Centro di Etnobiofarmacia
Università degli Studi di Pavia

Abstracts of the Lectures given during the

Master in Etnobiofarmacia e Utilizzo Sostenibile della Biodiversità

Accademic year 2010-2011

Guidelines to the History of Extra-European Civilisations (10 hours)

Teacher: **prof. Gian Paolo Calchi Novati**
e-mail: "Prof. Calchi Novati Gian Paolo" cngp@unipv.it

A short course outline:
The European expansion overseas in XVIII and XIX centuries exported into Asia and Africa - with Europe's political domination and a dependent capitalism - the main features of Western law and culture. The assumption of such an onslaught was the "superiority" of the Western experience. The African and Asian nations were deprived of their history. Modernity and progress were confused with Westernisation.
Despite the attempt to revive the past cultures through Pan movements and territorial nationalism, the eurocentric universalism survived to the end of colonialism.
The process of liberation of the colonized peoples has been largely based on principles and interest inherited by the colonizers.
The course will highlight the formation of the Third World after decolonisation and its contradictory links with the North. The scheme Centre-Periphery doesn't regard only the economic market of goods and capitals but culture as well.
The ideals of independence sponsored a policy of positive neutralism and non-alignment in order to preserve the new nations from the Cold War obligations.
New trends started after the end of Bipolarism and the emergence of a South capable to challenge the traditional hegemony of the West promoting its own values.

Phytochemistry (14 hours)

Teacher: **Paola Vita Finzi**
Dipartimento di Chimica Organica - Via Taramelli 10 – 27100 Pavia
Telefono 0382-987322 – e-mail: vitafinz@unipv.it

A short course outline:
The aim of this course is to illustrate the main classes of natural organic products known as secondary metabolites. Starting from the fundamental biosynthetic pathways (Krebs cycle, glycolisys, pentose cycle) the other biosynthetic pathways that start from C_2 units or from sugars through shikimic acid are described.
Particularly polyketides, terpene and steroid compounds that are derived from two different biosynthetic pathways, the natural products, coming from shikimic acid, some classes of alkaloids and some natural products with a mixed biosynthesis will be described.
For all the classes, further the description of the biosynthesis, the structure and the reactivity of the most important natural organic products, their biological and pharmacological properties are illustrated.

- The most important subjects are the basic enzymatic reactions (alkylation reactions, Wagner-Meerwein rearrangements, aldol and Claisen reactions, Schiff base formation, and Mannich reactions, decarboxylation reactions, oxidation and reduction reactions, phenolic oxidative couplings, glycosylation reactions.
- Acetogeninic products from acetate and propionate molecules. Polyenic and non-polyenic macrolides. β-poliketonic chains and their condensation to form aromatic derivatives: for instance, anthraquinones, tetracyclines, some rearranged skeleton derivatives.

- Biosynthesis of shikimic acid and C_6-C_1, C_6-C_3 derivatives (for instance, flavonoids, quinones, etc.).
- Biosynthesis of terpenes (the different classes, squalene and phytoene and various classes of steroids). Biosynthesis of seco-loganine.
- The most important classes of alkaloids derived from different aminoacids an their activities (for instance, tropane, pyridine, benzyltetrahydroisoquinoline and morphine, and indole alkaloids).
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Bibliography

Paul M. Dewick
Medicinal Natural Products – A Biosynthetic Approach
John Wiley & Sons, LTD

Methods of structure determination of bioactive compounds (10 hours)

Teachers: Giovanni Vidari e Giorgio Mellerio
Dipartimento di Chimica Organica
Via Taramelli 10 – 27100 Pavia
Telefono: 0382-987322 – e-mail: vidari@unipv.it, <giorgio@cgs.unipv.it>

