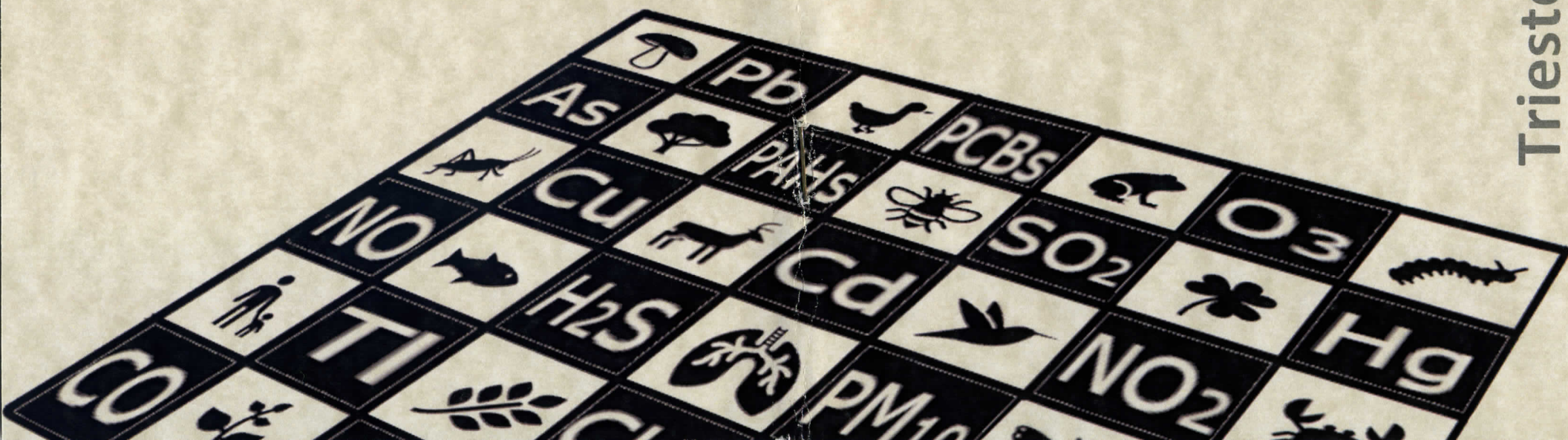


International
Association for
Biomonitoring of
Environmental
Pollution

Fundative Conference

BOOK OF ABSTRACTS

Trieste, October 11-13, 2023



International Association for Biomonitoring of Environmental Pollution

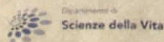
Fundative Conference

BOOK OF ABSTRACTS

Trieste, October 11-13, 2023



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TYPESETTING BY:

Elena Pittao, Mauro Tretiach (Department of Life Sciences, University of Trieste, Italy)

PROGRAMME

October 11, 2023 (Wednesday)

13:30 – 14:30 Registration of participants.

14:30 – 14:50 Opening ceremony with greetings from the Authorities.

14:50 – 16:30 First session, "**Classics**" (chairperson Pedro Pinho,
University of Lisboa, Portugal):
(full talks of 15 minutes each, plus 5 minutes for discussion.)

Pedro Pinho, Bernardo Rocha, Cristina Branquinho, Paula
Matos *Lichens as ecological indicators for the effects of
environmental changes in urban context: ongoing research
and major challenges.*

Stefano Martellos, Sebastiano Andreatta, Stefano Loppi
Lichens and air quality: a new citizen science approach.

Elisa Pellegrini, Lorenzo Cotrozzi, Cristina Nali, Giacomo
Lorenzini *Standardized biomonitoring protocols to assess
the air quality: 30 years of experience from Italy.*

Giovanna Salbitani, Piergiorgio Cianciullo, Viviana Maresca,
Sergio Sorbo, Marilena Insolubile, Francesco Loreto, Alessia
Di Fraia, Adriana Basile, Simona Carfagna *Cation
localization and related biological responses in the liverwort
Conocephalum conicum L. Dum exposed to environmentally
relevant concentrations of Zn, Cu, Cd and Pb.*

Sébastien Leblond, Caroline Meyer *Moss sample, the Swiss
Army knife of biomonitoring.*

16:30 – 17:10 Coffee break.

