

## **An Editorial View on the Possible Connections Between the Human Microbiome and Most of the Neuropsychiatric Disorders – As Viewed from the Perspective of Biodiversity in the Living Environment**

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**Abstract.** *The connection between mental health, the human microbiome and biodiversity in the living environment must be viewed in an interdisciplinary way, thus resulting in the fact that macrobiodiversity in the external environment influences, in a defining way, human well-being, immune functions and last but not least ethology and mood swings. Therefore, this complex interaction between several fields leads to the definition of an innovative concept called bio-eco-psychological medicine. Our present mini-editorial view here is focusing on the possible connections between the human microbiome and most of the neuropsychiatric disorders – as viewed from the perspective of biodiversity in the living environment. Thus, these aspects are fitting quite well in the theory referent to the fact that lately there is an increase interest in the connections that might appear between most of the neuropsychiatric disorders and the general and specific biodiversity, as our group demonstrated on several recent occasions.*

**Key words:** biodiversity, neuropsychiatric disorders, microbiome.

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The connection between mental health, the human microbiome and biodiversity in the living environment must be viewed in an interdisciplinary way, thus resulting in the fact that macrobiodiversity in the external environment influences, in a defining way, human well-being, immune functions and last but not least ethology and mood swings. Therefore, this complex interaction between several fields leads to the definition of an innovative concept called bio-eco-psychological medicine [1].

Viewed from the perspective of holobiont theory, life itself and living organisms, multicellular eukaryotes and persistent symbionts constitute a complex

functional and structural unit. In this way, the host and its microbiome can be interpreted as an ecological community [2].

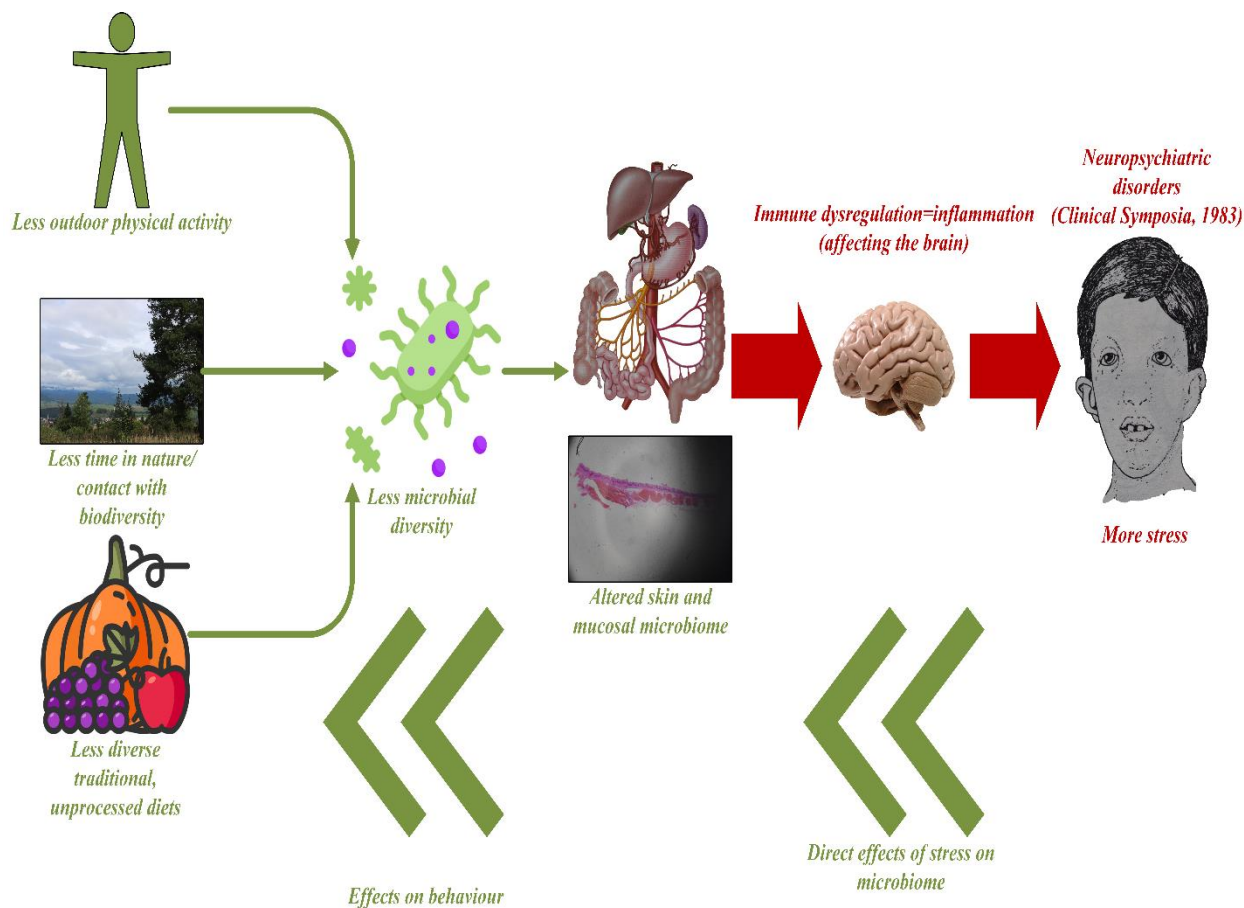
Equally important is the genetic contribution of symbiont microorganisms throughout human evolutionary phylogeny. [3] Physiological contributions include nutrient absorption, protection against pathogens and, last but not least, the production of chemicals essential for survival [4].

If we accept the holobiont theory that humans are complex symbiont organisms, then we must also accept that we live within an ecological picture. As for global biodiversity, it is unequivocally essential in mental health through the diversity of component species, through the genetic contribution of species throughout a coevolutionary history that has led to the complexity of contemporary man, integrated into the living environment as if increasingly degraded by acute urbanization processes [5, 6].

We would like to stress that, as the WHO states: "There is no health without mental health"[7], but extending the concept to "There is no health without ecological health", thus addressing the full range of planetary biodiversity.

Perhaps one of the most emblematic scientists concerned with the issues of human ecology, microbiologist Rene Dubos, accurately outlines the consequences of altering the human gut microbiota, and also the role of microbiota within ecosystems: "*Animals and man evolved in intimate association with a complex microbial flora. Therefore, it is expected that many features of their anatomical and physiological development reflect this evolutionary past and are manifestations of tissue responses to microflora*" [8].

Regarding mental health, metagenomic (genomic analysis of microbial DNA from communities in environmental samples) and proteomic (examination of protein activity to understand disease) analyses will certainly provide an understanding of the microbial role in short- and long-term host status, severe mental disorders prophylaxis strategies, etc [9, 10].



**Fig. 1.** A schematic representation of types of biological interactions that could lead to some psychopathologies among the human population.

Thus, we can observe the direct consequences of reducing contact with nature in the environment that cause microbial balance, inflammatory processes and finally neuropsychiatric disorders.

### Concluding remark

Thus, these aspects are fitting quite well in the theory referent to the fact that lately there is an increase interest in the connections that might appear between most of the neuropsychiatric disorders and the general and specific biodiversity, as our group recently demonstrated [11].

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