Results of the inquiry of the Society for Medicinal Plant Research

„Biological and Biochemical Contents of Study Courses in Pharmaceutical Biology/ Pharmacognosy“

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

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%)**

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Study design:

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

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Questionnaire (1):

Questionnaire on the Curriculum of Pharmaceutical Biology/Pharmacognosy in Europe

Pharmacy is included in the process of harmonising Higher Education Studies in Europe. 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**) wants to evaluate the contents of theoretical and practical courses by Pharmacognosy/ Pharmaceutical Biology groups and departments in Europe.

The following questionnaire will help us to learn which of the contents are considered to be part of the material taught in Pharmacognosy/ Pharmaceutical Biology in the different European countries and schools of Pharmacy and how their importance is rated for the future. The interrogated persons were asked for details on:

- **Present situation:**

Subjects are taught at the college/university/ institute at present: **yes or no**.

- **Teaching method:**

Methods used to teach the subject matter (if it applies)

L by lectures and seminars
P by laboratory classes, excursions, other practical training

- **Future importance:**

Considerations for the importance of the subject in future as follows:

1 Absolutely necessary
2 Important
3 Optional
4 Unnecessary

At the end of the table there was some space for individual suggestions.

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Questionnaire (2):

BIOLOGICAL AND BIOCHEMICAL CONTENTS of Study Courses in Pharmaceutical Biology/ Pharmacognosy (based on the Committee for Pharmaceutical Education) of the European Commission XV/E/8341/6/93 of 26-7-95.

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**

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Questionnaire (3):

GENERAL BIOCHEMISTRY (interdisciplinary)

BIOCH1	Proteins, peptides and amino acids, protein biosynthesis; metabolism of proteins
BIOCH2	Enzymes and coenzymes
BIOCH3	Nucleic acids, transcription, replication, translation
BIOCH4	Porphyrins (haemoglobin, chlorophyll)
BIOCH5	Biological oxidation (metabolism of oxygen)
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
BIOCH11	Photosynthesis
BIOCH12	Metabolic pathways (regulation of metabolism)
BIOCH13	Inorganic metabolism, water regulation
BIOCH14	Nutrition, vitamins
BIOCH15	Specific biochemical functions of some organs

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Questionnaire (4):

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)

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Questionnaire (5):

DRUGS OF BIOLOGICAL (NATURAL) ORIGIN

DRUG1	Medicinal plants, crude drugs, preparations (parent plants, cultivation and harvesting, secondary metabolites, active principles, mode of actions)
DRUG2	Pharmaceutically used secondary plant metabolites (including essential oils, gums)
DRUG3	Pharmaceutically used primary plant metabolites
DRUG4	Natural addictive toxins and their sources, drugs of abuse/addiction of plant origin
DRUG5	Antibiotics and biological cytostatics (sources, production, mode of action, therapeutic uses, mechanisms of resistance and transmission)
DRUG6	Microbes used as drugs (eg. *S. cerevisiae, E. coli*, *Lactobacillus*, yeast products, etc)
DRUG7	Drugs produced by biotechnology
DRUG8	Enzymes, vitamins and hormones, including activation and inhibition of biological processes
DRUG9	Blood products
DRUG10	Biotechnology (Production and processing of biologically-derived pharmaceuticals)
DRUG11	Isolation of natural products (strategies, methods)
DRUG12	Biosynthesis of plant and microbial constituents

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Questionnaire (6):

PHYTOPHARMACEUTICALS (HERBAL MEDICINAL PRODUCTS)

PHYTO1	Quality, activity, efficacy, adverse effects
PHYTO2	Therapeutic uses

QUALITY ASSURANCE OF DRUGS OF NATURAL ORIGIN

QUAL1	Identification and quality assessment of plant-derived drugs and preparations
QUAL2	Analytical procedures for investigation and standardization of herbal medicinal products and other preparations of biological origin

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

Questionnaire (7):

FURTHER SUBJECTS

SUB1	**Cultivation** and collection of medicinal plants
SUB2	**Cell and tissue culture** (plant and animal cells)
SUB3	**Principles of immunology**
SUB4	**Application of immunological and enzymatic methods** in analysis, diagnostics and therapy
SUB5	**Vaccination products, immunoglobulins and immune sera** (production, assay and use)
SUB6	**Molecular biology** (including molecular biology techniques)
SUB7	**Gene technology,** gene technology for production of pharmaceuticals
SUB8	**Poisonous plants and fungi** (phytotoxicology)
SUB9	**Alternative therapies based on biological remedies or** ethnopharmacognosy
SUB10	**Health food and dietary supplements**

OTHER SUBJECTS

SUB11	Gene expression and regulation
SUB12	Regulation of cell cycle, cell division, cell and tissue differentiation
SUB13	Gene therapy
SUB14	Viruses, oncogenes and cancer

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

CONTRIBUTIONS:
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

Total questionnaires: 88

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

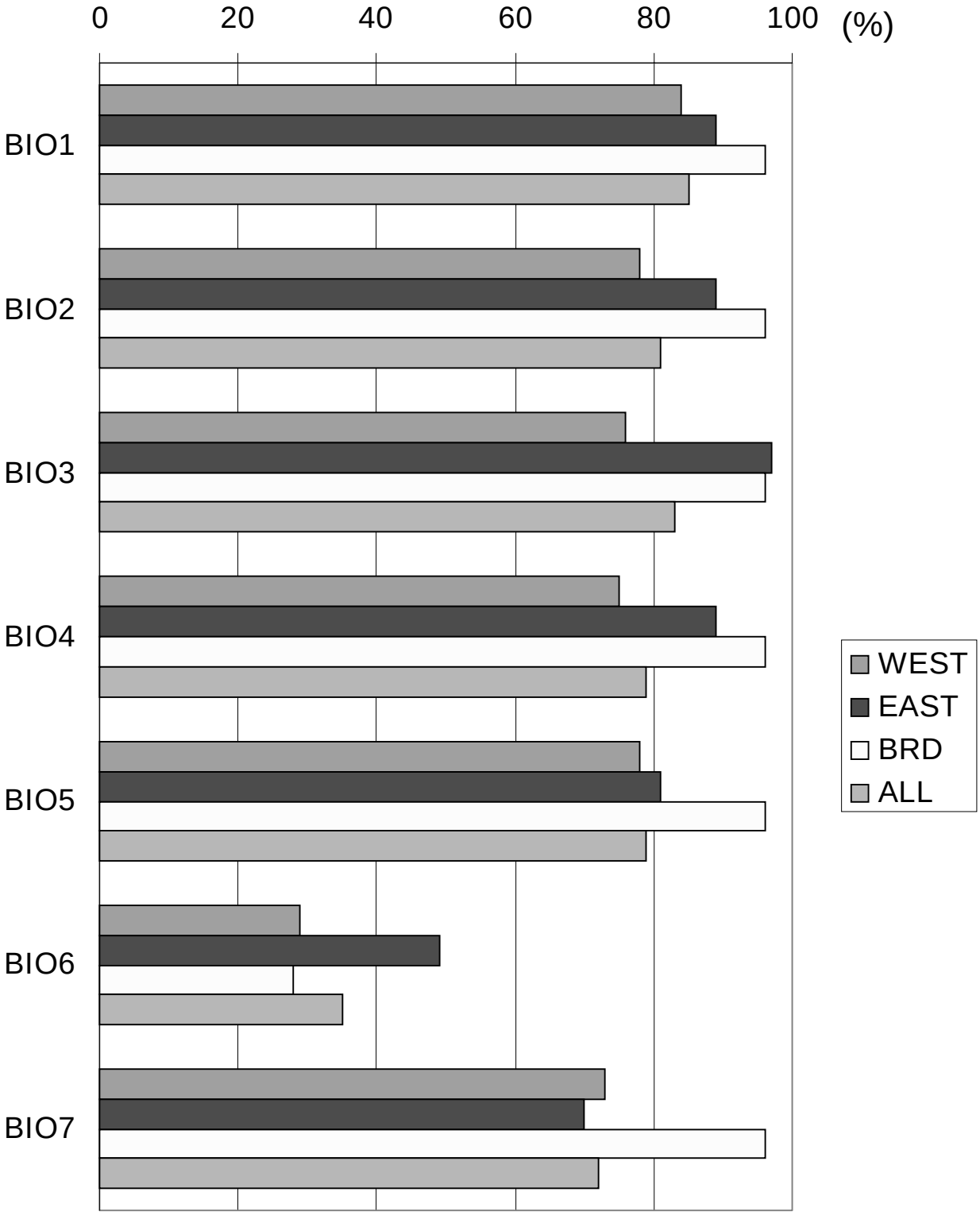
CONTRIBUTIONS:
CENTRAL AND EASTERN EUROPE