17:10 – 17:50 First session, “**Classics**” (continued):

Mélanie Jean, Nicole Fenton, Mia Courville-Todorov, Olivier Clarisse *Monitoring atmospheric deposition of pollutant with mosses around point-sources and across the landscape in eastern Canada.*

Tania Contardo, Stefano Loppi *The pitfalls of mapping biomonitoring data.*

17:50 – 18:30 First session, “**Classics in short**” (chairperson: Anna Bérešová Guttova, Slovak Academy of Sciences, Institute of Botany, Bratislava, Slovakia):
(short talks of 5 minutes for 3 slides each.)

- Drava *et al.*, It is time to consider time in biomonitoring studies.
- Ait Kaci *et al.*, Exploring natural biocides: Assessing the impact on microorganism diversity in agricultural soils as environmental bioindicators.
- Ghennam *et al.*, Lichen biomonitoring in the botanical garden of El Hamma in Algiers is used to assess the impact of green space structure on air quality.
- Zorza *et al.*, Preliminary evaluation of the algal periphyton biomass and community composition in the Isonzo River
- Amelmann *et al.*, First assessment of the macrozoobenthic community of Ragogna lake.
- Risoli *et al.*, Ozone biomonitoring: A versatile tool for citizen science.
- Mesraty, Lichens CitiSci: A community science project engaging volunteers in air quality.

19:00 – 20:30 Optional tour to the town, with Dr Andrea Moro, University of Trieste.

October 12, 2023 (Thursday)

08:30 – 10:30 Second Session, “**New methods**” (chairperson: Julian Aherne, Trent University, Peterborough, Canada):
(full talks of 15 minutes each, plus 5 minutes for discussion.)

Lorenzo Cotrozzi, Ivan Fiaccadori, Giuseppe Quaratiello, Giacomo Lorenzini, Cristina Nali, Luca Paoli, Elisa Pellegrini *The potential of using hyperspectral data for plant and lichen biomonitoring of environmental pollution.*

Lisa Grifoni, Aldo Winkler, Francesca Boldrighini, Marcos A. E. Chaparro, Luigi A. Di Lella, Fernando Marte, Luciano Pensabene Buemi, Alfonsina Russo, Antonio Sgamellotti, Lilla Spagnuolo, Gabriella Strano, Marcos Tascon, Stefano Loppi *Magnetism and environmental biomonitoring: application for the preventive conservation of Cultural Heritage.*

Andrea Vannini, Massimo Chiari, Alessandro Petraglia *A first (small) step towards understanding the ability of biochar to provide information on the environmental availability of potentially toxic elements (PTEs) in atmospheric depositions.*

Fabrizio Monaci, Davide Baroni, Stefano Loppi *Harnessing the potential of biomonitors to assess atmospheric mercury pollution: recent insights and perspectives.*

Mehriban Jafarova, Lisa Grifoni, Monia Renzi, Tecla Bentivoglio, Serena Anselmi, Aldo Winkler, Luigi A. Di Lella, Julian Aherne, Stefano Loppi *The suitability of Robinia pseudoacacia L. (black locust) leaflets as biomonitors of airborne microplastics.*

Nuno Ratola, Arminda Alves *Pinus needles as bioindicators of organic micropollutants.*

10:30 – 11:00 Coffee break.

11:00 – 11:40 Second Session, “**New methods**” (continued):

Baptiste Delaunay, Jérôme Ledauphin, Nathalie Sauret
Using a bioindicator plant, Eleagnus ebbingei, to predict the concentrations of polycyclic Aromatic Hydrocarbons in the atmosphere of temperate areas in Europe

Mira Aničič Urošević, Maja Kuzmanoski, Tijana Miličević,
Igor Kodranov, Konstantin Vergel, Aleksandar Popović
Moss bag biomonitoring of airborne elements at a suburban background site in Belgrade (Serbia) during Saharan dust intrusions.

11:40 – 12:20 Second Session, “**New methods in short**” (chairperson: Lorenzo Fortuna, University of Trieste, Italy).
(short talks of 5 minutes for 3 slides each.)

