Expansion of Our Universe Through the Eyes of a Microbiologist

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Abstract

From the point of view of a microbiologist, the Hubble equation describes the expansion of our universe as an exponential phase of the expansion of a colony of microbes-galaxies on the surface of a dark nutrient medium.

Text

According to the empirical Hubble equation, the speed of recession of galaxies is proportional to the radial distance from the Earth. Now it is considered as a cosmological law describing the expansion of the Universe [1]. The Hubble equation is:

$$\frac{d}{dt}r = H_0 \cdot r \qquad \text{differential form}$$

$$r(t) = r_0 \cdot e^{H_0 \cdot t} \qquad \text{integral form}$$

Here H_0=2.2·10^{-18} Hz is the Hubble constant; r is the radial distance between the Earth and the galaxy.

From the point of view of a microbiologist, the Hubble equation describes the expansion of the Universe like an exponential phase of the expansion of a colony of microbes on the surface of a nutrient medium [2,3]. In this case, H0 is the specific growth rate of the galaxy colony and r0 is the starting radius of the colony. Figure 1 shows the exponential phase of the expansion of a galaxy colony over the surface of a dark medium. The starting radius corresponds to the distance to the nearest galaxy, Andromeda.

Figures 2-3 show Hubble plots for this process.

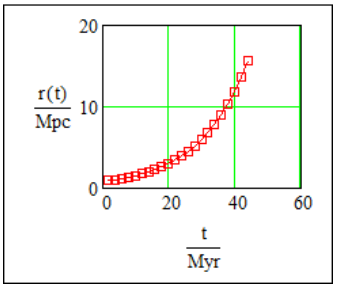
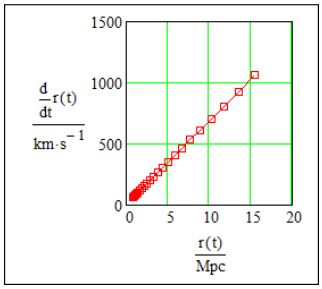


Fig.1 Exponential phase of the expansion of a colony of galaxies.



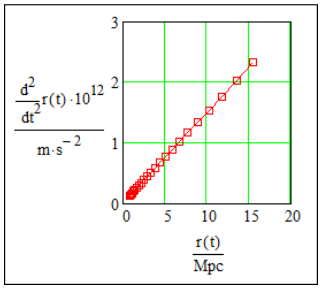


Fig. 2-3. Velocity and acceleration of the exponential phase of the expansion of a galaxy colony over the surface of a dark medium.

If we consider the expansion of a colony of galaxies within the framework of the diffusion-wave model, then the criterion relation will be valid for it:

$$\frac{u^2}{D \cdot H_0} = 1 \quad ,$$

here u is the wave velocity, D is the diffusion coefficient or specific action.

Curiously, - the common features of colonies of microbes and galaxies are also manifested in the similarity of patterns, schemes-images of their life, accessible to our visual perception. Figure 4 shows photographs of a colony of bacteria and a galaxy - their vortex spiral-like lifestyle is clearly visible.

Fig. 4. Photographs of a bacterial colony on agar jelly [4] (left) and the galaxy NGC 1232 (right).

The principle of similarity of analogies seems to be a useful tool in helping us to live creatively in the visible universe. In particular, he allows one to look at dark matter as a medium for galaxies, and at their stellar arms as external organs of the body - like the cilia of bacteria - then we can assume that our life in the stellar arm is a part of the galaxy's communication system. By the way, this, according to Vladimir Vernadsky, is indicated by the empirical principle of cephalization, which consists in the continuous complication of the nervous communication system of earthly life.

Figure 5 shows 3 frames of a GIF animation of the growth of a microbial colony on agar gel [5] as a microbial model of the expansion of the Universe. Figure 6 shows the dynamics of microbial colony expansion in integral and differential form for GIF animation.