	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
Slowakia	5	4
Turkey	5	4

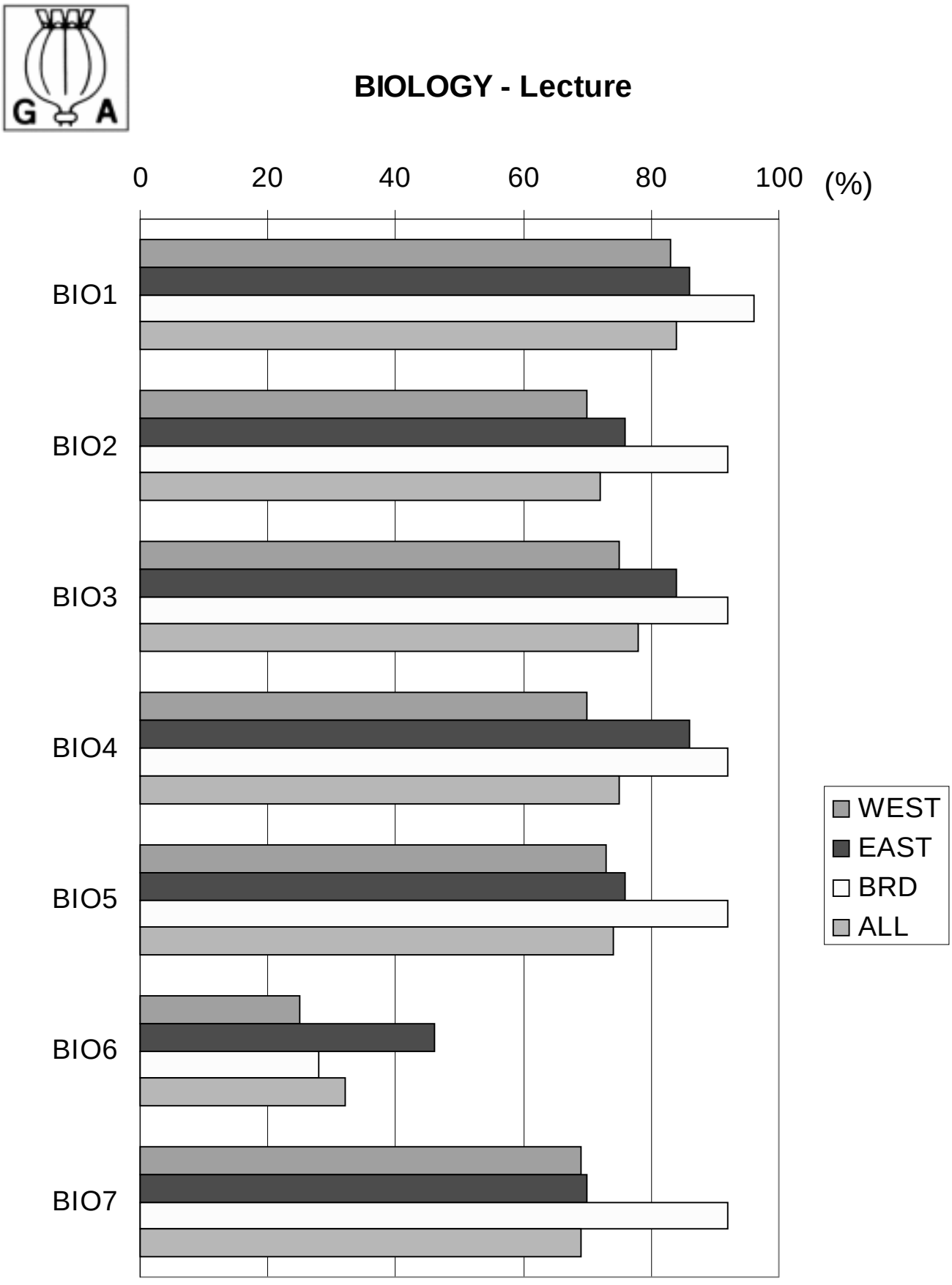
Total questionnaires: 38

B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

BIOLOGY - Present situation

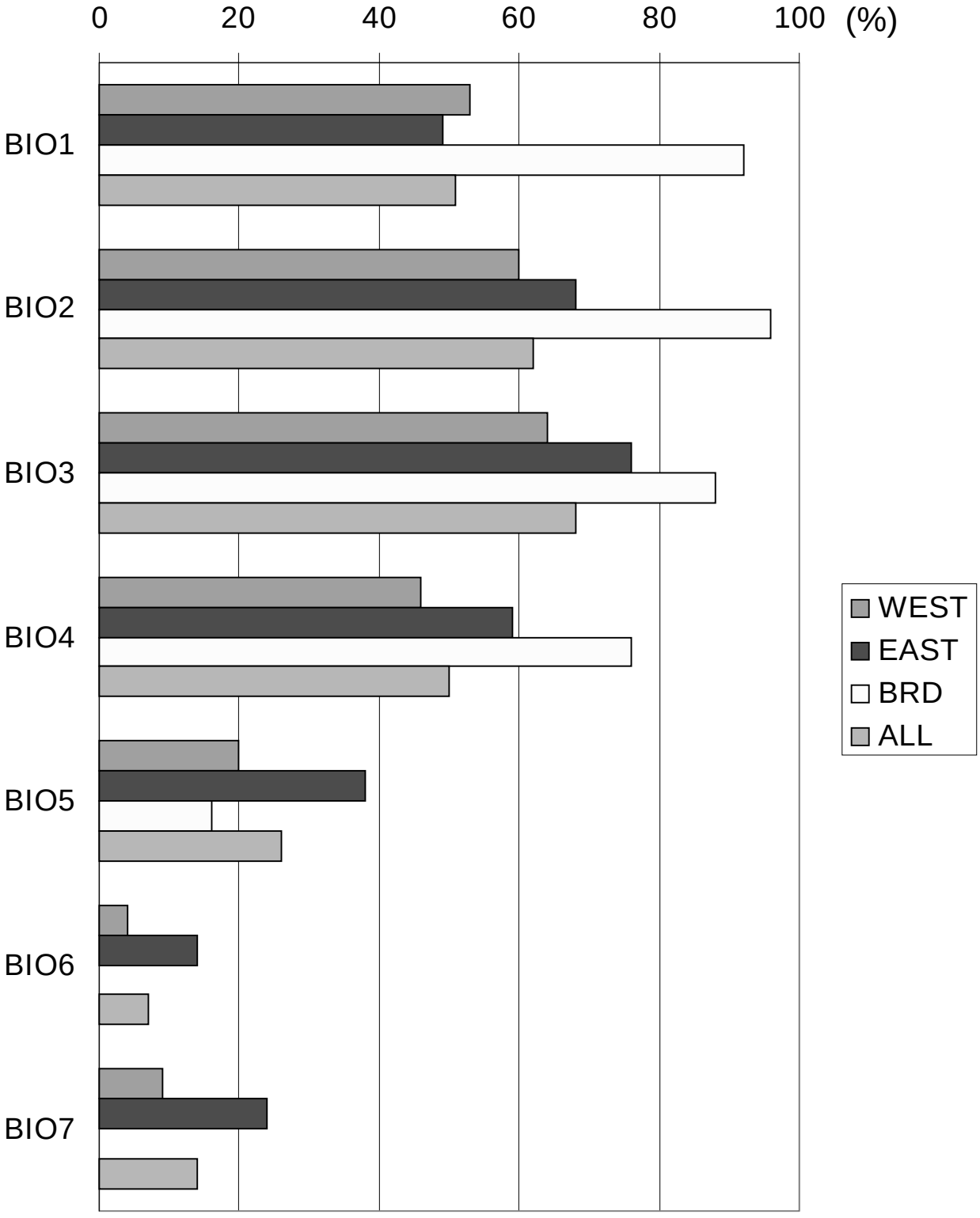


B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

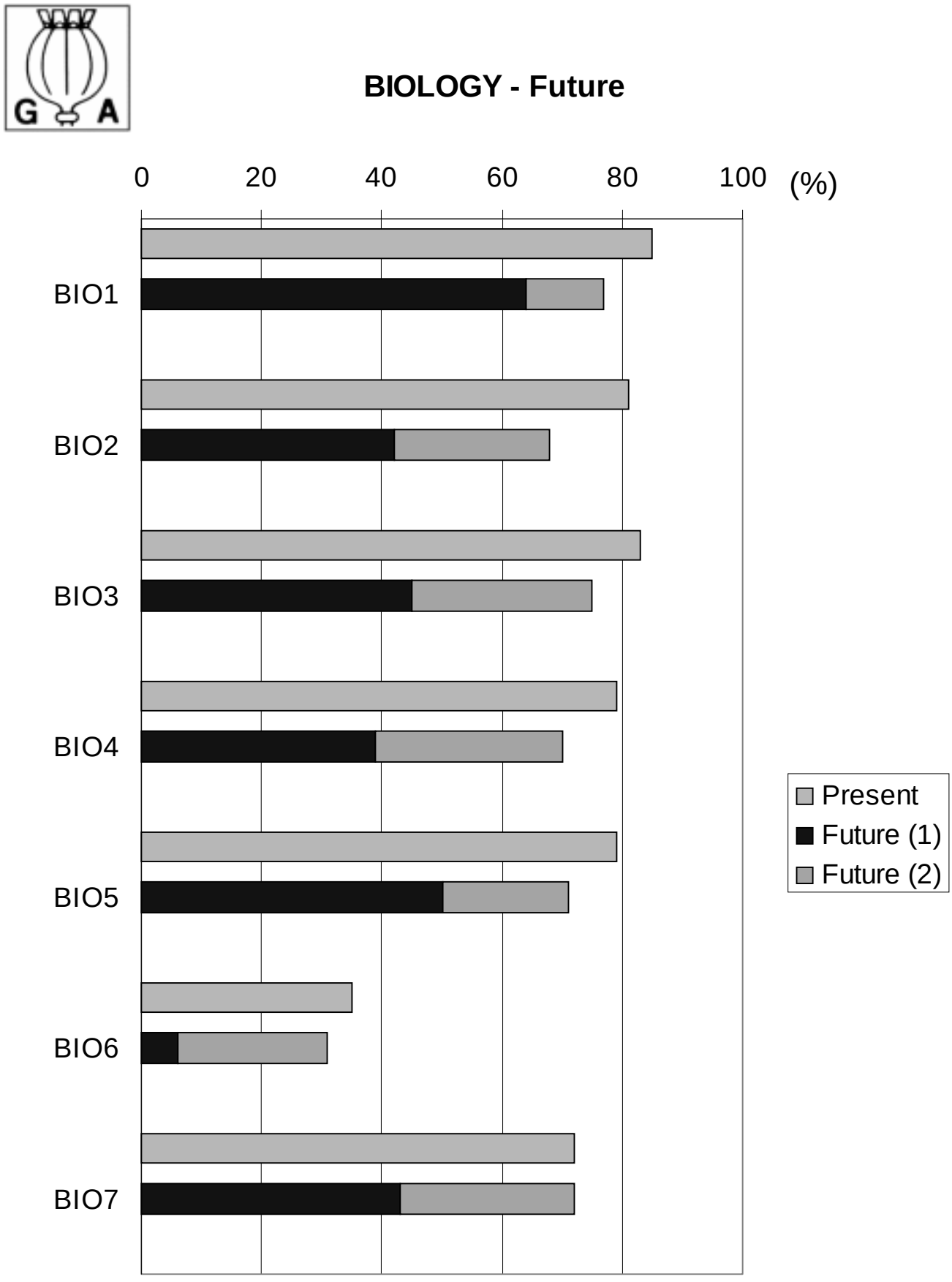


