



Education in Pharmacognosy/Pharmaceutical Biology: Present Situation and Future Prospects* I



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The current process of harmonising Higher Education Studies in Europe also includes Pharmacy. In order to prepare a statement on the current status and on future perspectives of Pharmacognosy/Pharmaceutical Biology education in Europe, the Society for Medicinal Plant Research (GA) has evaluated the contents of theoretical and practical courses. This was done by making an inquiry amongst Pharmacognosy/ Pharmaceutical Biology groups and departments in Europe.

The questionnaire entitled "Biological and Biochemical Contents of Study Courses in Pharmaceutical Biology/ Pharmacognosy" was divided into 7 main categories: Biology for Pharmacists, General Biochemistry (interdisciplinary), Microbiology, Drugs of biological (natural) origin, Phytopharmaceuticals (herbal medicinal products), Quality Assurance of Drugs of natural origin, Further Subjects. These main categories were again structured into 56 subcategories. For each subcategory people were asked whether at present the subject is taught or not, and if so whether it is presented as lecture/seminar and/or practical course/laboratory class/excursion. Finally, it was asked to estimate the importance of the subject for the future.

STUDY DESIGN

- **Period:** November 1999 - January 2000
- **Target group:** university teachers and staff (GA members) all over Europe and Turkey
- 300 questionnaires sent out
- 126 questionnaires returned (42%)

7 main categories:

- **BIOLOGY FOR PHARMACISTS**
- **GENERAL BIOCHEMISTRY (interdisciplinary)**
- **MICROBIOLOGY**
- **DRUGS OF BIOLOGICAL (NATURAL) ORIGIN**
- **PHYTOPHARMACEUTICALS (herbal medicinal products)**
- **QUALITY ASSURANCE OF DRUGS OF NATURAL ORIGIN**
- **FURTHER SUBJECTS**

with a total of 56 subcategories

CONTRIBUTIONS BY COUNTRY

Western Europe

	n	%
Austria	8	6
Belgium	9	7
England	9	7
France	6	5
Germany	25	20
Greece	1	1
Ireland	1	1
Italy	5	4
Netherlands	1	1
Norway	1	1
Portugal	6	5
Spain	12	10
Switzerland	4	3

Central and Eastern Europe

	n	%
Bulgaria	1	1
Croatia	2	2
Czech Republic	7	6
Hungary	1	1
Macedonia	1	1
Poland	11	9
Romania	4	3
Serbia	1	1
Slovakia	5	4
Turkey	5	4

Total questionnaires: 38

Total questionnaires: 88

DIAGRAMS

Present situation: shows the frequency at which the subject is taught, either by lecture or by a practical course.
 ■ **EST** - percentage out of a total of 88 questionnaires from Western Europe
 ■ **AST** - percentage out of a total of 38 questionnaires from Central and Eastern Europe
 ■ **RD** - percentage out of a total of 25 questionnaires from Germany
 ■ **L** - percentage out of a total of 126 questionnaires.

Future situation: considerations for the importance of the subject in the future.
 ■ **Future (1)** - percentage regarding the subject as absolutely necessary
 ■ **Future (2)** - percentage regarding the subject as important

BIOLOGY FOR PHARMACISTS

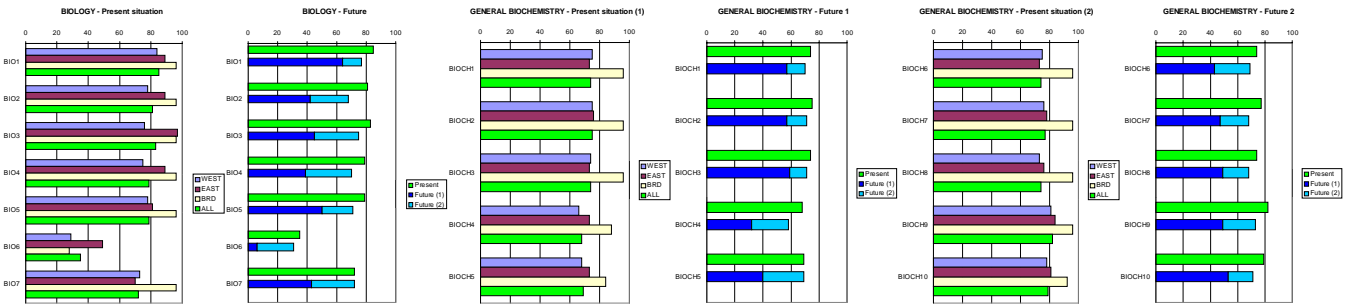
BIO1	Principles of cytology, basic cell structure and organization (Pro- and eukaryotes, plant and animal cells)
BIO2	Principles of histology (plant and animal tissue)
BIO3	Principles of anatomy and morphology of plants and animals
BIO4	Principles of systematics of pharmaceutically and medically important taxa of viruses, microorganisms, fungi, plants
BIO5	Principles of physiology (plants and mammals)
BIO6	Principles of ecology
BIO7	Principles of genetics

GENERAL BIOCHEMISTRY (interdisciplinary) I

BIOCH1	Proteins, peptides and amino acids, protein biosynthesis; metabolism of proteins
BIOCH2	Enzymes and coenzymes
BIOCH3	Nucleic acids, transcription, replication, translation
BIOCH4	Porphyryns (haemoglobin, chlorophyll)
BIOCH5	Biological oxidation (metabolism of oxygen)

GENERAL BIOCHEMISTRY (interdisciplinary) II

BIOCH6	Respiration and citric acid cycle
BIOCH7	Simple lipids and lipid metabolism
BIOCH8	Complex lipids, phospholipids, glycolipids and membrane structures
BIOCH9	Isoprenoids (steroids, carotenoids)
BIOCH10	Sugars (glycolysis, alcohol, fermentation, metabolism, aerobic carbohydrate decomposition, gluconeogenesis), Glycosides



GENERAL BIOCHEMISTRY (interdisciplinary) III

BIOCH11	Photosynthesis
BIOCH12	Metabolic pathways (regulation of metabolism)
BIOCH13	Inorganic metabolism, water regulation
BIOCH14	Nutrition, vitamins
BIOCH15	Specific biochemical functions of some organs

MICROBIOLOGY

MICBIO1	General morphological and physiological basic aspects of microorganisms, industrial significance
MICBIO2	Practical microbiology (nutrient media, sterilization, safety protocols), staining techniques, identification, counting, classical and modern methods in microbiology
MICBIO3	Special techniques (antibiotic assays, sterility tests, detection of endotoxins, disinfection and preservation)
MICBIO4	Introduction to hygienics (hygienic working, cleaning and disinfection, CIP, SIP, hygiene protocols, GMP, HACCP)

