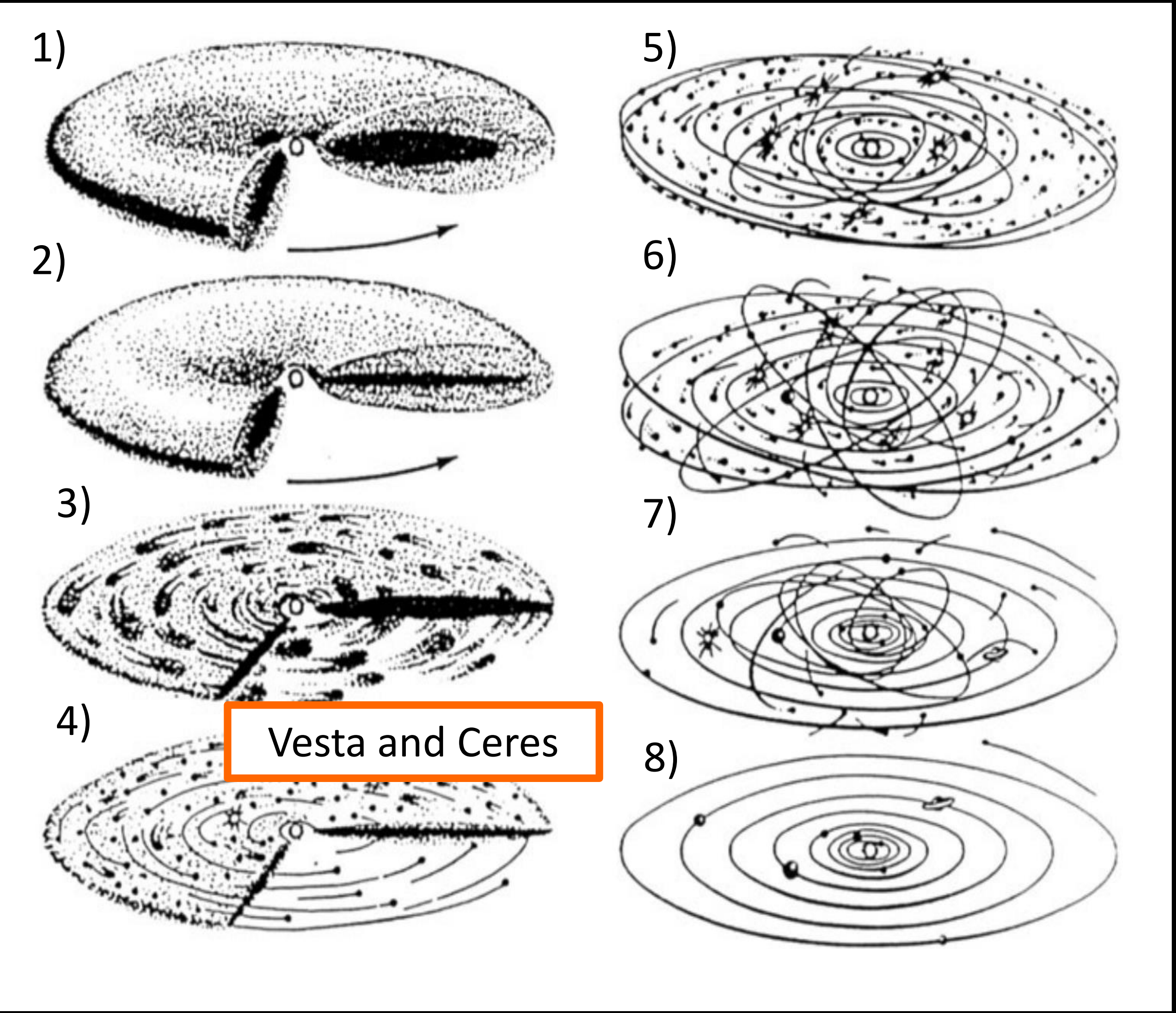
⑦ Late-state mergers

⑧ Present state



Safronov & Ruskol 1994

1. Formation of a nebula disk
2. Settling to mid-plane
3. Dust coagulation
4. Orderly growth
5. Runaway growth
6. Gas dispersal
7. Late-state mergers
8. Present state



