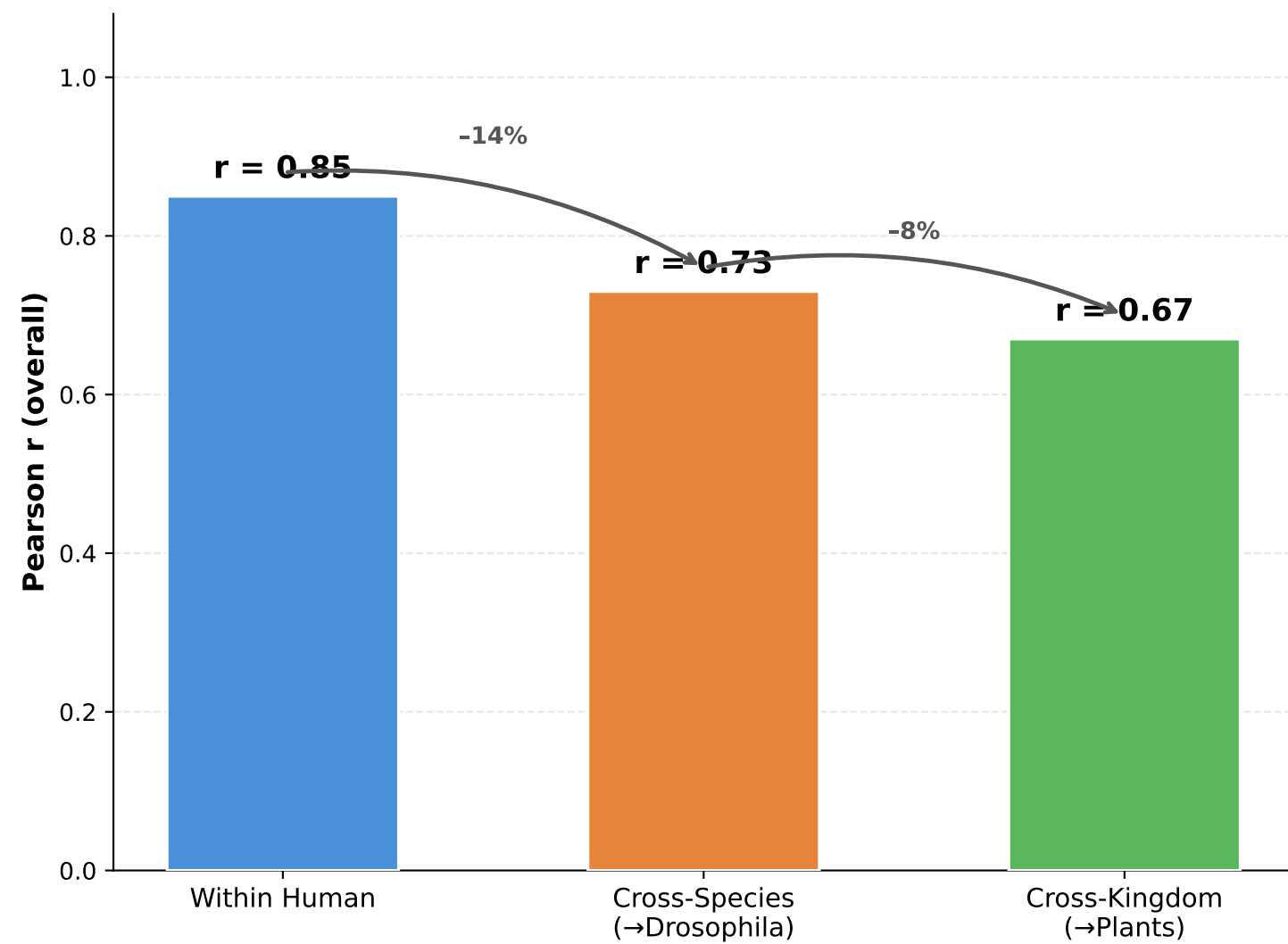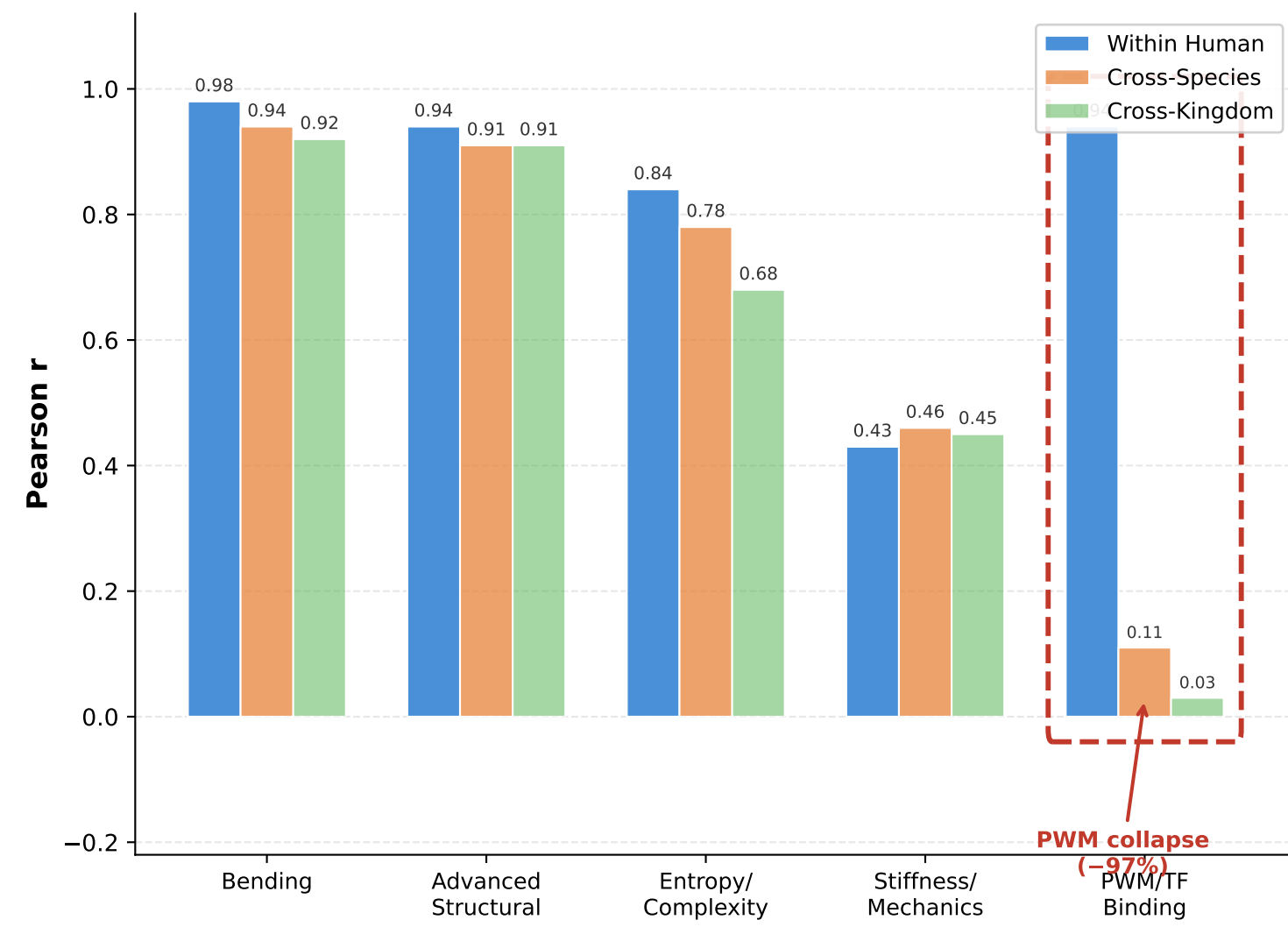Figure 8. Universal Physics Hierarchy: Feature Transfer Across Evolutionary Distance
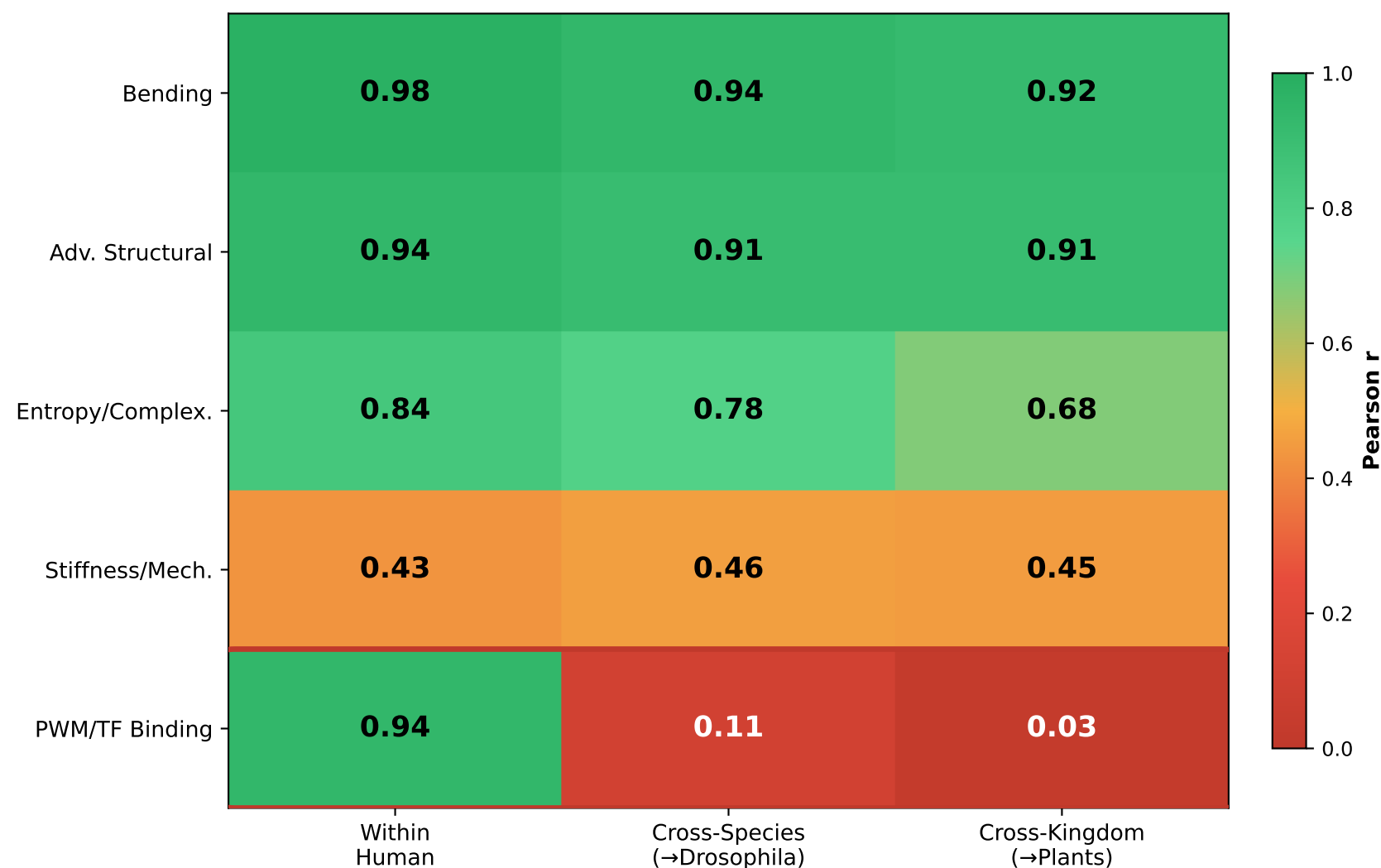
(A) Overall Transfer Degradation

(B) Feature Category Transfer by Scenario

(C) Transfer Heatmap (Pearson r)

(D) Key Insights: Physics vs. Regulatory Transfer

PHYSICS-BASED FEATURES
(Bending, Structural, Entropy, Stiffness)

- **Bending:** −6% — Near-perfect conservation (0.98 → 0.92)
- **Adv. Structural:** −3% — Highly conserved (0.94 → 0.91)
- **Entropy/Complexity:** −19% — Moderate degradation (0.84 → 0.68)
- **Stiffness/Mechanics:** +5% — Slight improvement cross-species (0.43 → 0.45)

REGULATORY FEATURES
- **PWM/TF Binding:** −97% — Near-total collapse (0.94 → 0.03)

KEY INSIGHT
DNA physical properties are conserved across evolutionary distance, while regulatory grammar is species-specific.

Bending: −6% vs. PWM: −97%