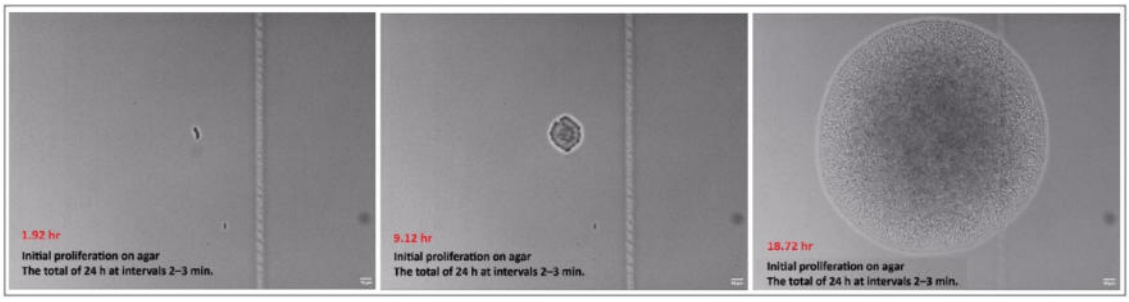


Fig.5. Microbial Model of the Expansion of the Universe

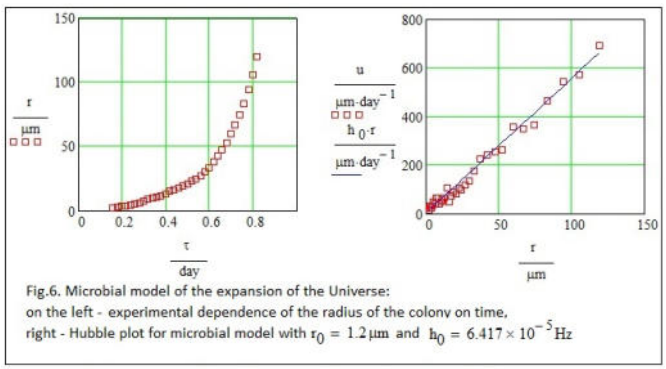


Fig.6. Dynamics of the Microbial Model of the Expansion of the Universe

There are many astronomical images of adjoining galaxies - they are called interacting galaxies and for some reason they are considered colliding, merging [6].
The microbial model allows us to look at some of them as pictures of the birth of galaxies by fission, because they can be interpreted, for example, as images of the bubble decay of the parent vortex into two child vortex-galaxies.
About experiments with the bubble regime of vortex decay can be found in the book - Alekseenko S.V. et al. Introduction to the Theory of Concentrated Vortices (2003) [7].
The figure 7 shows a fragment of the streamline pattern for this regime and a pair of suitable images from the Hubble collection and the wiki gallery of interacting galaxies.

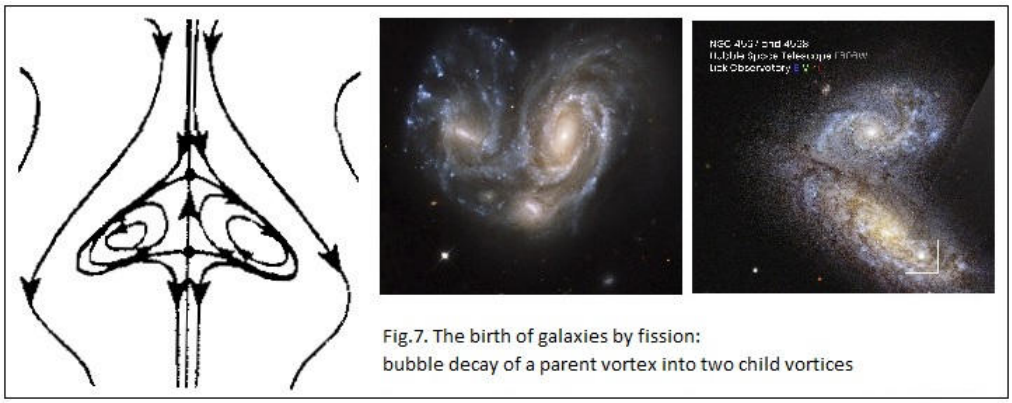


Fig.7. Microbial model for the birth of galaxies by fission

For me, the microbial, cellular model seems to be not without interest, if only because it makes the Universe accessible to us more attractive, alive.

Links

1. https://en.wikipedia.org/wiki/Hubble%27s_law
2. https://en.wikipedia.org/wiki/Bacterial_growth
3. https://en.wikipedia.org/wiki/Exponential_growth
4. http://www.uvm.edu/pdodds/files/papers/others/everything/ben-jacob1997a.pdf
5. https://www.biorxiv.org/content/10.1101/2020.12.25.424384v1.supplementary-material
6. https://en.wikipedia.org/wiki/Interacting_galaxy
7. http://techlibrary.ru/