- Cinti *et al.*, The evolutionary importance of stomata and mesophyll traits on adaptation to climate changes.
- Munzi, Engaging citizens in soil monitoring: the project ECHO.
- Paoli *et al.*, Air quality changes witnessed by herbarium specimens of lichens: a case-study in the Western Carpathians.
- Swisłowski and Rajfur, Mosses as bioindicators of indoor air pollution.
- Perri *et al.*, Soil-plant analyses to determine the bioindication and bioaccumulation capacity of native vascular plants in dismissed mining area of Calabria region (S-Italy).

- Stringa Basile *et al.*, Lichen biomonitoring of airborne microplastics in the urban area of Pisa (Italy).
- Santunione *et al.*, Urban forest as a strategy of particulate matter (PM) capture and retention.
- Pisuttu *et al.*, Evaluation of the suitability of *Tillandsia usneoides* as biomonitor of airborne elements in a natural environment of Italy

12:20 – 14:30 Lunch (free).

14:30 – 16:00 Opening of the Assembly Appointment of the president of the Assembly. Presentation of the preparatory work for the foundation of the International Association for Biomonitoring of Environmental Pollution: structure of the statute, advisory and control bodies, election mechanisms. Open discussion. Voting of the Assembly on the Statute.

16:00 – 16:30 Public signing of the founding act, in the presence of a notary and journalists.

16:30 – 17:00 Coffee break.

17:00 – 17:30 Election of the Association bodies. Press release.

20:00 Social dinner in a local restaurant.

October 13, 2023 (Friday)

08:30 – 10:30 Third session, “**Standardisation**” (chairperson: Prof Stefano Loppi, University of Siena):
(full talks of 15 minutes each, plus 5 minutes for discussion).

Zbigniew Ziembik, Agnieszka Dothańczuk-Śródka, Andrzej Kłos, Daniel Janecki, Sławomir Wierzbza *Issues in biomonitoring data interpretation and their mitigation.*

Erica Rancati, Alessandro D'Aietti, Arianna Macor, Gabriele Piazza, Alessandra Sinesi, Damiano Virgilio, Elisa Zanut, Raffaella Zorza, Enrico Bressan, Antonello Zanello
Monitoring of priority substances in biota for classifying the environmental quality status of surface water bodies.

Aldo Winkler, Lisa Grifoni, Leonardo Sagnotti, Stefano Loppi
Magnetic biomonitoring: towards a standardization of the operational and measurement protocols.

Fiore Capozzi *Toward the adoption of a shared protocol in the moss bag approach: main outcomes from the MOSSclone project.*

Zulema Varela, Jesús R. Aboal, José Ángel Fernández
Mossphere: a new biotechnological passive sampler for environmental air quality management.

Julian Aherne, Mehriban Jafarova, Stefano Loppi *The good, the bad, and the ugly of biomonitoring of atmospheric microplastics.*

10:30 – 11:00 Coffee break.

11:00 – 12:00 Third session, “**Standardization**” (continued):

Elena Gottardini, Fabiana Cristofolini, Antonella Cristofori, Radek Novotny, Matej Rupel, Vicent Calatayud, Marcus Schaub, Diana Pitar, Marco Ferretti *Visible foliar symptoms as a proxy of ozone impact on vegetation. from the multi species approach of the ICP Forests method applied on European scale to the single bioindicator species approach.*

Mauro Tretiach, Fabio Candotto Carniel, Lorenzo Fortuna
Biomonitoring techniques for testing the pollution impact of Recovered Derived Fuels (RDFs): a ten-year-long study case centred on a cement mill in NE Italy.

Paolo Giordani, Renato Benesperi, Elisabetta Bianchi, Giorgio Brunialti, Elva Cecconi, Tania Contardo, Luca Di Nuzzo, Lorenzo Fortuna, Luisa Frati, Stefano Loppi, Fabrizio Monaci, Silvana Munzi, Juri Nascimbene, Luca Paoli, Sonia Ravera, Mauro Tretiach, Andrea Vannini *Lichen biomonitoring after standardisation. another step towards systematisation?*

12:00 – 13:00 Round table “**The role of Biomonitoring in a ill world**”, with the IABEP Council and invited guests.

