On the rheology of cats

παντα ρει: panta rei
rheology: 流動学
aphorism: 格言
ヘラクレイトス（B.C.540?-B.C.480?）:「万物は流転する」
insubordination: 反抗
thixotropic: チキソトロピー：時間とともに粘性が変化する特性
viscoelasticity: 粘弾性、粘性と弾性の両方の特性をもつこと。粘性は、形状変化する物質を構成する原子・分子の拡散により生じるが、弾性は結晶面での原子・分子の結合により生じる。
athermal: 非熱的
shear viscosity: 剪断粘性（ずれ粘性）
extensional viscosity: 伸張粘性
Trouton ratio = extensional viscosity / shear viscosity
Tribology: 摩擦学
Substrates: 基質、基盤

1. The states of matter are a matter of time.：物質の状態をきめるのは、時間である。
2. Traditional definition of solid, liquid, and gas: Solid: matter maintains a fixed volume. Liquid: matter maintains a fixed volume but adapts to the shape of container. Gas: matter expands to occupy whatever volume is available.：固体、液体、気体の古典的な定義。
3. Characteristics time = relaxation time τ: 特性時間 = 緩和時間τにおける変化を見る。

   $$De \equiv \frac{\tau}{T}$$

   De: Deborah number, T: duration of experiment

4. Gas vs. liquid: relaxing = expanding ➔ De <<1: gas
   Liquid vs. solid: relaxing = adapting → De<<1: liquid
5. Cat appears solid (De>>1) sometimes, and appears liquid (De<<1) sometimes!
   τ: 1s – 1min, Older cats may have a shorter relaxation time! (Interesting and funny)
6. Deborah number is the dimensionless expression of the concept of linear 'viscoelasticity'
7. For simple incompressible and athermal molecular fluids, τ can be calculated by viscous dissipation ($\tau = \delta^2/\nu$). However, how about cat?

8. Simple incompressible fluids: extensional viscosity = 3 * shear viscosity
9. In case of cat, Trouton ratio (=extensional viscosity / shear viscosity) is more complicated. But, author define 'catpillary' number: $Ca = \eta U/\gamma_{LV}$
10. Tribology of cat: superfelidaphobic, yield stress, rough substrate, low affinity, sliding, adhesion (funny insights)