B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

BIOLOGY - Practical

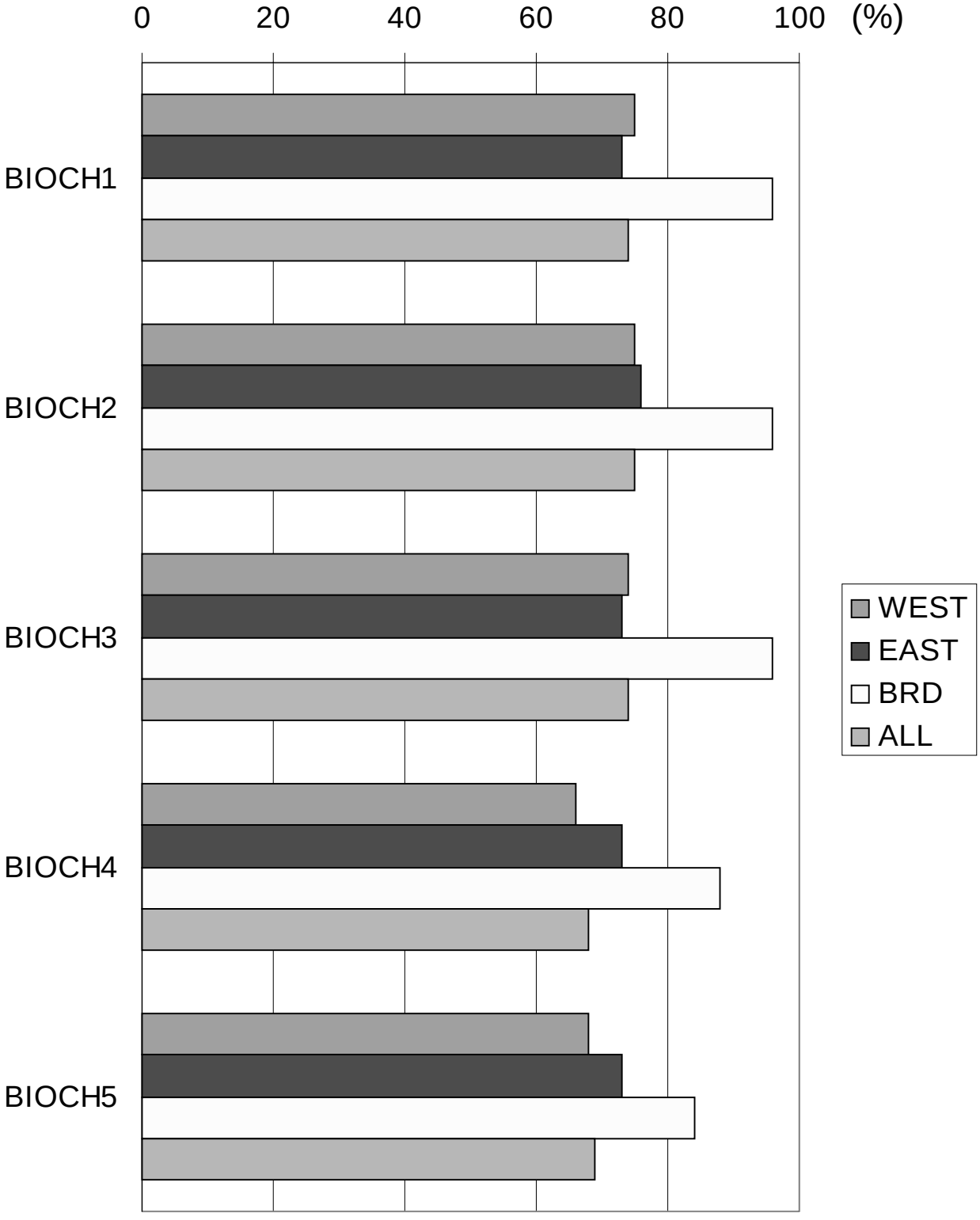


B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna



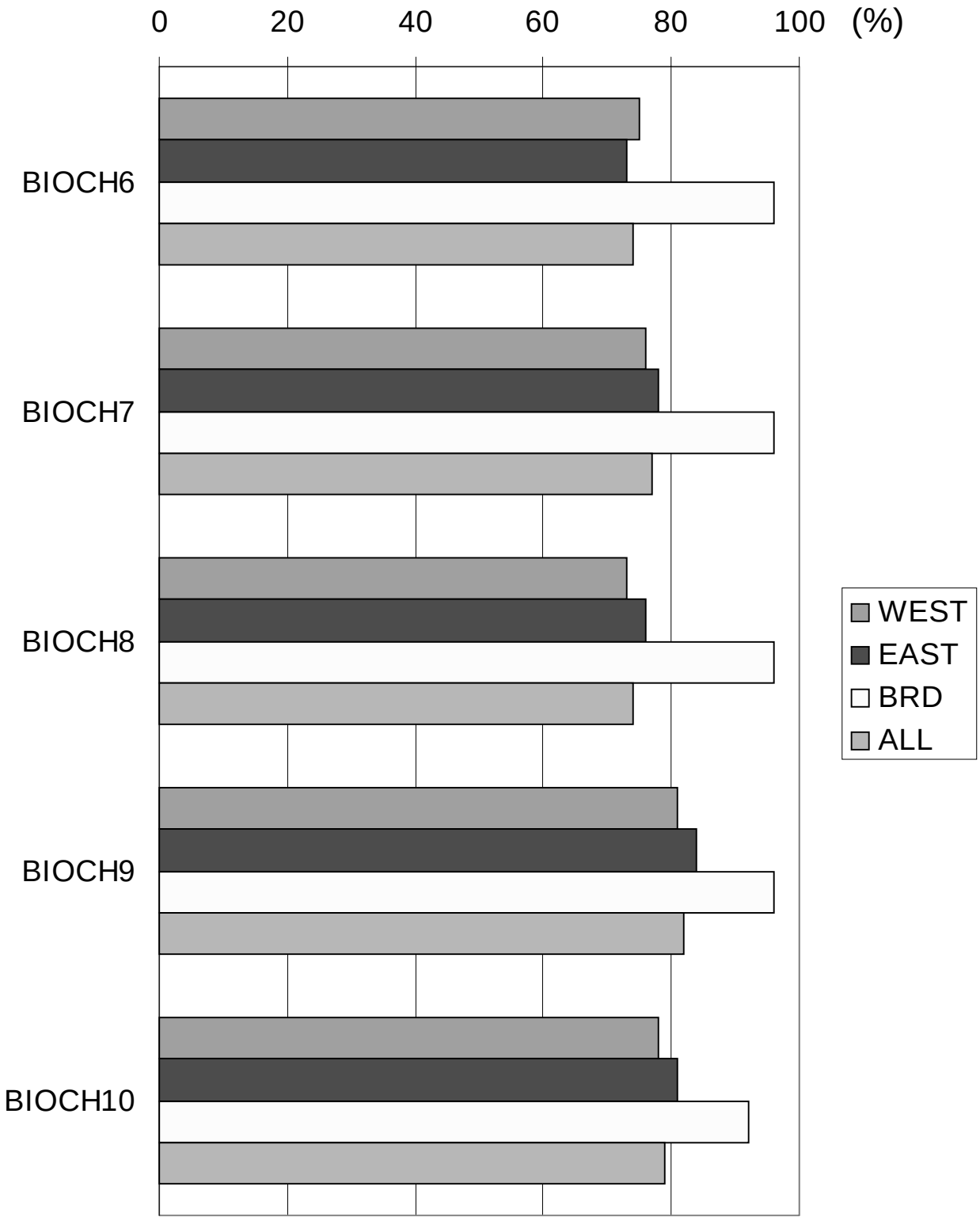
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Present situation (1)



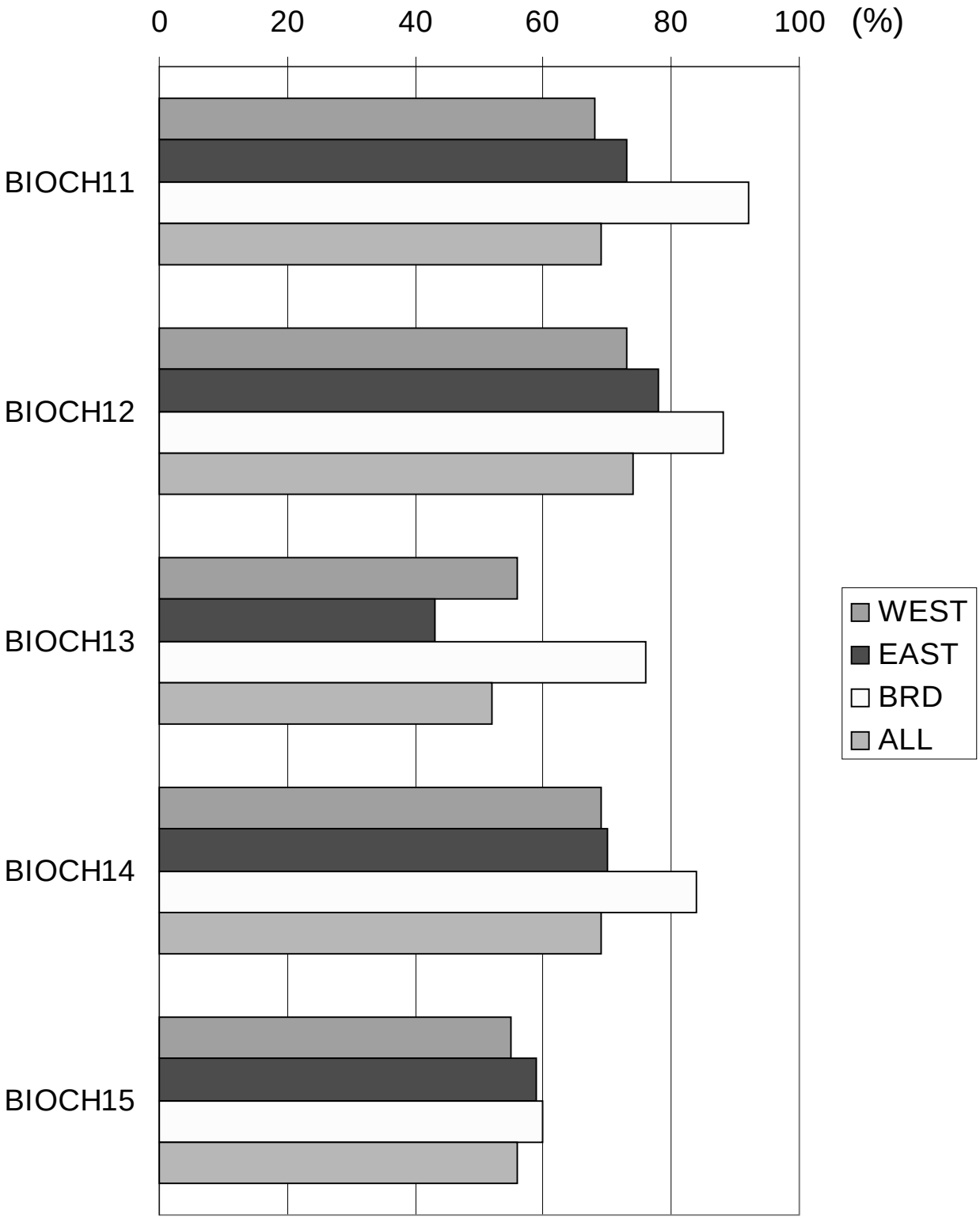
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Present situation (2)