13:00 – 13:30 Closing ceremony

CONTENTS

First session, "Classics"	9
Second session, "New methods"	16
Third session, "Standardisation"	24
First session, "Classics in short"	33
Second Session, "New methods in short"	40
Index of Authors	48

LICHENS AS ECOLOGICAL INDICATORS FOR THE EFFECTS OF ENVIRONMENTAL CHANGES IN URBAN CONTEXT* ONGOING RESEARCH AND MAJOR CHALLENGES

PEDRO PINHO (1), BERNARDO ROCHA (1),
CRISTINA BRANQUINHO (1), PAULA MATOS (2)

(1) cE3c Center for Ecology, Evolution and Environmental Changes & CHANGE Global Change and Sustainability Institute, Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal. (2) CEG – Centro de Estudos Geográficos, IGOT – Instituto de Geografia e Ordenamento de Território, Universidade de Lisboa, Lisboa, Portugal.

Although cities are places for human fulfilment, urbanization causes environmental problems, such as atmospheric pollution and the urban heat-island effect. These can be quantified by sensors, but measuring its effects on urban ecosystems biodiversity and provision of ecosystem services remains a challenge. To overcome this, the aim of this work is to present ongoing research, challenges, and application on the use of lichens as ecological indicators in cities. This includes both the use of lichens to measure the effect of environmental drivers and to measure the provision of ecosystem services by urban ecosystems.

Overall, the selection of the more appropriate lichen-based metrics was based on the intensity of the environmental driver: taxonomic-based or trait-based metrics and/or physical-chemical analysis of lichen thallus to understand pollutants deposition and origin in ecosystems. Analysis of lichen metrics over space enhanced the interpretation and application of lichens as indicators for factors working at different spatial scales. Still multi-city studies, across continental gradients, remain challenging, as disentangling the local effects from the large trends observed in a continental scale is still ongoing.

Urban ecosystems are impacted by environmental changes, but also contribute to ameliorating its effects, by providing ecosystem services. We used lichens to quantify how green and blue infrastructure characteristics affect the provision of ecosystem services, e.g. how green areas characteristics (e.g. tree-density or habitat fragmentation) influence the amount of microclimate or air quality regulation. Still, measuring ecosystem services provision under the effects of multiple drivers remains a challenge.

Addressing such challenges could allow us to improve even further the use of lichens as ecological indicators, contributing to the planning and management of cities green infrastructure and to adapt cities to future environmental changes.

Keywords: air pollution, ecosystem services, urban areas, urban heat island.

THE POTENTIAL OF USING HYPERSPECTRAL DATA FOR PLANT AND LICHEN BIOMONITORING OF ENVIRONMENTAL POLLUTION

LORENZO COTROZZI (1), IVAN FIACCADORI (1), GIUSEPPE QUARATIELLO (1), GIACOMO LORENZINI (1), CRISTINA NALI (1), LUCA PAOLI (2), ELISA PELLEGRINI (1)

(1) Department of Agriculture, Food and Environment, University of Pisa, Via del Borghetto 80, 56124 Pisa, Italy. (2) Department of Biology, University of Pisa, Via Ghini 13, 56126 Pisa, Italy

Hyperspectral detection has emerged as a promising tool, being a non-destructive, rapid, and relatively low-cost technique to monitor vegetation (as well as other targets). Reflection of light in the visible, near-infrared, and short-wave infrared (350-2500 nm) can provide a comprehensive assessment of shifts in macroscopic symptoms and the underlying morpho-anatomical and physio-chemical responses of plants to environmental constraints. This spectral approach is also scalable from leaf to remote sensing level, using airborne and space platforms. However, the use of this technology for the biomonitoring of environmental changes and/or environmental pollution effects – a well-known low-cost and effective method to estimate levels of air pollutants and their impact on biological receptors – has remained underdeveloped. Therefore, the present work aims to highlight the potential of hyperspectral data for the biomonitoring of environmental changes using plants and lichens. First, it briefly reports basic concepts of vegetation spectroscopy, including the most used approaches for exploiting information from hyperspectral data (e.g., spectral indexes, trait retrieval, spectral classification). Then, it reviews the few available studies on the topic. Finally, it shows that this approach could also be used for lichen biomonitoring, as using hyperspectral data we were able to discriminate with high accuracy (>95%) native specimens of the forest lichen *Lobaria pulmonaria* (L.) Hoffm. under different environmental conditions (i.e., acclimated/exposed or not to sudden increase of solar radiation, in relation to the effects of forest management), as well as to predict with high accuracy key lichen stress makers, i.e., maximal photochemical efficiency of photosystem II (PSII), PSII performance index and chlorophyll content (R2 for validation: 0.6-0.8). We believe that these preliminary outcomes may encourage further research to highlight the potential of the proposed approach.