A short course outline

Aim of the course is to provide students with the basic notions necessary to understand: i) the interactions of molecules with different wavelength electromagnetic radiations and with electrons; ii) the characteristic features of each spectroscopic method and electromagnetic spectrum; iii) the use of different spectra for the structure determination of organic compounds. The most important spectroscopic techniques used by organic chemists will be illustrated. They comprise: the nuclear magnetic resonance (NMR) spectroscopy of the ^{1}H and the ^{13}C nucleus, infrared (IR) and UV-visible spectroscopy, and mass spectrometry (MS). In particular, the effect of different ionization techniques on the mass-spectra characteristics will be examined. A short account of. spectropolarimetric and X-ray techniques will also be presented. Partial informations about a molecule's structure, derivable from careful analysis of each spectrum, will be rationally combined in order to define the formulas of unknown compounds. In particular, the spectra of very well-known natural products of different biosynthetic origin will be illustrated as reference examples.

Microbiology (hours 6)

Teachers: Cesare Dacarro e Pietro Grisoli
Dipartimento di Farmacologia Sperimentale e Applicata
Via Taramelli - 27100 Pavia
Tel: 0382987397-6945, e-mail:cesare.dacarro@unipv.it

A short course outline:

During the course microorganisms culture methods will be explained with particular reference to the implementation of quality control assays of herbal medicinal products. The course describes the evaluation methods of antimicrobial compounds by determining the Minimum Inhibitory Concentration and Minimum Bactericidal Concentration (MIC, MBC) and the assay of diffusion

methods in nutrient agar. Finally the verification methods of the antimicrobial preservative power will be discussed according to the "Challenge test".

International Cooperation and the International Agency for development: giuridic and economic aspects (5 hours)

Teacher: Lorenzo Bianchi
COOPI
e-mail: bianchicarnevale@coopi.org,

A short course outline:

1. Main actors of International Cooperation: public institutions, civil society and beneficiaries.
2. International Cooperation, how does it work?: bilateral, multilateral, multi-bilateral.
3. Italy and International Cooperation: national cooperation e decentralised cooperation.
4. European Union:
   a) The most important actor in development cooperation and its direct and in direct modalities of intervention;
   b) financial instruments and thematic programmes;
   c) call for proposals and call for tender.

5. UN galaxy, World Bank and GEF.

The objective of this module is to provide students with an understanding of the way of working of international cooperation and the actors involved. The attention will be set at first on the types of actors that are the protagonists of international cooperation and then on the forms that it takes on.
As a second step, it will be analysed a sample of the actors involved in international cooperation, starting with the Italian national government and to the so-called decentralized cooperation carried out by local authorities. The next example will be dedicated to the European Union, in particular the European Community external assistance, which is the main donor in the world to which all who are looking for funding today are related. Precisely because of its international role, to Community support will be devoted more space in the class; it is also the opportunity to show the different methods of intervention used by international donors in the framework of international cooperation. Finally will be introduced to the United Nations, the World Bank and GEF Global Environment Facility, explaining how to place them in the landscape of international cooperation and their role.

Epistemology of Science (8 hours)

Teacher: Luciano Valle
lcn.valle@gmail.com

A short course outline:

THEMATIC ARTICULATION: AN OUTLINE

I. The Constitution of Science as seen through the two paradigmatic figures:

1. Newton (*representing Modernity*):
   - Scientific Method
   - Religion
   - Ethics

2. Einstein (*representing 20th Century*):
   - Scientific Method
   - Religion
   - Ethics
   - Knowledge process
   - History
   - Society

II. Models in Science

- Duhem
- Einstein
- Popper

III. Problematization of the Statute of Science: between Science and Epistemology

- Popper
- Prigogine
- Feyerabend
- von Weizsäcker

IV. Science and ...

- Religion
- Metaphysics
- Ethics
- Aesthetics
- Nature
- Society

Methods for Isolation of Active Natural Compounds (4 hours)

Teacher: Gianluca Gilardoni
Universita' degli Studi di Pavia - Dipartimento di Chimica Organica
via Taramelli 10, 27100 Pavia-Italy
tel +39 0382-987321
e-mail: Gianluca Gilardoni <gianluca.gilardoni@unipv.it>

