

european journal of histochemistry  
a journal of functional cytology

ISSN 1121-760X  
volume 66/ supplement 2  
2022

**Proceedings of the  
32<sup>nd</sup> National Conference  
of the Italian Group for the Study  
of Neuromorphology  
“Gruppo Italiano per lo Studio  
della Neuromorfologia” G.I.S.N.**

**November 25-26, 2022**

*University of Campania, Luigi Vanvitelli  
Naples, Italy*

e j h

under the auspices of  
the University of Pavia, Italy



Published by PAGEPress, Pavia, Italy

**Editorial Office:**

PAGEPress s.r.l.

via A. Cavagna Sangiuliani 5, 27100 Pavia, Italy

Phone: +39.0382.1549020 - Fax: +39.0382.1727454

E-mail: [info@pagepress.org](mailto:info@pagepress.org)

**Printed quarterly by:**

Press Up s.r.l.

via E.Q. Visconti, 90, 00193 Roma, Italy

Tel. +39.0761.527351 – Fax +39.0761.527254

**Annual Subscriptions**

Europe: Euro 250

All other Countries: Euro 300

*Subscriptions, cancellations, business correspondence and any enquiries must be sent to PAGEPress Publications, Pavia, Italy.*

*Cancellations must be received before the end of September to take effect at the end of the same year.*

*No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means (electronic, electrostatic, magnetic type, mechanical, photocopying or otherwise) without written permission by the Publishers.*

Reg. Tribunale di Pavia n. 289/23.2.1984.

Recognized by the Ministero per i Beni e le Attività Culturali, Italy as a publication of high cultural value.



Associato all'USPI  
Unione Stampa Periodica Italiana

---

**Disclaimer.** Whilst every effort is made by the publishers and the editorial board to see that no inaccurate or misleading data, opinion or statement appears in this journal, they wish to make it clear that the data and opinions appearing in the articles or advertisements herein are the responsibility of the contributor or advisor concerned. Accordingly, the publisher, the editorial board and their respective employees, officers and agents accept no liability whatsoever for the consequences of any inaccurate or misleading data, opinion or statement.

europaean journal of histochemistry  
a journal of functional cytology

ISSN 1121-760X  
volume 66/ supplement 2  
2022

**Editor in Chief**

C. Pellicciari

*Dipartimento di Biologia e Biotecnologie  
"Lazzaro Spallanzani" Università di Pavia*

**Editors**

M. Biggiogera

M. Malatesta

ehj

under the auspices of  
the University of Pavia, Italy



# *European Journal of Histochemistry*

## *a journal of functional cytology*

The *European Journal of Histochemistry* was founded in 1954 by Maffo Vialli and published till 1979 under the title of *Rivista di Istochimica Normale e Patologica*, from 1980 to 1990 as *Basic and Applied Histochemistry* and in 1991 as *European Journal of Basic and Applied Histochemistry*. It is now published under the auspices of the University of Pavia, Italy.

The *European Journal of Histochemistry* is the official organ of the Italian Society of Histochemistry and a member of the journal subcommittee of the International Federation of Societies for Histochemistry and Cytochemistry (IFSHC), and has been an influential cytology journal for over 60 years, publishing research articles on functional cytology and histology in animals and plants.

The Journal publishes Original Papers, Technical Reports, Reviews, Brief Reports, Letters to the Editor, Views and Comments, and Book Reviews concerning investigations by histochemical and immunohistochemical methods, and performed with the aid of light, super-resolution and electron microscopy, cytometry and imaging techniques; attention is also given to articles on newly developed or originally applied histochemical and microscopical techniques.

Coverage extends to:

- functional cell and tissue biology in animals and plants;
- cell differentiation and death;
- cell-cell interaction and molecular trafficking;
- biology of cell development and senescence;
- nerve and muscle cell biology;
- cellular basis of diseases.