Keywords: air quality, hyperspectral imaging, machine learning, spectral classification, spectral indexes, spectroscopy, trait retrieval.

MAGNETISM AND ENVIRONMENTAL BIOMONITORING: APPLICATION FOR THE PREVENTIVE CONSERVATION OF CULTURAL HERITAGE

LISA GRIFONI (1,2), ALDO WINKLER (2), FRANCESCA BOLDRIGHINI (3), MARCOS ADRIAN EDUARDO CHAPARRO (4), LUIGI ANTONELLO DI LELLA (1), FERNANDO MARTE (5), LUCIANO PENSABENE BUEMI (6), ALFONSINA RUSSO (3), ANTONIO SGAMELLOTTI (7), LILLA SPAGNUOLO (2), GABRIELLA STRANO (3), MARCOS TASCÓN (5), STEFANO LOPPI (1)

(1) University of Siena, Italy. (2) Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy. (3) Parco Archeologico del Colosseo, Rome, Italy. (4) CIFICEN-UNCPBA-CONICET, Tandil, Argentina. (5) Universidad Nacional San Martín, Buenos Aires, Argentina. (6) Peggy Guggenheim Collection, Venice, Italy. (7) Accademia dei Lincei, Rome, Italy.

In urban contexts, Cultural Heritage (CH) is heavily threatened by particulate matter (PM), which acts on their surfaces creating functional and aesthetical losses. Magnetic and chemical biomonitoring has been applied as an innovative preventive strategy for evaluating the impact of PM and potentially toxic elements (PTEs) on CH. Lichens collected in remote areas are exposed for three months inside and outside CH sites. Plant leaves are collected for checking their role in the removal of airborne pollutants. The magnetic properties of lichens and leaves provide information about the composition, concentration and grain-size of the bioaccumulated magnetic fraction of PM, that is usually linked to anthropogenic, mainly vehicular, emissions. The first application was at Villa Farnesina, in Rome, Italy, where, despite the intense magnetic properties outdoors, the lichens showed a minor accumulation of metallic emissions indoor, due to the combined effects of the distance from the road and the retention properties of roadside *Platanus* leaves. At the Peggy Guggenheim Collection in Venice, Italy, lichen bags were exposed along a transect from the Grand Canal to the Museum's Garden. In this lagoon context, the accumulation of magnetic PM was moderate outdoors and negligible inside the museum. The leaves of *Pittosporum tobira* were unsuitable for the removal of airborne particles. The bioaccumulation of PTEs was similar in indoor and outdoor lichens and the modest accumulation of magnetic particles outdoors was attributed to long-distance pollution. Further investigations are going on at the Parco Archeologico del Colosseo in Rome, and at two museums in Buenos Aires, Argentina, in busy urban sites where vehicular traffic is by far the main source of metallic emissions. The aim is to test these methods in various urban ecosystems, where the use of lichen transplants and the correct choice of leaves can substantially improve the provision of preventive conservation services.

Keywords: cultural heritage, leaves, lichens, magnetic properties, PM, trace metals.