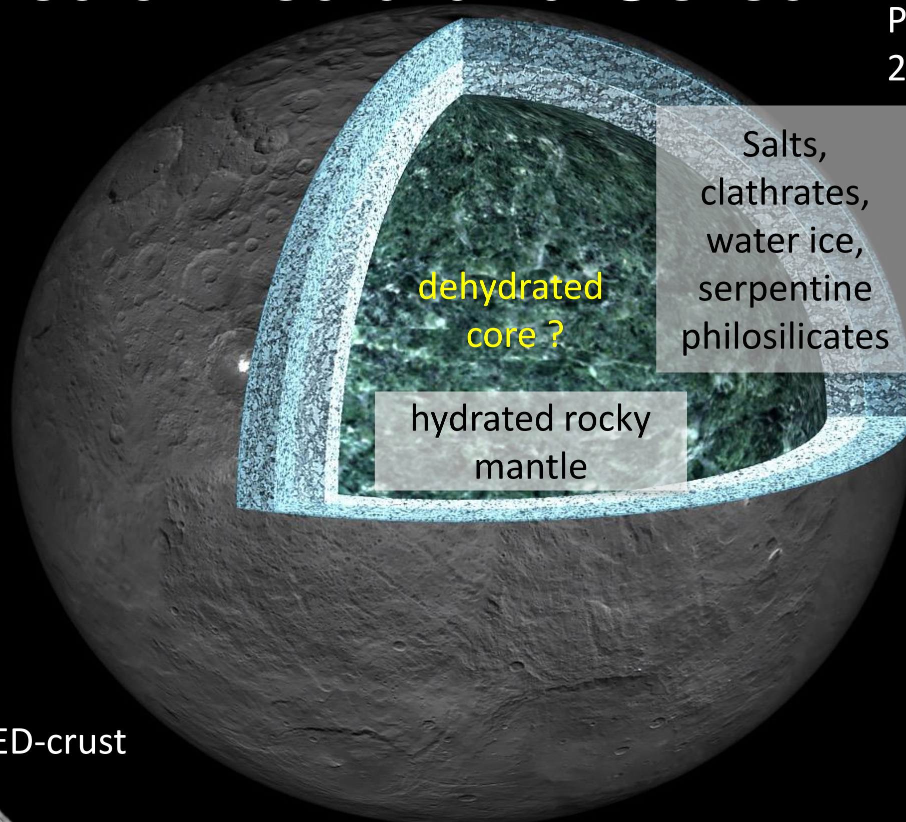
Safronov & Ruskol 1994

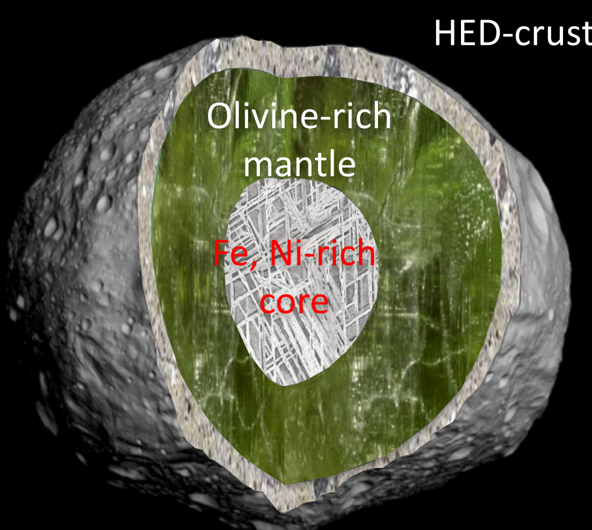
Internal structures of Vesta and Ceres

Park et al., 2016

Ceres➔

- **Crustal density constrained by admittance analysis**
- **Mantle density constrained by degree-2 gravity**
- **Possible dehydrated rocky core remains unconstrained**





🡐Vesta

- **Crustal density constrained by HEDs and admittance**
- **Mantle-crust density contrast constrained by the Rheasilvia central peak anomaly**
- **Core density constrained by iron meteorites**