A short course outline:
The characterization of new natural products is a procedure based on the application of chemical and physical methods to significant amounts of unknown substances. These applications are subject to the accomplishment of two previous steps:

1. The extraction process, intended to separate the metabolites from their biological matrix, usually in a complex mixture called “extract”;

2. The purification process, in which the compounds are isolated from the extract in the purest form possible.

On the other hand, even processes whose purpose is not the characterization of new compounds, such as production of commercially available natural products or instrumental analysis of known metabolites, the extraction remains the first and critical step.
This course is focused on this process, rarely viable from general protocols but usually developed case by case on the basis of experimental evidences. Limits and advantages of different methods will be discussed, together with some examples taken from real cases.

Active ingredients from plants: the large scale exploitation (4 hours)

Teacher: **Giori Andrea M.**

R&D - Indena S.p.A.

e-mail: andrea.giori@indena.com

A short course outline:
Aim of the module is to introduce the industrial approach to large scale production of plant derived active ingredients. Through extensive use of examples of commercial extracts and pure natural products, the following topics will be treated:

- Fields of application and significance of plant derived active ingredients
- Definitions of herbal drugs, herbal drug preparations and extract
- Characteristics of plants suitable for large scale exploitation (cultivation, wild sourcing, harvesting, post-harvest treatments, storage, selection, sustainability...)
- Main techniques applied for industrial production (extraction and purification) and quality control
- Quality system: how to manage in a simple way the overall quality of complex products like the plant extracts

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Manufacturing of cosmetic, food and drug products of natural origin (4 hours)

Teacher: Prof. Bice Conti (position: full professor)
Department: Drug Sciences
Address: Viale Taramelli 12 – Phone: 0382 987378 – email: bice.conti@unipv.it
Professor interview time: Wednesday 9 – 11 a.m.

A short course outline:
The course aims at providing technical and methodological skills useful for the application of the principles of formulation technology to the industrial manufacturing of cosmetic, food and drug products. The various topics will be treated in the frame of laws and guidelines in force (e.g. GMP, ISO), which regulate the industrial production in these areas.

Topics list:
- ISO rules, Good Manufacturing Practices (GMP), laws of industrial safety.
- The certification system following ISO rules.

- The structural organization of pharmaceutical and cosmetic plants following GMP requirements:
- manufacturing areas – aseptic production areas.
- Industrial plant general utilities: heat ventilation air control (HVAC) systems, heating systems for steam production and treatment, vacuum and compressed air production, refrigeration and freezing apparatuses, powder abatement systems, waste treatment and disposal.

Pharmaceutical Botany (6 hours)

Teacher: Francesco Bracco

Dipartimento di Ecologia del Territorio – via S. Epifanio 14 – 27100 Pavia
Telefono: 0382 984848. E-mail: bracco@et.unipv.it

A short course outline:
Il corso di Botanica farmaceutica è basato principalmente sulla identificazione botanica e la conoscenza delle specie importanti per fini farmaceutici, economici e per qualsiasi utilità riguardante l'uomo o gli altri esseri viventi. Vengono a questo proposito introdotti concetti di Botanica Sistematica (classificazione tassonomica, nomenclatura binomia, concetto di specie e taxa intraspecifici) e cenni di sistematica e di organizzazione generale di Famiglie di specie autoctone e di specie esotiche di interesse farmaceutico.
Vengono forniti strumenti bibliografici per la ricerca botanica (Flore, database informatici).
Vengono trattati poi elementi di Ecologia Vegetale considerando le fonti di variabilità del contenuto in principi attivi (fattori endogeni ed esogeni che influenza la produzione di principi attivi nelle piante medicinali). Tempo balsamico. Raccolta, preparazione e conservazione delle droghe.