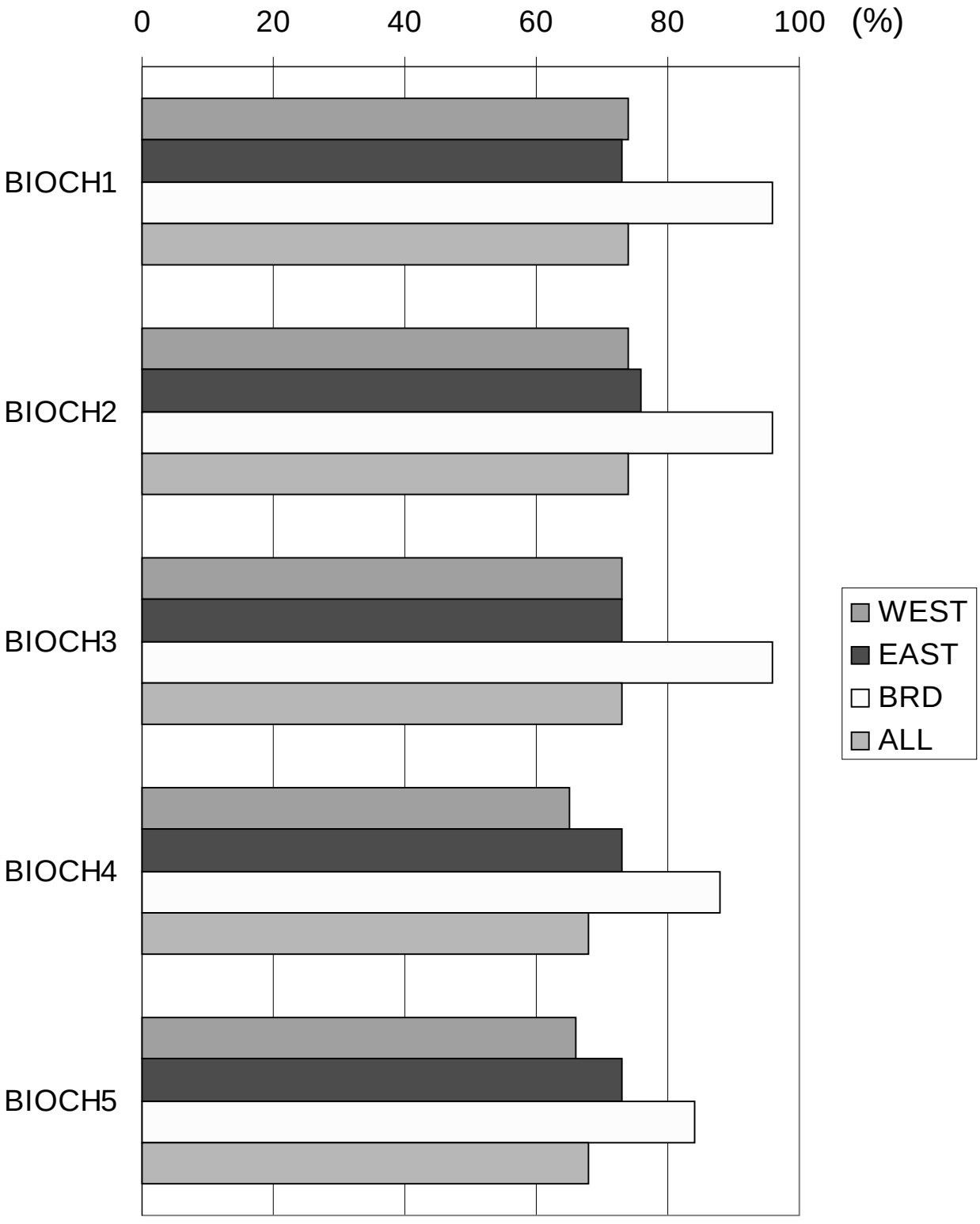
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Present situation (3)



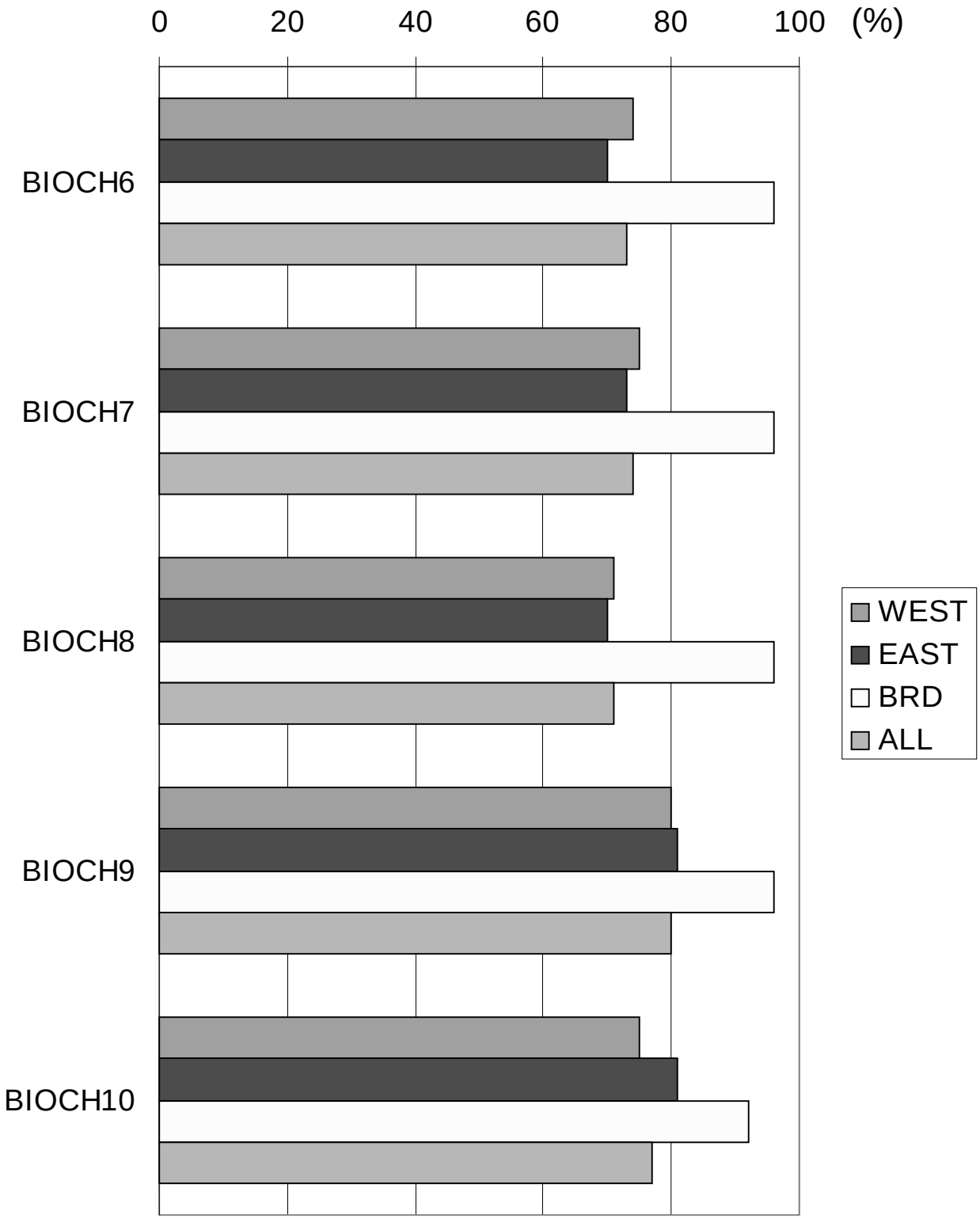
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Lecture (1)



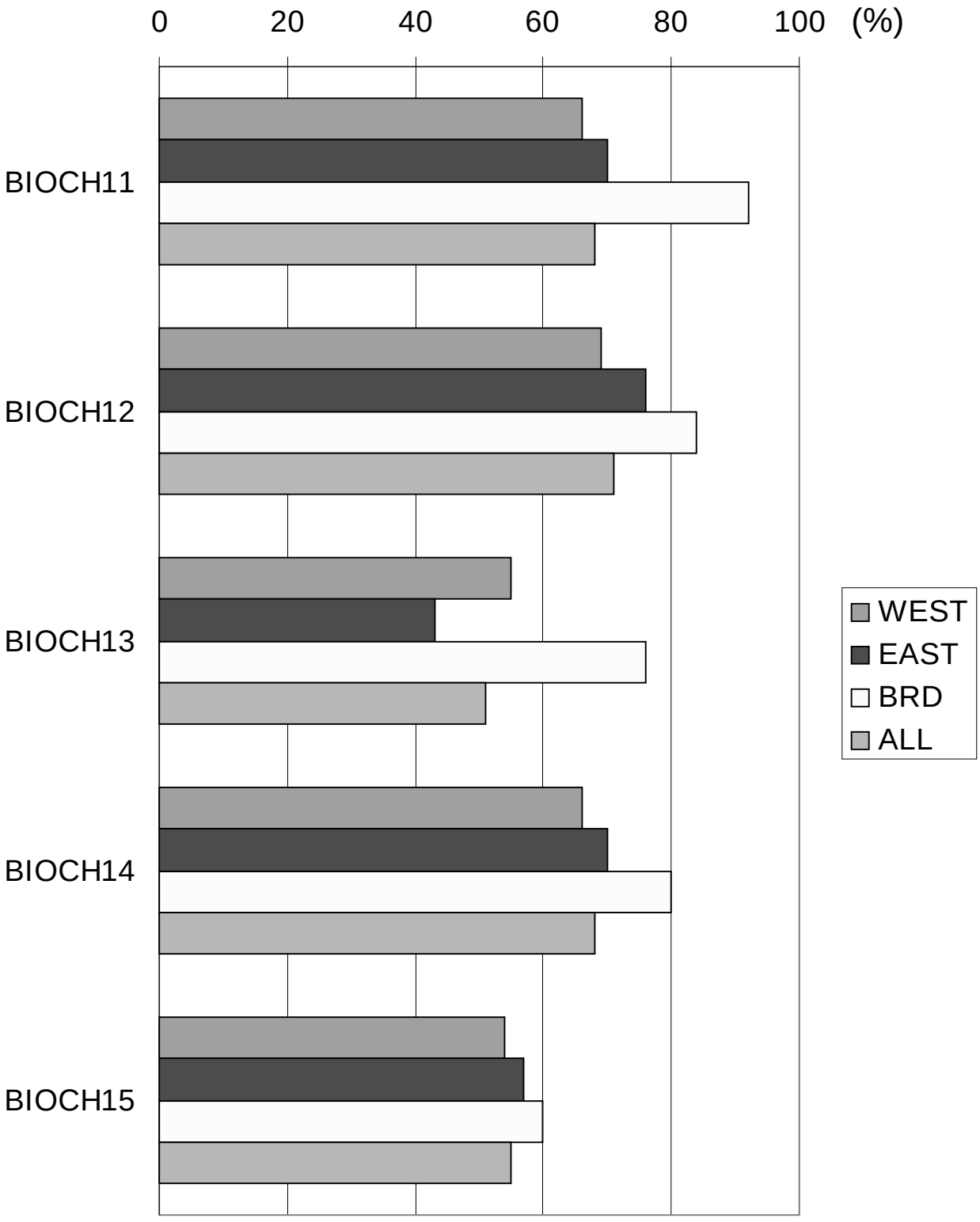
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Lecture (2)



