

INFORMATION ENTROPY of BIOCOMMUNITY in GEOLOGY HISTORY

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In physics, entropy can be employed to describe the probability of different movement mode of mass molecule. Therefore there is a corresponding relationship between the entropy value of a system and the disorder degree of the system. That is the Boltzmann equation

$$S = K_B \ln \Omega$$

Where K_B is the Boltzmann constant, Ω the thermodynamics probability of a system's status.

After creating information theory, Shannon introduced the concept of entropy into his theory. It can be expressed as following:

$$H = - \sum p_i \log p_i$$

Where H is information entropy, p_i the probability of an event happening in the system.

As an ecological system in geology history, palaeotologia community shares the main essence of thermodynamics. Therefore we can use the information indicated by palaeocommunity and its thermodynamical characteristic to compute the information entropy of different palaeocommunity and different stages in palaeocommunity evolution.

For a long time, species index of diversity has been used as the statistic of the information entropy in palaeocommunity. But we think it simply reflect the abundance and the structure of a system. Thus we put forward the following four parameters as the information entropy to reflect the structure characteristic of paleeocommunity of Brachiopod.

1. species index of diversity reflecting the species abundance and structure in community, is the comprehensive reflection of interaction among species within a community and their action with environment.
2. Average body size of individual reflecting the growth speed, is the indication of living competition.
3. Average convexity of species reflecting species' trophic structure status in community, larger convexity indicating the larger area of lophophore.
4. Biomass of species reflecting the biggest amount of a species member that a certain environment can hold.