Program:
- Definizione e scopi della Botanica farmaceutica. Sviluppo storico dell'utilizzazione delle piante officinali.
- Utilità delle piante per l'uomo. Piante come fonte di sostanze di interesse farmaceutico.
- Elementi di ecofisiologia delle piante medicinali utili per la comprensione dei meccanismi di produzione di sostanze di interesse farmaceutico.
- Fattori endogeni ed esogeni che influenza la produzione di principi attivi nelle piante di interesse farmaceutico.
- Sistematica: definizione e scopi. Criteri di classificazione del regno vegetale. Esempi di famiglie autoctone ed esotiche con importanza antropico-farmaceutico.

Methodologies in biothecnology (6 hours)

Teacher: Enrico Selva
e-mail: enricoselva50@yahoo.it

A short course outline:
The majority of antibiotics and many bioactive molecules used in a variety of fields are of microbial origin. Their discoveries was driven by the microbial diversity available in nature and the connected biosynthetic abilities. The seminar deals with the approaches to discovery of

novel therapeutic agents and focuses on antibiotics produce by fermenting microorganisms. We will consider medical and industrial aspects in the typical context presented by developed and developing societies.

Analytical methodologies for the quality control and security of natural products in pharmaceutical, cosmetic and food fields (6 hours)

Teacher: Gabriella Massolini
Dipartimento di Scienze del Farmaco – Via Taramelli 12 – 27100 Pavia
Telephon: 0382-987383, e-mail: gabriella.massolini@unipv.it

A short course outline:
The objective of this course is the study of the theoretical basis and practical use of analytical methods (instrumental techniques) for the quality control of natural products

In particular, this course gives the scientific background to separative methods (liquid and gas chromatography, capillary electrophoresis), together with the methodological approaches for the analysis of bioactive molecules.

Different applications of the discussed analytical methods will be considered with particular emphases on the fields of pharmaceutical, cosmetic and food.

The validation of the analytical methods will be also discussed.

Chemistry and analysis of volatile compounds (7 hours)

The volatile fraction in ecosystem and analysis of the mixture composition

Teacher: Carlo Bicchi
Laboratorio di Analisi Fitochimiche - Dipartimento di Scienza e Tecnologia del Farmaco
Via Pietro Giuria 9 - I-10125 Torino (Italy)
Tel. + 39 011 670 7662; Fax+ 39 011 670 7687, e-mail: carlo.bicchi@unito.it - www.phytoanalysis.unito.it

A short course outline:
Topics
The following topics will be dealt with:
- The volatile fraction as a parameter to characterize a vegetable matrix
- Headspace sampling
- Essential oil definition
- Approaches to investigate the volatile fraction composition of a vegetable matrix – Total Analysis Systems (T.A.S.)
- Modern approaches to sample preparation – Solventless sample preparation techniques – High concentration capacity techniques
- Separation techniques – Fast gas chromatography (F-GC) – Fast mass spectrometry (F-MS)
- Multidimensional gas chromatography – Comprehensive GC (GCxGC)
- Higher level of information from analysis results – Statistical elaboration and data mining

Each subject will be illustrated by some examples.

Teacher: Maurizio Benzo
Osmotech S.r.l. c/o Dipartimento di Chimica Farmaceutica
Via Taramelli, 12 – I-27100 Pavia (Italy)
Tel. + 39 0382 987788; Fax+ 39 02 700526506
e-mail: maurizio.benzo@osmotech.it - www.osmotech.it

A short course outline:
Theory
- Odour Threshold (OT): theory and measurement techniques
- Gaschromatography/Olfactometry (GC/O): gaschromatographic sniffing port and olfactograms
- main odorants evaluation in volatile fraction according to Grosch (AEDA) and Acree (CharmAnalysis)

Practical tests
- evaluation of individual Odour Threshold using a dynamic dilution olfactometer
- sensorial analysis of an essential oil using a GC/MS system equipped of a sniffing port

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Pharmacognosy (4 hours)

Teacher: **Andrea Lugli**
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Objective: to familiarize with the concept of drug and phytocomplex, both from a static point of view (composition / chemical complexity, variability) and dynamic one (characteristics of the interaction between complex systems: phytocomplex-human organism).