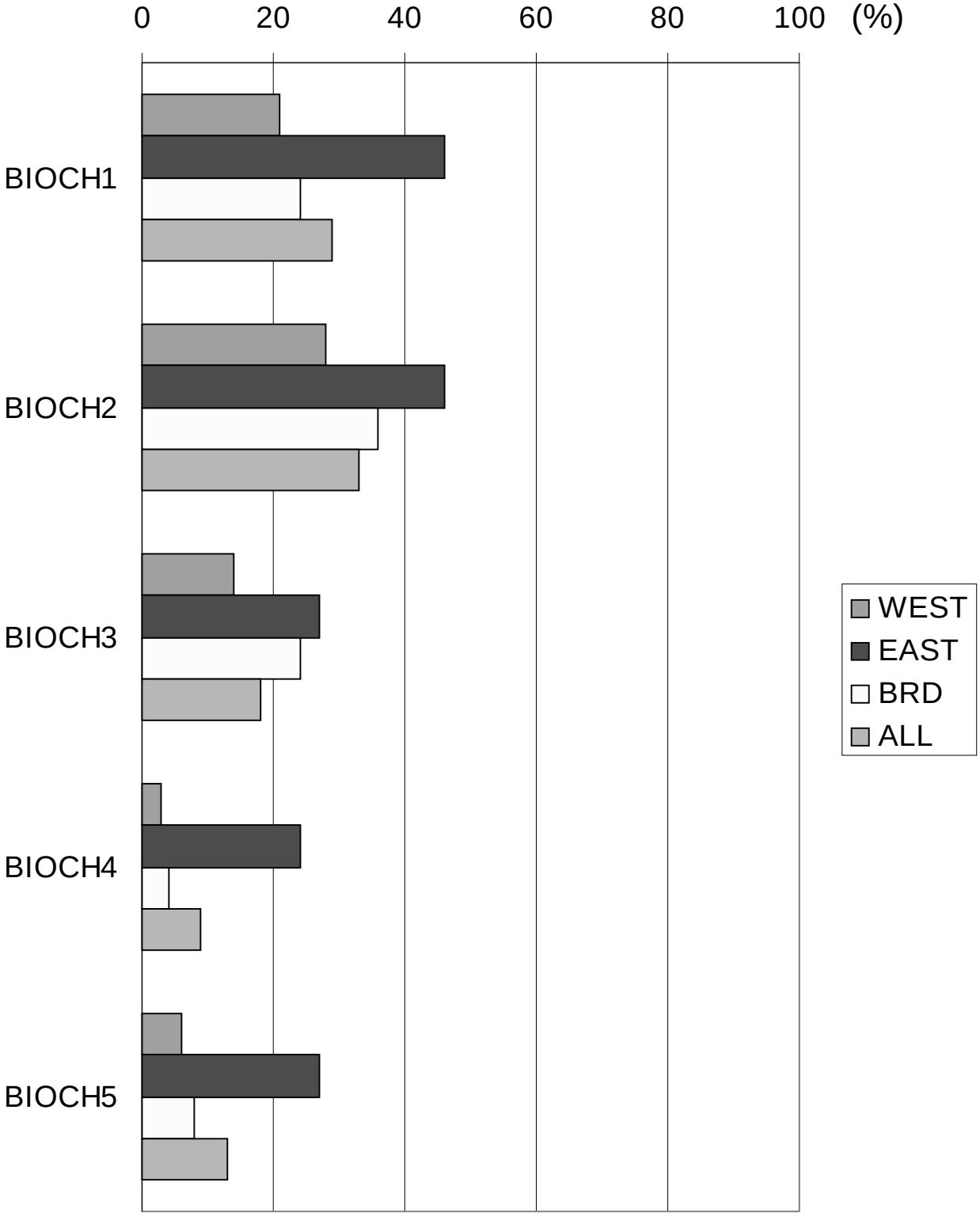
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Lecture (3)



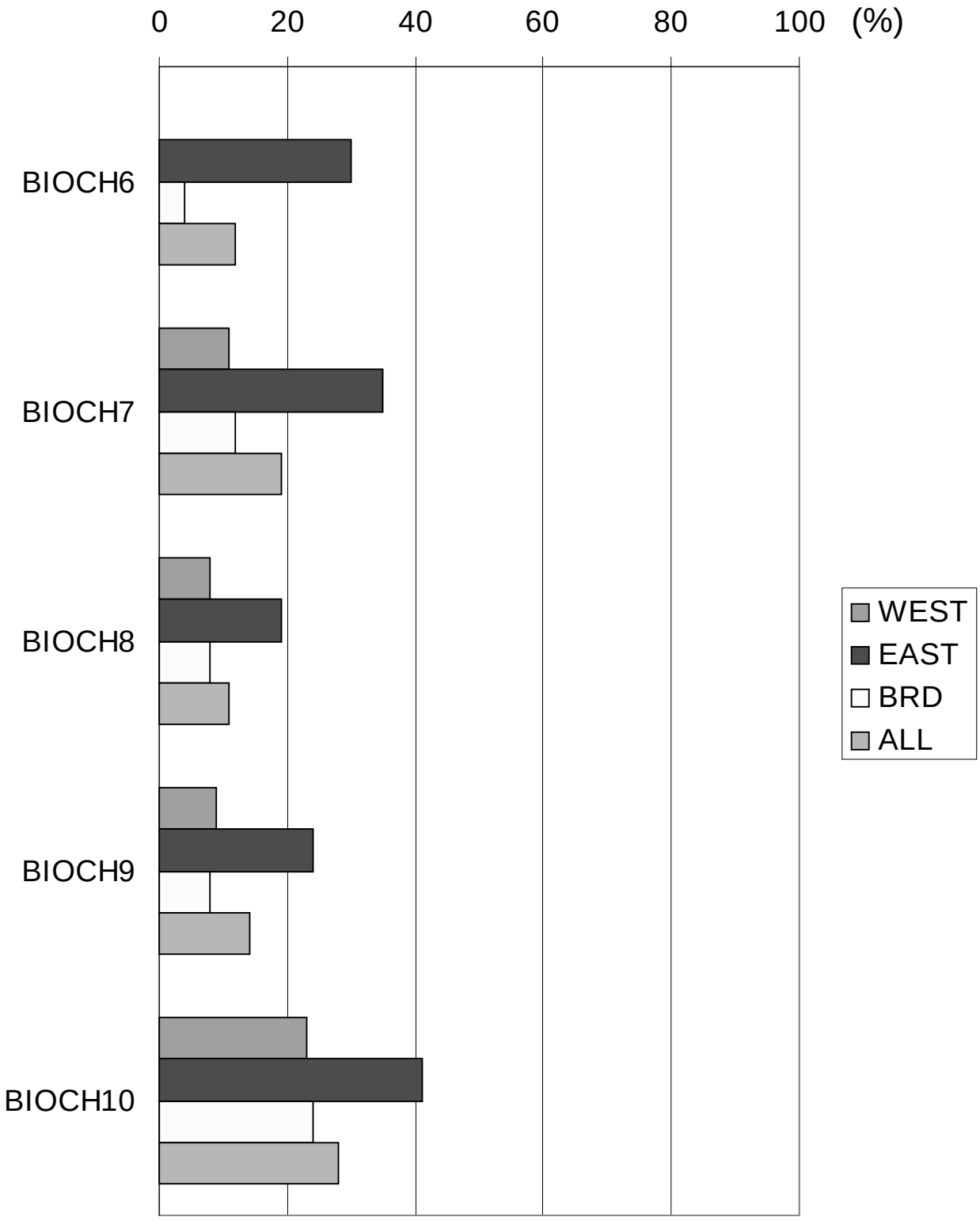
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Practical (1)



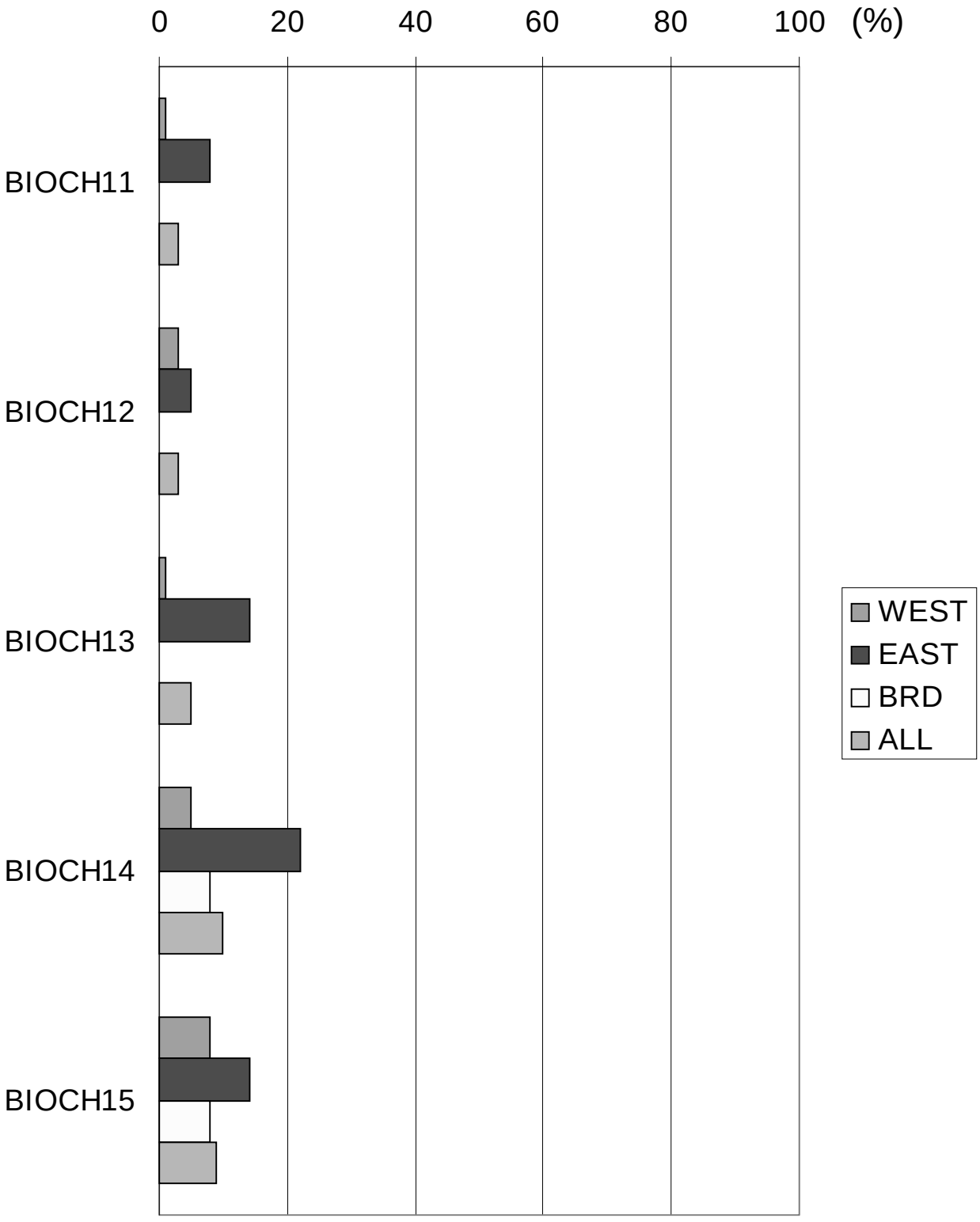
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Practical (2)



