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Article 6-7. The Synthesis of Biological Antibiotics and Its Application on Bio-medicine/生物抗生素合成与在生物医药中的应用

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In previous articles, the immunology of host cells becomes the key to resist the invasive pathogen. Nevertheless, there are some exceptions that the immunological potential of host cells, which relies on the synthesis of antibiotics in host cells, may not be sufficient to resist the invasive pathogen (such as congenital defect of rat species against a specific pathogen). Then the vegetation antibiotics is helpful as complementary solution. The steps of synthesis of vegetation antibiotics are described below. The potential of inoculation of microbial vaccine in animals such us rats is also discussed for bio-medicine production, which provides solutions for human host cells.

Step 1. $N \times N$ samples of a vegetation species, which has been identified to be helpful in biomedicine, are cultivated during simulation of different electromagnetic wave conditions;

Step 2. Different frequency of electromagnetic wave (or different wavelength) are simulated, and labeled as F_1, F_2, \dots, F_n ;

Step 3. Metabolomics test is conducted individually after cultivation in F_1, F_2, \dots, F_n , respectively.

Step 4. Under each simulated frequency of electromagnetic wave, different electromagnetic wave intensity (AND amplitude) are simulated, and labeled as I_1, I_2, \dots , and I_n .

Step 5. Metabolomics test is conducted individually after cultivation in I_1, I_2, \dots, I_n , respectively. The amount of $N \times N$ metabolomics tests are conducted in total.

Step 6. In total $N \times N$ different samples of vegetation antibiotics are abstracted from each different cultivation condition (The method of this abstraction is the same as the preparation of Traditional Chinese Medicine).

Step 7. Each sample of vegetation antibiotics is injected into the invasive simulation of pathogens targeting the host cells of rats respectively, in combination with the training of host cells discussed in other articles [1][2].

Step 8. The infection of host cells are observed, and the effectiveness of each sample of vegetation antibiotics is decided correspondingly.

To improve the biophysical training method, the simulation method of time-varying

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electromagnetic waves has been designed in another biophysics article [3], which can be used to replace the static frequency and intensity specified in article [1][2] above. It is expected that a combination of antibiotics from both host cells and vegetation leads to the best solution, and a combination of different vegetation antibiotics is more effective. However, the 'dead' antibiotics abstracted from vegetation is not as effective as 'living' antibiotics in host cells, due to the evolved resistance of pathogens against the static or constant antibiotics. Actually, there are lots of cases that insect pests frequently evolve into resistance to VERY toxic pesticides, which is the same phenomenon. Please note: the abstraction of vegetation antibiotics here is on the basis of ancient preparation method of Chinese medicine, and the advantages of this is to consider all the vegetation metabolites cultivated in Lab as the whole substances for antibiotics, rather than separating a specific chemistry species from the vegetation metabolites, which can be proven by that plant resistance (or antibiotics) substances usually contain multiple biochemistry species discussed in other articles. Another advantages of ancient preparation of Chinese medicine is to provide additional nutrition for host cells. During effective vegetation antibiotics condition, the invasive pathogens are usually dormant so that the competition in nutrition between host cells and pathogens is minimized. Otherwise the additional nutrition may benefit the pathogens rather than host cells.

There are three kinds of vegetation species selected in future research for better 'diversity of antibiotics': one is the *Ganoderma Lucidum* (I started to grow this from 2011), another is *Anoectochilus roxburghii* (Wall.) Lindl.(I started to grow this from 2016. Not only human species know this, but also wild pigs must be keen to look for this vegetation for remediation after injury), and the last one is rhizome of Leguminosae species, because the symbiosis of rhizobium in Leguminosae species leads to antibiotics with higher dynamics from both vegetation cells and rhizobium cells. However, the inoculation of various rhizobium, which successfully lead to tumour in root system as symbiosis, is necessary. The reason of enriching rhizobium biodiversity has been discussed in other articles (the specificity of host-invasion interaction), which results in various antibiotics from both plant cells and microbial cells.

For the shading-habitat plant species, which suits shading environment only for growth, plants' leaves usually turns to be yellow when they are long-termly exposed to the intensive sunshine. Inversely, the leaves of sunshine-habitat plant species turn from green into yellow when they are shaded. For the shading habitat plant such as the *Anoectochilus roxburghii* (Wall.) Lindl. as well as *Ganoderma Lucidum*, the intensity of UV-B radiation must be reduced for the cultivation, as compared to the intensity used in other articles of this journal.

In addition to the synthesis of vegetation antibiotics for biomedicine, the inoculation of microbial vaccine in animals such us rats, pointed out in other article of this journal[4], also provides effective way of generating antibiotics for biomedicine

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production against similar genetic strains in human host cells. However, in this case, symbiosis between microbial vaccine and host cells is not compulsory, which means that the host cells can be 'eaten up' by microbial vaccine for biomedicine production. Please note: according to the Traditional Chinese Medicine, the biomedicine made from animal cells tends to be 'warm,' possibly due to too much animal proteins, which need to be incorporated into vegetation biomedicines (which tends to be 'cool') as mixtures for best biomedicines.

This is the revised materials in book “Proceedings for Degree of Postgraduate Diploma in Environmental Science (3rd Edition).” Published in 2016. The ‘chapter’ content mentioned in this article is in previous book. Firstly Revised on 10/02/2021; Secondly Revised on 28/12/2021. This journal article is previously published as: Liu Huan. (2021). Article 10-7. The Synthesis of Biological Antibiotics and Its Application on Bio-medicine. Journal of Environment and Health Science (ISSN 2314-1628), 2021(02)., which is converted into Journal of Biological Sciences (ISSN 2958-4035). Both Journals belong to the same publisher, Liu Huan. The previous journal article is closed to the public, but the previous reference is still valid. Latest revised on 19/04/2023; 30/05/2023.

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