



ACCADEMIA NAZIONALE DEI LINCEI

FONDAZIONE «GUIDO DONEGANI»

INTERNATIONAL WORKSHOP

MOLECULES AT THE MIRROR
CHIRALITY IN CHEMISTRY AND BIOPHYSICS

29 – 30 October 2012

ROMA

PALAZZO CORSINI - VIA DELLA LUNGARA, 10

PROGRAMME

ORGANIZERS: Vincenzo AQUILANTI (Perugia), Marta CATELLANI (Parma), Adriano ZECCHINA (Torino), Vincenzo SCHETTINO (Firenze)

Monday, 29 October

9.30 Welcome addresses

10.00 L.D. BARRON (Glasgow University): *True and false chirality and absolute enantioselection*

L. MONSÙ SCOLARO (Università di Messina): *Selection of supra-molecular chirality by application of rotational and magnetic forces*

K.M. WEITZEL (Marburg Universität): *Chirality analysis employing femtosecond laser ionization mass spectrometry*

11.30 Coffee break

W.J. BUMA (Universiteit van Amsterdam): *The difference between left and right*

R. PURRELLO (Università di Catania): *Induction, amplification and memorization of chirality*

14.00 M. QUACK (ETH, Zürich): *Exploring parity violation in chiral molecules: current status of experiment and theory*

P. LAZZERETTI (Università di Modena): *NMR detection of chirality*

R. MILLINI (ENI, San Donato Milanese): *Chiral zeolites and microporous solids : state of art and perspectives*

G. GUERRA (Università di Salerno): *Polymers and chirality*

16.00 Coffee break

Communications and discussion

Tuesday, 30 October

9.30 J.M. RIBÒ (Universidad de Barcelona): *Effects of flows in auto-organization, self-assembly and emergence of chirality*

J.A. MAYORAL (Universidad de Zaragoza): *Chiral catalysis in confined spaces*

11.00 Coffee break

V. BARONE (Scuola Normale Superiore di Pisa): *Harmonic and anharmonic contributions to chiroptical properties*

C. VILLANI (Sapienza Università di Roma): *The chiral dimension of separation science*

M. BELLA (Sapienza Università di Roma): *Asymmetric synthesis: from Academia to Industry*

W. CABRI (Indena, Milano): *Chirality: natural sources vs total synthesis in the pharma segment*

14.00 H.U. BLASER (Formerly Solvias, Basel): *Industrial synthesis of chiral pharmaceuticals: challenges and solutions*

Communications and discussion

Conclusions

Communications:

Sergio Abbate (Università di Brescia); Luciano Caglioti (Sapienza Università di Roma); Chiara Cappelli (SNS e Università di Pisa); Alessandro D'Urso (Università di Catania); Serafino Gladiali (Università di Sassari); Andrea Lombardi (Università di Perugia); Savino Longo (Università di Bari); Susanna Piccirillo (Università di Roma Tor Vergata); Tommaso Prospero (CNR, Roma), Antonio Rizzo (CNR, Pisa); Francesco Ruffo (Università Federico II, Napoli); Stefano Stranges (Sapienza Università di Roma) and others

Participants to the discussions and posters:

Pedro Bargeño (Universidad Complutense Madrid); Maria Elisa Crestoni (Sapienza Università di Roma); Alberta Ferrarini (Università di Padova); Yeghis Keheyan (CNR, Roma); Dorina Kotoni (Sapienza Università di Roma); Alessandra Paladini (CNR, Roma); Federico Palazzetti (Università di Perugia); Fabrizio Santoro (CNR, Pisa); Debora Scuderi (Université Paris Sud) and others

Segreteria del convegno: masciangelo@lincei.it

Sito web: www.lincei.it

Fino alle ore 10 è possibile l'accesso da Lungotevere della Farnesina, 10

The *Accademia Nazionale dei Lincei* and the *Fondazione Guido Donegani*, under the patronage of *Società Chimica Italiana*, promote an International Conference on Molecular Chirality, a theme which involves several areas of pure and applied science.

The Conference will focus on a sequence of topics including: (i) the basic *biochemical and physicochemical* aspects regarding structure and transformations of chiral molecules; (ii) the *organic and industrial chemistry* of chiral recognition, asymmetric synthesis and heterogeneous catalysis, which are of prime interest to pharmaceutical and materials sciences; (iii) the ubiquitous manifestations of *molecular chirality in Nature*, and specifically in the biosphere, their study being relevant to key questions on the origin and evolution of life; long-standing efforts have indeed been aimed at clarifying mechanisms which may have led to the phenomenon of biological homochirality.

The Conference will consist of general lectures from internationally recognized experts and a series of presentations from scientists active in research on molecular chirality and involved in interdisciplinary networks. Ample space will be dedicated to the discussion, open to contributions of participants: particularly encouraged will be the involvement of doctoral students and post-docs.

Examples recording the curiosity of mankind about the symmetry relationship between an object and its mirror image can be traced back in arts and science since the birth of civilization.

The 19th Century witnessed an impressive sequence of investigations, among which we quote here the crucial contributions from three major scientists active in widely separated fields: the mathematical formulation by Moebius, the astonishing discovery by Pasteur of selective "handedness" in matter at the molecular level (notably in biological occurring substances), and the research on problems from physics by Lord Kelvin. The latter is also responsible for the introduction of the word chirality (from cheir, Greek for hand), which comprehends a concept that nowadays appears transversally across many disciplines.

In the 20th Century, overwhelming evidence was accumulated that selective chirality governs the organic chemistry of biologically active molecules: familiar examples include the exclusive left handedness of aminoacids and the right handedness of natural sugars, electing molecular homochirality as a signature of life at the molecular level. Physicists discovered that chirality acts selectively only when interactions designated as "weak nuclear forces" are operative. Since these forces are traditionally considered irrelevant in chemistry, the fact that biology distinguishes molecules and their mirror images is an intriguing theoretical challenge for the 21st Century, but not the only one: well known are implications for pharmaceutical sciences, and in general for applied chemistry. Indeed chirality related issues involve a large fraction of the world's research and industrial budget.