Contents:
Definition and aims of pharmacognosy, its interdisciplinary essence. A brief introduction to different approaches for the classification and systematization of herbal drugs.
The study and knowledge of a drug as an example of how studing the characteristics and potential of a complex system. Definition, structural and dynamic characteristics of the phytocomplex. Characterization of drug/phytocomplex: notes on the issues. Phenomena that characterize the activity of a drug and its phytocomplexes (eg synergy, multi-tasking, etc.).

The course will be accompanied by a number of practical examples to clearly illustrate the theoretical concepts.

Global Market and Economic Development (8 hours)

Teacher: Alberto Botta
Department of History, Law, Social and Economic Sciences – via Tommaso Campanella 89125 – Reggio Calabria. e-mail: abotta@eco.unipv.it

A short course outline:
Development Inidcators
Economic indicators: Per-capita Gross Domestic Product (GDP) and Gross National Product (GNP).
Worldwide economic comparison among different areas. Measures of Uneven development.

Elements of Development Economics

Rural Development: Agricultural surplus and the necessary conditions for industrialization.
Investments and Structural Change.
Export diversification and natural re source dependence.
Raw material markets and "terms of trade" dynamics.
Poverty traps.
Human Development Index.

References

- Gianni Vaggi e Marco Missaglia, *Introduzione all'Economia dello sviluppo*, Pavia 2007.
- Chiappero Martinetti Enrica e Semplici Andrea, *Umanizzare lo sviluppo*, Rosenberg e Sellier, Torino 2001. In particolare i capitoli 1-3.

Outline of Anthropology and Ethnomedicine (10 hours)

Teacher: Giampaolo Buzzi
e-mail: <gpbuzzi@hotmail.com>

A short course outline:

Medical Anthropology: Health, Disease, Illness, Therapy.

Medical Anthropology and Ethnomedicine: definitions and contents

Complementary, non conventional medicine and Biomedicine: similitudes and diversities about the concept of disease and sick person

Parallel, Popular and Tratitional Medicine: history and methodology

Crosscultural Medicine: ethnos, race, culture

Outline of Crosscultural Communication.

Pharmacopoeias of various Countries concerning natural products (2 hours)

Teacher: Franca Pavanetto
Dipartimento di Chimica Farmaceutica – Via Taramelli 12 – 27100 Pavia
Telefono: 0382-987377, e-mail: franca.pavanetto@unipv.it

A short course outline:

Regulatory signs on medicinal products (definition, types, requirements and controls), with particular emphasis on natural products and their presence in the various pharmacopoeias.

Natural Products in the Pharmaceutical Field (8 hours)

Teacher: Gabriele Caccialanza
Dipartimento di Chimica Farmaceutica- via Taramelli 12 – 27100 - Pavia
Telefono: 0382-987391, e-mail: gabriele.caccialanza@unipv.it
Docente: Giovanni Appendino
Università del Piemonte Orientale – Largo Donegani 2 - 28100 Novara
appendino@pharm.unipmn.it

A short course outline:

1. Medicinal plants from prehistory to modernity

Natural remedies have always been notorious to humanity. Indeed they are the expression of an instinct for health which is deeply rooted within man's consciousness.
Since antiquity humans have projected their need for health towards the surrounding environment and especially towards the plants world.

2. Examples of optimization of active principles originating from plants.

a) From the *Papaver somniferum* to modern analgesics

b) From the *Erythroxylum coca* to modern local anesthetics

In the second part of the course, of the relevance of the natural products for the biomedical research will be discussed on the molecular basis with an outline of the fundamental strategies for the utilization of the chemical diversity found in the products of vegetal sources and their limitations. At the end, the utilization of the medicinal plants and their derivatives in the modern medical clinics are illustrated, to put in evidence the relevance of the ethnophrmaciological observations for a rational phytotherapy.

