

Accepted Manuscript

Title: CRACKING THE BARCODE OF FULLERENE-LIKE CORTICAL MICROCOLUMNS

Authors: Arturo Tozzi, James F. Peters, Ottorino Ori

PII: S0304-3940(17)30180-5
DOI: <http://dx.doi.org/doi:10.1016/j.neulet.2017.02.064>
Reference: NSL 32676

To appear in: *Neuroscience Letters*

Received date: 15-12-2016
Revised date: 5-2-2017
Accepted date: 22-2-2017

Please cite this article as: Arturo Tozzi, James F.Peters, Ottorino Ori, CRACKING THE BARCODE OF FULLERENE-LIKE CORTICAL MICROCOLUMNS, *Neuroscience Letters* <http://dx.doi.org/10.1016/j.neulet.2017.02.064>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



CRACKING THE BARCODE OF FULLERENE-LIKE CORTICAL MICROCOLUMNS

Arturo Tozzi (corresponding Author)

Center for Nonlinear Science, University of North Texas

1155 Union Circle, #311427

Denton, TX 76203-5017, USA, and

Computational Intelligence Laboratory, University of Manitoba, Winnipeg, Canada

Winnipeg R3T 5V6 Manitoba

ASL NA2 Nord

tozziarturo@libero.it

James F. Peters

Department of Electrical and Computer Engineering, University of Manitoba

75A Chancellor's Circle, Winnipeg, MB R3T 5V6, Canada and

Department of Mathematics, Adiyaman University, 02040 Adiyaman, Turkey,

Department of Mathematics, Faculty of Arts and Sciences, Adiyaman University

02040 Adiyaman, Turkey and Computational Intelligence Laboratory, University of

Manitoba, WPG, MB, R3T 5V6, Canada

james.peters3@umanitoba.ca

Ottorino Ori

Actinium Chemical Research, Via Casilina 1626/A, 00133 Rome, Italy

ottorino.ori@gmail.com

Highlights

- Microcolumns stand for the uniform, stereotyped cortical architecture.
- Microcolumns might be arranged in guise of fullerene-like structures.
- Neural computations take place on such structures, with precise mathematical rules

ABSTRACT

Artificial neural systems and nervous graph theoretical analysis rely upon the stance that the neural code is embodied in logic circuits, *e.g.*, spatio-temporal sequences of ON/OFF spiking neurons. Nevertheless, this assumption does not fully explain complex brain functions. Here we show how nervous activity, other than logic circuits, could instead depend on topological transformations and symmetry constraints occurring at the micro-level of the cortical microcolumn, *i.e.*, the embryological, anatomical and functional basic unit of the brain. Tubular microcolumns can be flattened in fullerene-like two-dimensional lattices, equipped with about 80 nodes standing for pyramidal neurons where neural computations take place. We show how the countless possible combinations of activated neurons embedded in the lattice resemble a

Download English Version:

<https://daneshyari.com/en/article/5738800>

Download Persian Version:

<https://daneshyari.com/article/5738800>

[Daneshyari.com](https://daneshyari.com)