Index of Authors

A

Abismail Y. 34
Aboal J. R. 28
Aherne J. 20, 29, 45
Ait Kaci M. 34
Alves A. 21
Amelmann V. 37
Aničić Urošević M. 23
Andreatta S. 10
Anselmi S. 20
Apollaro C. 44
Attou F. 35
Atzori G. 40

B

Barbieri A. 46
Baroni F. 19
Basile A. 12
Belhoucine F. 34
Benespero R. 32
Bentayeb K. 34
Bentivoglio T. 20
Berrebbah Alioua A. 34
Bianchi E. 32
Boldrighini F. 17
Branquinho C. 9
Bressan E. 25, 36, 37
Brunialti G. 32

C

Calatayud V. 30
Candotto Carniel F. 31
Capozzi F. 27
Carfagna S. 12
Caricaterra L. 38, 47
Carli A. 40
Cecconi E. 32
Centritto M. 40
Cerri M. 40
Chaparro M. A. E. 17
Chiari M. 18
Ciunciullo P. 12
Cinti E. 40
Clarisse O. 14
Contardo T. 15, 32
Cotrozzi L. 11, 16, 38, 47
Courville-Todorov M. 14
Cristofolini F. 30
Cristofori A. 30

D

D'Aietti A. 25, 36, 37
Delaunay B. 22
Di Fraia A. 12
Di Lella L. A. 17, 20
Di Nuzzo L. 32
Dolhańczuk-Śródka A. 24
Drava G. 33

F

Fenton N. 14
Fernández J. A. 28
Ferretti M. 30
Fiaccadori I. 16, 38
Filicetti S. 44
Frati L. 32
Fortuna L. 31, 32
Fuoco I. 44

G

Gaiola G. 36
Gargano D. 44
Ghennam K. 35
Giordani P. 32, 33
Gottardini E. 30
Grifoni L. 17, 20, 26
Guttová A. 42

H

Haworth M. 40

I

Incerti G. 37
Insolubile M. 12

J

Jafarova M. 20, 29, 45
Janecki D. 24
Jean M. 14

K

Kłós A. 24
Kodranov I. 23
Kuzmanoski M. 23

L

Larbi Y. 35
La Russa M. F. 44
Leblond S. 13
Ledauphin J. 22
Loppi S. 10, 15, 17, 19, 20, 26, 29, 32
Lorenzini G. 11, 16, 38
Loreto F. 12

M

Macor A. 25, 36, 37
Malaspina P. 33
Maresca V. 12
Marte F. 17
Martellos S. 10
Matos P. 9
Mesraty H. 39
Meyer C. 13
Miličević T. 23
Mokhtari B. 35
Monaci F. 19, 32

M

Munzi S. 32, 41

N

Nali C. 11, 16, 38, 47
Nascimbene J. 32
Novotny R. 30

O

Orazi D. 47

P

Panico S. 37
Paoli L. 16, 32, 42, 45
Pedrelli A. 47
Pellegrini E. 11, 16, 38
Pensabene Buemi L. 17
Perri G. 44
Petraglia A. 18
Piazza G. 25, 36, 37
Pinho P. 9
Piras G. C. 38, 47
Pisuttu C. 38, 47
Pitar D. 30
Popović A. 23

Q

Quaratiello G. 16

R

Rajfur M. 43
Rambi K. 35
Rancati E. 25, 36, 37
Ratola N. 21
Ravera S. 32
Reale L. 40
Renzi M. 20
Risoli S. 38
Rocha B. 9
Rupel M. 30
Russo A. 17

S

Sagnotti L. 26
Salbitani G. 12
Sanità di Toppi L. 45
Santunione G. 46
Sauret N. 22
Schaub M. 30
Scimone G. 38
Sgamellotti A. 17
Sgarbi E. 46
Sinesi A. 25, 36, 37
Sorbo S. 12
Spagnuolo L. 17
Strano G. 17
Stringa Basile C. 45
Swislawski P. 43

T

Tascon M. 17
Tonelli M. 38
Tretiach M. 31, 32

V

Vannini A. 18, 32
Varela Z. 28
Vergel K. 23
Virgilio D. 25, 36, 37

W

Wierzbica S. 24
Winkler A. 17, 20, 26

Z

Zanello A. 25, 36, 37
Zanut E. 25, 36, 37
Ziembik Z. 24
Zorza R. 25, 36, 37
Zuluaga D. 40

for your notes...

1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
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77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

1	1
2	2
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16	16
17	17
18	18
19	19
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23	23
24	24
25	25
26	26
27	27
28	28
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31	31
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39	39
40	40
41	41
42	42
43	43
44	44
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71	71
72	72
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74	74
75	75
76	76
77	77
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79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
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92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100



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