Bioactive natural products for Cosmesis (4 hours)

Teacher: Daniela Rossi
P.&P.Profumi & Profumi
e-mail: rossi@profumieprofumi.eu

A short course outline:

The course will cover issues related to the cosmetic use of bioactive component from natural sources, starting from an historical interpretation.In particular, due to the increasing interest toward natural products, current trends in cosmetic market will be investigated. Although cosmetics made entirely from natural ingredients are difficult to find, several proposals show in the ingredients the presence of bioactive natural compounds, especially in the anti-aging products.
Plants with known and potential cosmetic activities will be studied highlighting the bioactive components that may contribute to maintenance of the young skin properties.

Natural Compounds Useful in Control of Insect Pests, Weeds and Diseases (4 hours)

Teacher: Paolo Piccardi

Isagro Ricerca
e-mail: <ppiccardi@isagro.it>

A short course outline:
Crop protection Market:

- Industry Structure
- Problems and Prospects of Natural Control Agents

Research and Development of a Novel active Ingredient:

- The Role of Industry
- Research Approaches to the Discovery
- Product Development
  - The Contribution of Academic and Government Institutions

Registration of Natural Pesticides:

- Data Requirements
- Socio-Economic Aspects of Pesticide Use for Human Welfare

Natural Insecticides:

- Insecticides from Plants and Microbes
- Insect Pheromones and Insect Growth Regulators
- The Contribution of Genetic Engineering

Biorational Control of Fungi:

- Plant Defence Responces
- Antifungal Compounds from Natural Sources

Biorational Control of Weeds

- Mcrobial Herbicides
- Role of Natural Products in Herbicide Discovery
- The Contribution of Genetic Engineering

Plant Growth Regulators and Biostimulants:

- Uses and Research Advancements

Outline of Agronomy (4 hours)

Teacher: Paolo Bergamo
Regione Lombardia - D.G. Agricoltura
c/o Dip. Ecologia del Territorio - Università degli Studi di Pavia, via S. Epifanio 14 - 27100 Pavia
Tel. ufficio 0382-304460 fax 0382-34240 e-mail: paolo.bergamo@ersaf.lombardia.it

A short course outline:
The employ of natural source compounds, in particular of plant origin, involve the pick up of plants in natural environment, with a potential danger for their conservation, otherwise their antropic growing. The cultivation allow also the achievement of products in bigger amounts ad often in better quality too. However also the cultivation may have hazard, especially if carried out in breakable ecosystems, e.g. subject to erosion or soil impoverishment.

Agronomy is the art to regulate the factors that govern the plant production so as to reach maximum crop production, also in quality terms, without compromise soil fertility.
In the course of the lessons we will explain the agronomy principles with special reference to the traditional and sustainable agriculture, also making reference to issues of specific interest as how, e.g., the seed law and the cultivation method of aromatic plants.

Natural Products in the Food Field (4 hours)

Teacher: Luigia Favalli
Dipartimento di Farmacologia Sperimentale e applicata
Via Taramelli
Telefono: 0382987399, e-mail: farola@unipv.it

A short course outline:
The aim of the course is an introduction to the main varieties of food suitable for a healthy and balanced diet, in respect of biodiversity.
Features concerning nutrients composition, digestibility, organoleptic properties and gastronomic opportunities will be discussed more in detail as far as these kinds of food are concerned:

- meat
- cereal, starchy food, tubers.
- dressings and sauces
- fruits
- dairy products and cheese
- legumes
- vegetables
- fish and other fishing products
- eggs
- sweets

Bibliographic Research on Natural Products (4 hours)

Teacher: Giuseppe Zanoni
Dipartimento di Chimica Organica - Via Taramelli 10 – 27100 Pavia
Telefono 0382-987321 – e-mail: gzanoni@unipv.it

A short course outline:
Online bibliographic research tools, such as SciFinder and Reaxys will be illustrated with the focus on the chemistry and biological activity of natural products.
SciFinder is a research discovery tool that allows college students and faculty to access a wide diversity of research from many scientific disciplines, including biomedical sciences, chemistry, engineering, materials science, agricultural science, and more.
Reaxys is a brand-new workflow solution for chemists. Offering a wealth of experimentally validated information, Reaxys brings a fresh look to synthetic chemistry through powerful functionality and relevant content. Designed by the chemists that brought you the CrossFire databases, Reaxys reduces the time it takes to get to the relevant results.