### **Editor in Chief**

Carlo Pellicciari (University of Pavia, Italy)

### **Editors**

Marco Biggiogera (University of Pavia, Italy)

Manuela Malatesta (University of Verona, Italy)

### **Editorial Board**

M. Battistelli, Urbino (Italy), L. Cocco, Bologna (Italy), A.C. Croce, Pavia (Italy), M. De Falco, Naples (Italy), R. Di Pietro, Chieti (Italy), E. Falcieri, Urbino (Italy), M. Harata, Sendai (Japan), P. Hozak, Prague (Czech Republic), Z. Kmiec, Gdansk (Poland), R. Mancinelli, Rome (Italy), N.M. Maraldi, Bologna (Italy), F.J. Medina, Madrid (Spain), F. Michetti, Roma (Italy), M. Pavelka, Vienna (Austria), C.A. Redi, Pavia (Italy), S. Shibata, Tokyo (Japan), C. Schoeffer, Vienna (Austria), D. Tomassoni, Camerino (Italy)

### **Managing Board of the Italian Society of Histochemistry for the years 2022-2025**

Roberta Di Pietro (President)

University of Chieti, Italy

Romina Mancinelli (vice-President)

University of Rome "La Sapienza", Italy

Maria De Falco

University of Naples Federico II, Italy

Daniele Tomassoni

University of Camerino, Italy

Michela Battistelli (Secretary)

University of Urbino "Carlo Bo", Italy

Elisabetta Falcieri (past-President)

University of Urbino "Carlo Bo", Italy

### **Editorial Staff**

Nadia Moscato, Managing Editor

Cristiana Poggi, Production Editor

Tiziano Taccini, Technical Support

2021 Impact factor: 1.966. ©JCR Clarivate Analytics



**32<sup>nd</sup> National Conference of the Italian Group  
for the Study of Neuromorphology  
“Gruppo Italiano per lo Studio della Neuromorfologia” G.I.S.N.**

**November 25-26, 2022**

***University of Campania, Luigi Vanvitelli  
Naples - Italy***

**Conference Chair**

Michele Papa

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania “Luigi Vanvitelli”, Naples, Italy*

**Organizing Committee**

Giovanni Cirillo

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania “Luigi Vanvitelli”, Naples, Italy*

Ciro De Luca

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania “Luigi Vanvitelli”, Naples, Italy*

Assunta Virtuoso

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania “Luigi Vanvitelli”, Naples, Italy*

### **Scientific committee**

Giovanni Cirillo

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania "Luigi Vanvitelli", Naples, Italy*

Antonio De Luca

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania "Luigi Vanvitelli", Naples, Italy*

Ciro De Luca

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania "Luigi Vanvitelli", Naples, Italy*

Assunta Virtuoso

*Dipartimento di Salute Mentale e Fisica e Medicina Preventiva  
University of Campania "Luigi Vanvitelli", Naples, Italy*

### **Guest Editors**

Fabrizio Michetti

*Department of Neuroscience, Università Cattolica del S. Cuore, Rome, Italy*

Seyed Khosrow Tayebati

*School of Medicinal Sciences and Health Products, University of Camerino, Italy*

### **Sponsorship**

*University of Campania "Luigi Vanvitelli"  
Italian Society of Anatomy and Histology (S.I.A.I.)  
Anatomage  
Leica, Microsystems  
Società Italiana Chimici*

*Inaugural speech*

*MACCHINE VIVENTI. RICORDI DI UN CIBERNETICO*

*Giuseppe Trautteur*

*Università degli Studi di Napoli Federico II*



## table of contents

### Proceedings of the 32<sup>nd</sup> National Conference of the Italian Group for the Study of Neuromorphology “Gruppo Italiano per lo Studio della Neuromorfologia” G.I.S.N.

<b>MAIN LECTURES .....</b>	<b>1</b>
<b>SESSION I – NEURODEGENERATION .....</b>	<b>2</b>
<b>SESSION II – NEURO-METABOLIC COUPLING AND BRAIN-GUT AXIS .....</b>	<b>4</b>
<b>SESSION III – BRAIN TUMORS .....</b>	<b>6</b>
<b>SESSION IV – NEUROINFLAMMATION AND NEURODEGENERATION.....</b>	<b>7</b>
<b>SESSION V – NEURODEGENERATION - SYNUCLEINOPATHIES .....</b>	<b>9</b>
<b>SESSION VI – NEUROPLASTICITY AND BEHAVIOR.....</b>	<b>11</b>
<b>SESSION VII – GLIAL CELLS AND NEUROINFLAMMATION .....</b>	<b>13</b>
<b>POSTERS SESSION .....</b>	<b>16</b>