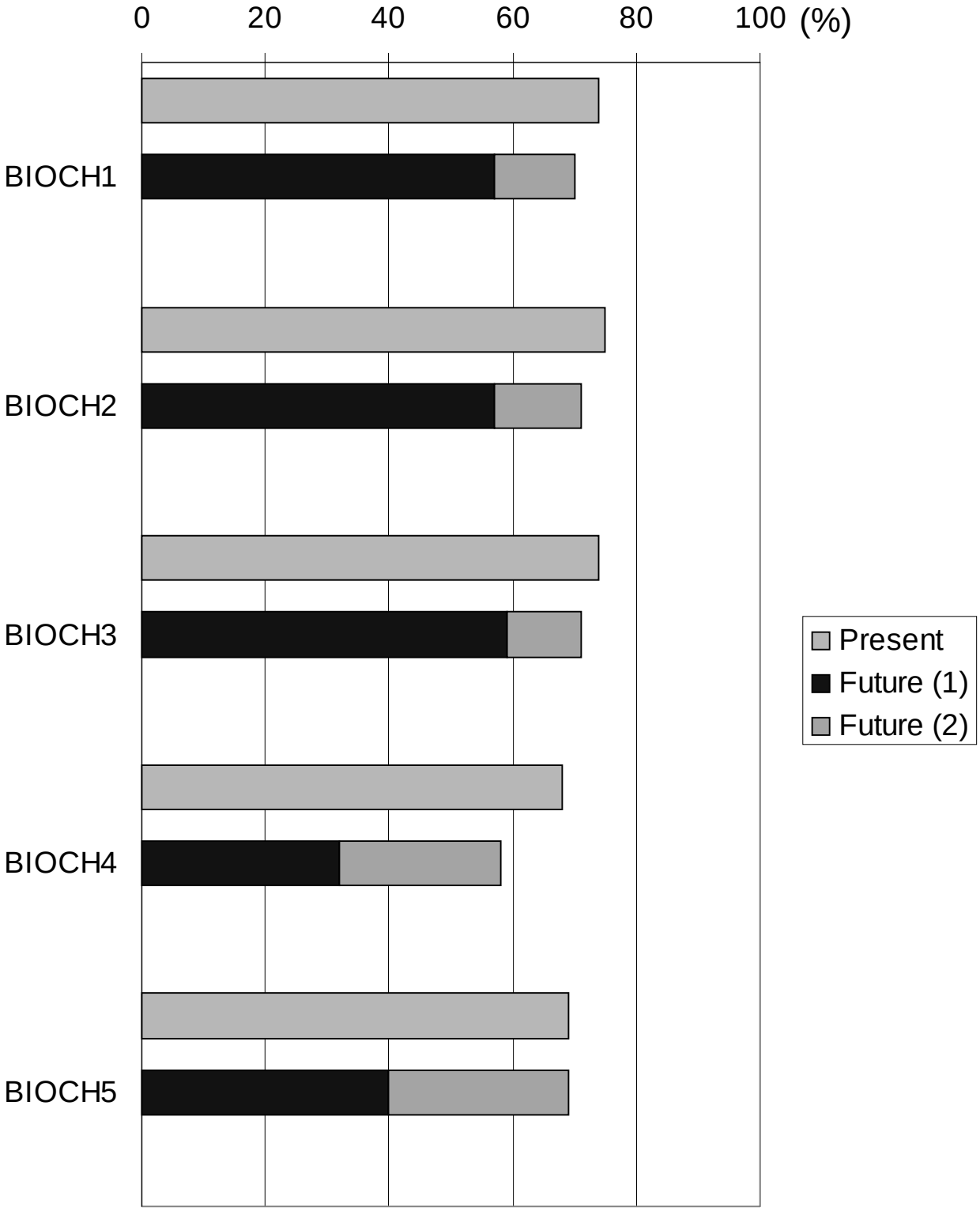
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Practical (3)



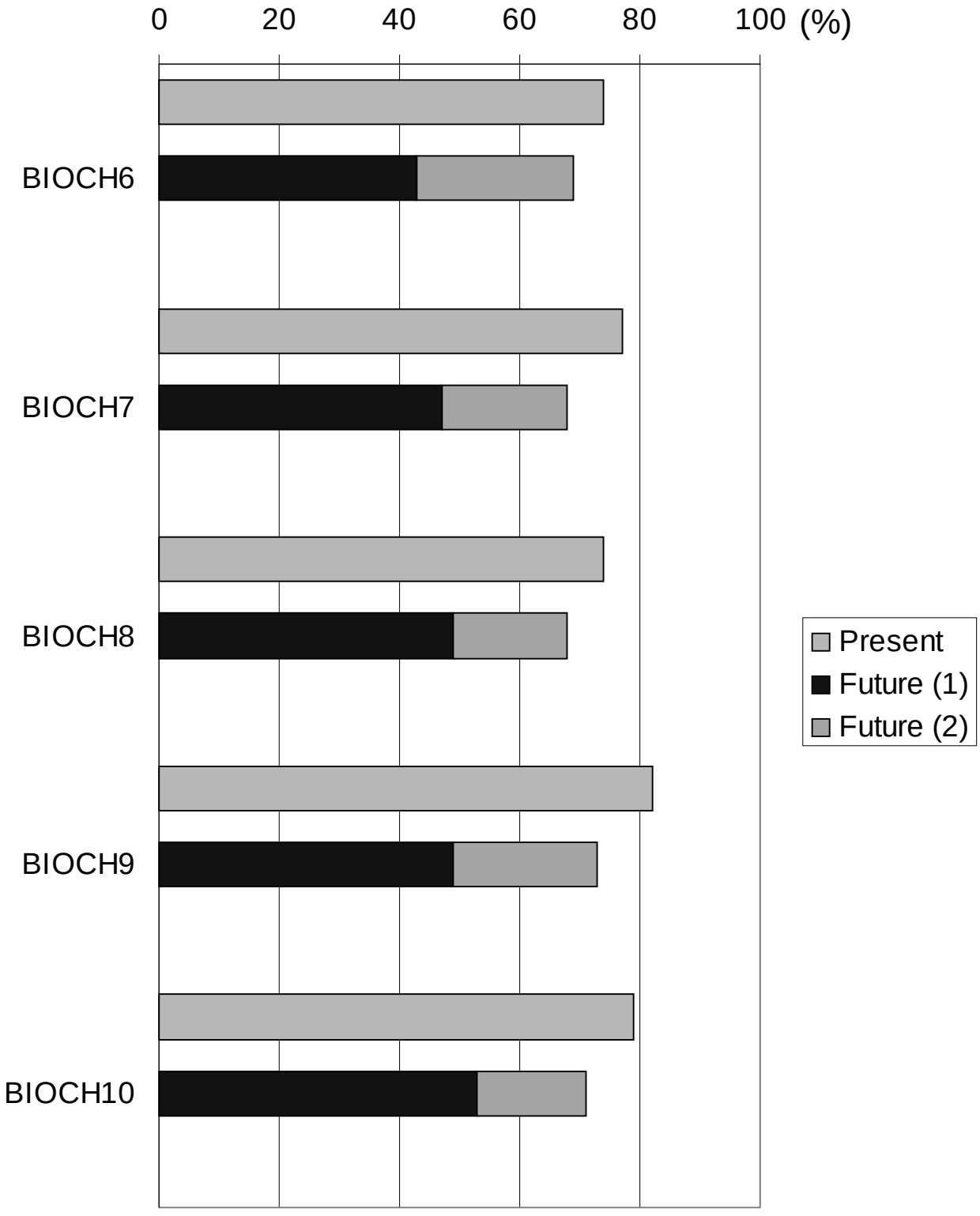
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Future 1