Outline on laws, regulamentations and patents by respect to ustilization aand marketing of natural products (3 hours)

Teacher: Valerio Bombardelli
e-mail: valerio.bombardelli@indena.com,

Methodology for the control and conservation of biodiversity and natural resources (4 hours)

Teacher: Francesco Bracco
Dipartimento di Ecologia del Territorio – via S. Epifanio 14 – 27100 Pavia
Telefono: 0382 984848. E-mail: bracco@et.unipv.it

A short course outline:
Vengono presentati in modo sintetico gli elementi fondamentali per la conoscenza della biodiversità a scala locale e globale al fine di inquadrare l'attività di ricerca e utilizzo dei derivati naturali in un sistema di riferimento che tenga conto delle variabili ambientali e delle problematiche di sostenibilità relative.
Sarà in particolare sviluppato il concetto di biodiversità vegetale articolata a vari livelli (biodiversità intraspecifica, biodiversità tassonomica e biodiversità fitocenotica e del paesaggio vegetale) e saranno parallelamente presentati i concetti fondamentali necessari (flora territoriale, vegetazione, paesaggio).
Verrà sinteticamente illustrato il quadro della variabilità dei paesaggi vegetali secondo la zonazione fitoclimatica globale e verrà illustrato il concetto di poli di biodiversità vegetale.
La biodiversità naturale e il suo condizionamento derivante dalla presenza e dalle attività dell'uomo antropico saranno discusse in relazione anche alle modalità di percezione della biodiversità vegetale da parte delle culture locali.
Verranno infine delineati elementi di tutela della biodiversità naturale e di quella indotta dal'uomo e verrranno prese in considerazione le problematiche inerenti allo sfruttamento delle risorse vegetali naturali al fine di impostare strategie cautelative di raccolta e/o coltivazione.

Socio-economic situation in extraeuropean Countries (4 hours)

Teacher: Antonio Raimondi
e-mail: info@antonioraimondi.it

Toxicology (6 hours)

Teacher: Stefano Govoni
Department Experimental and Applied Phamacology, Viale Taramelli 14
27100 PAVIA, ITALY
Tel.: ++39 0382 987394
Fax: ++39 0382 987405
e-mail: govonis@unipv.it

Web: http://www.unipv.it/farmacologia/

A short course outline:
Aim of the present 6 hrs program will be to provide to all the participants a similar toxicology background and terminology (concerning drugs, cosmetics, integrators, food, food additives, etc). In particular a brief overview of the preclinical and clinical toxicology concepts needed to develop new drugs from natural sources will be presented. The need for common guidelines for toxicity testing as well as for new in vitro methods, allowing to decrease the use of animals, will be discussed together with the translational relevance and value of the preclinical in vivo and in vitro studies to men. The short course will be completed with some case histories from the literature.

Methods for antifungal activity evaluation of natural extracts (4 hrs)

Teacher: Dr. Solveig Tosi
Dipartimento di Scienze della Terra e dell'Ambiente. Sezione di Micologia.
via S. Epifanio 14 – 27100 Pavia
Telefono: 0382 984870. E-mail: solveig.tosi@unipv.it

A short course outline:
The lecture is divided in three parts, organized as follows:
Part 1 (1 hr, theory): introduction to fungal biology and ecology, generality of fungi as disease agents.

Part 2 (1 hr, theory): *in vitro* methods for antifungal evaluation of natural extracts. Reading and analyzing the reference methods about fungi published by Clinical and Laboratory Standards Institute (CLSI).

Part 3 (2 hrs, practical): laboratory practice in the Mycology Section using fungal in vitro cultures, micro and macrodilution and agar diffusion methods, bioautography.