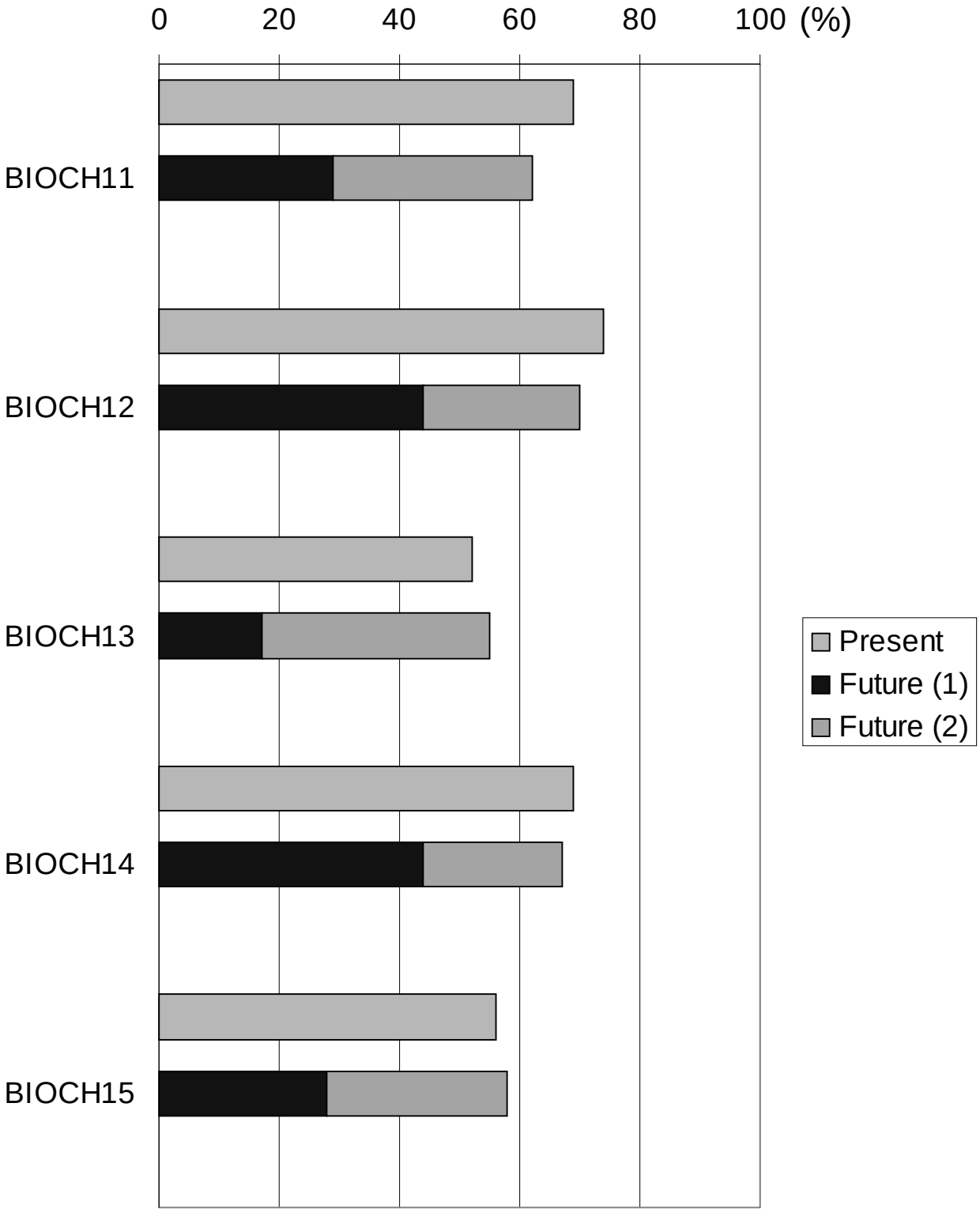
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Future 2



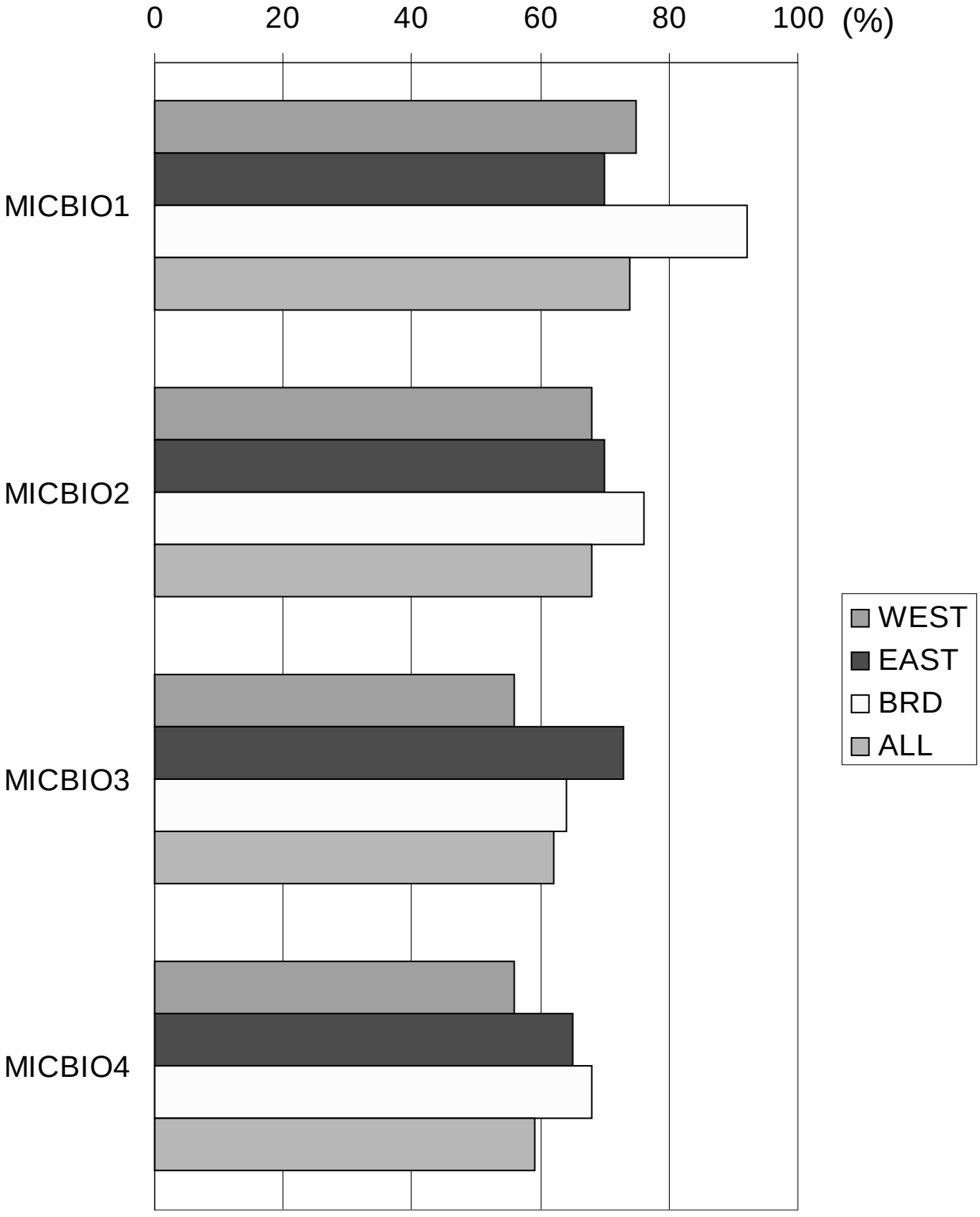
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

GENERAL BIOCHEMISTRY - Future 3

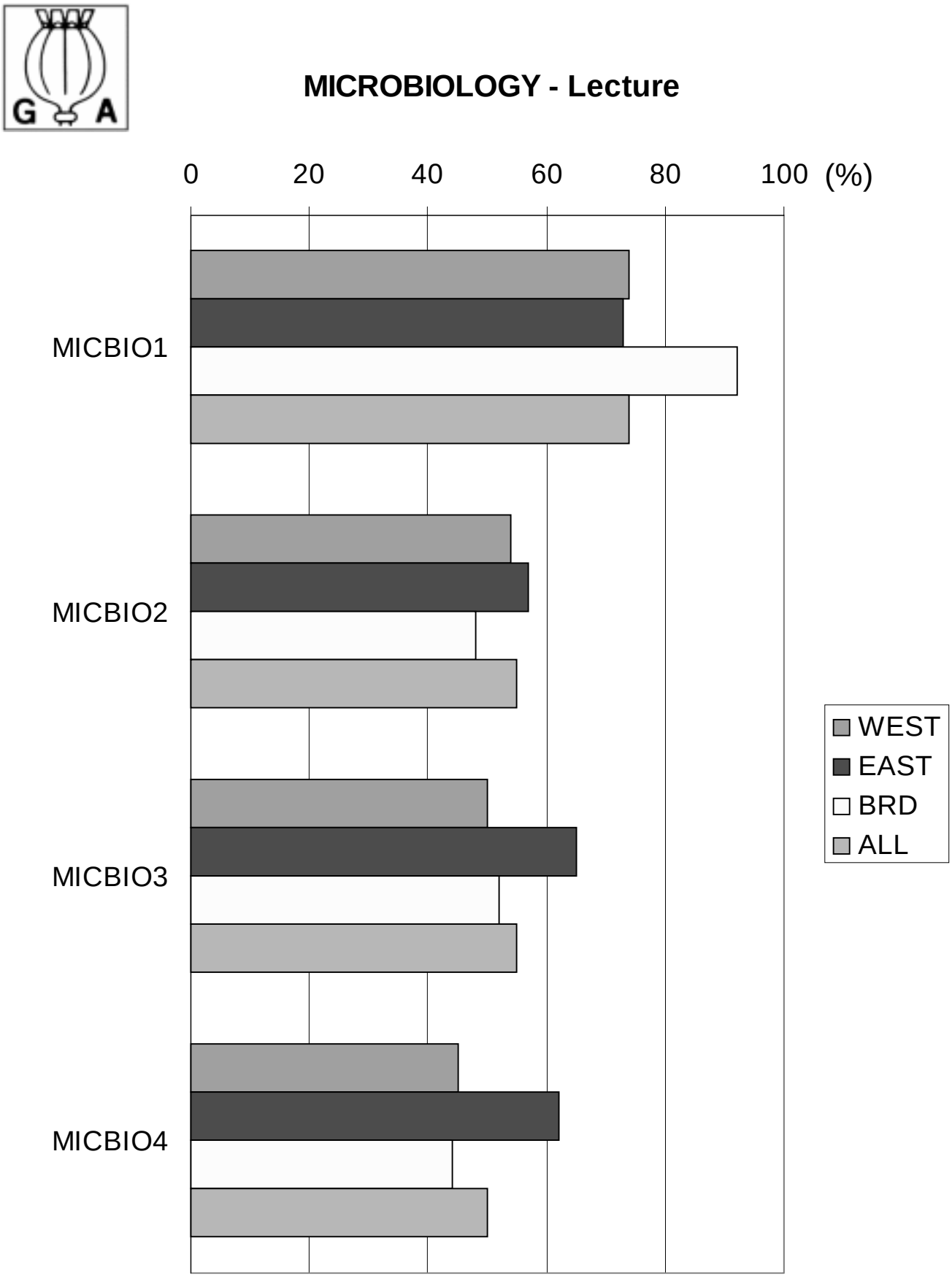


B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

MICROBIOLOGY - Present situation

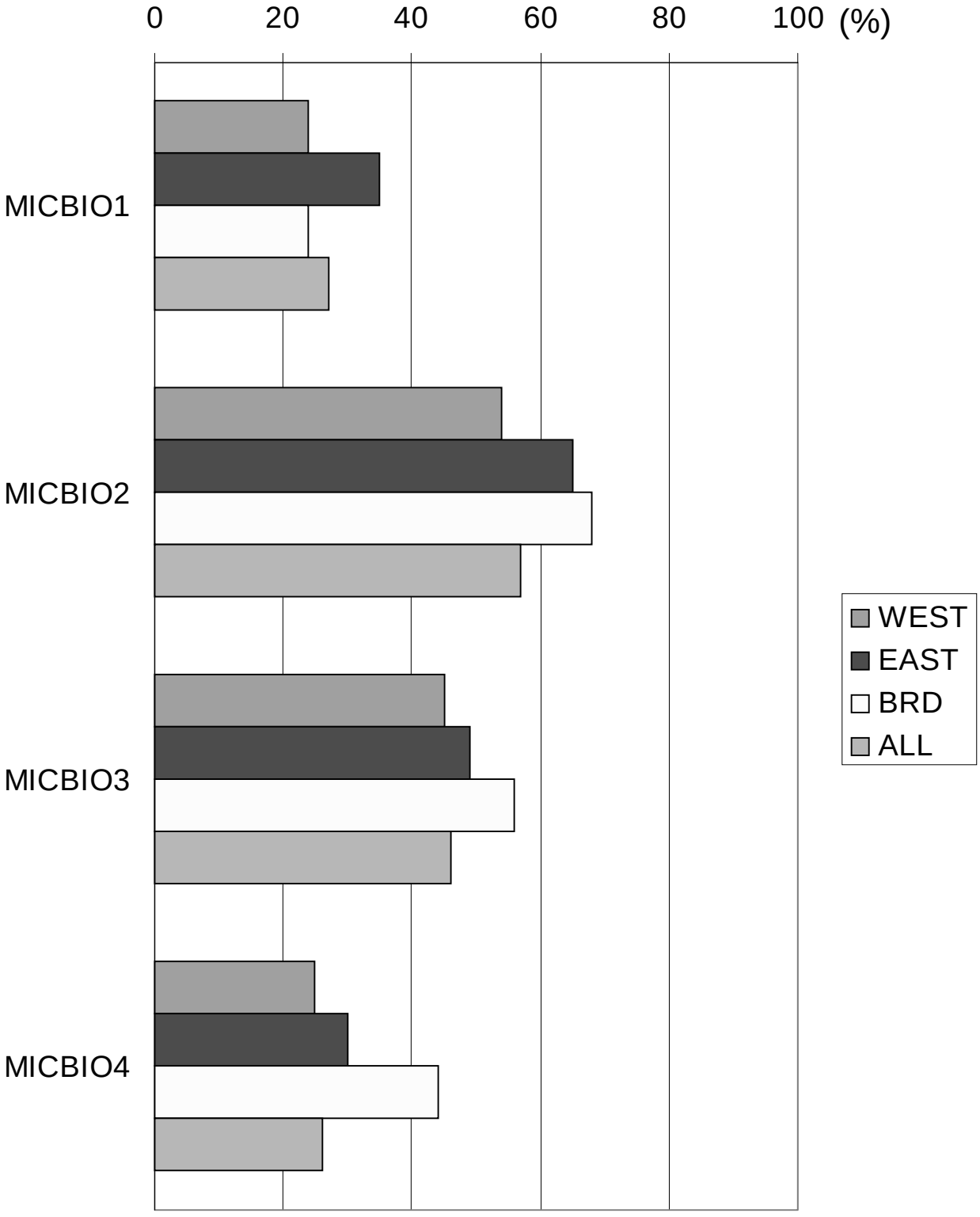


B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna



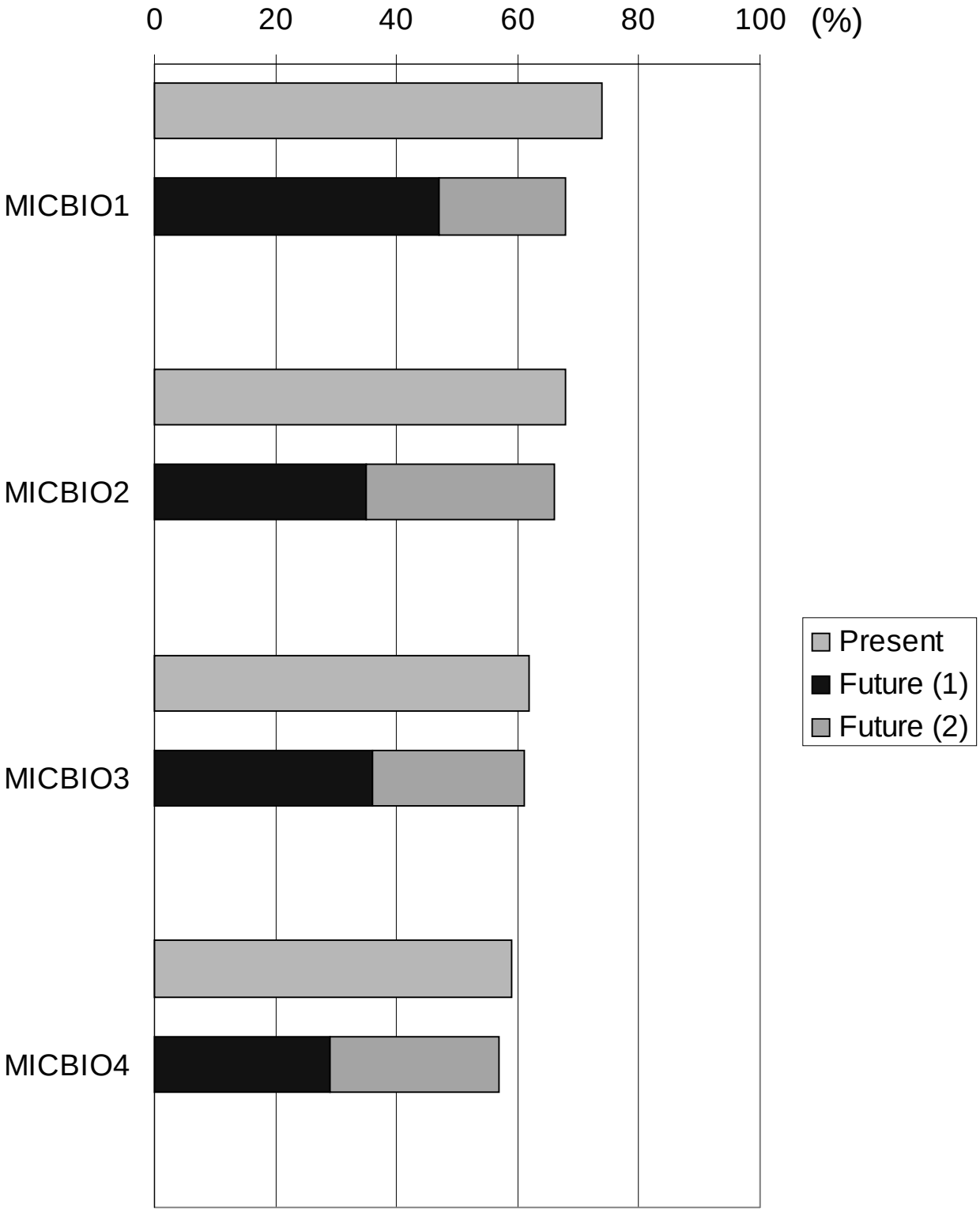
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

MICROBIOLOGY - Practical



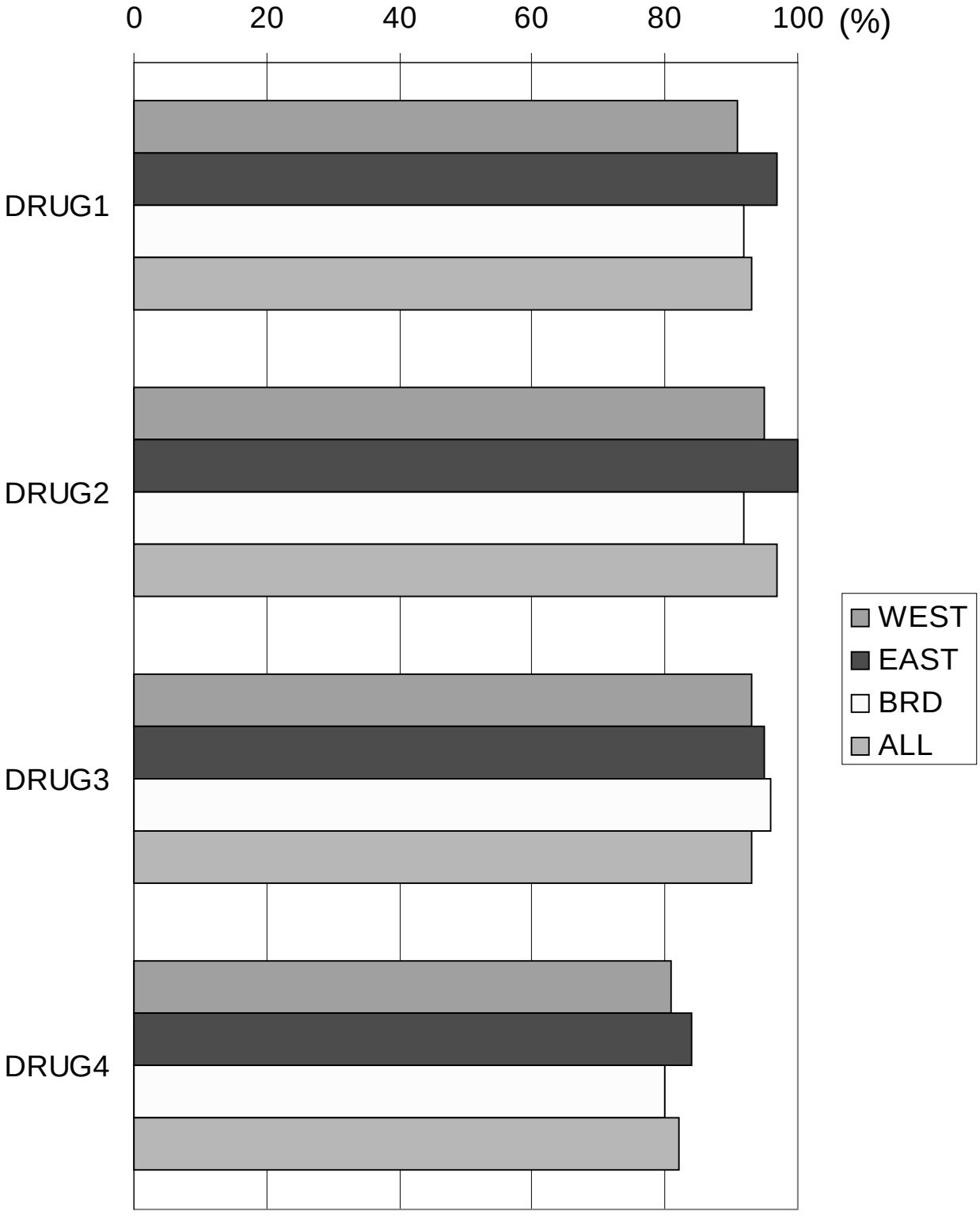
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

MICROBIOLOGY - Future



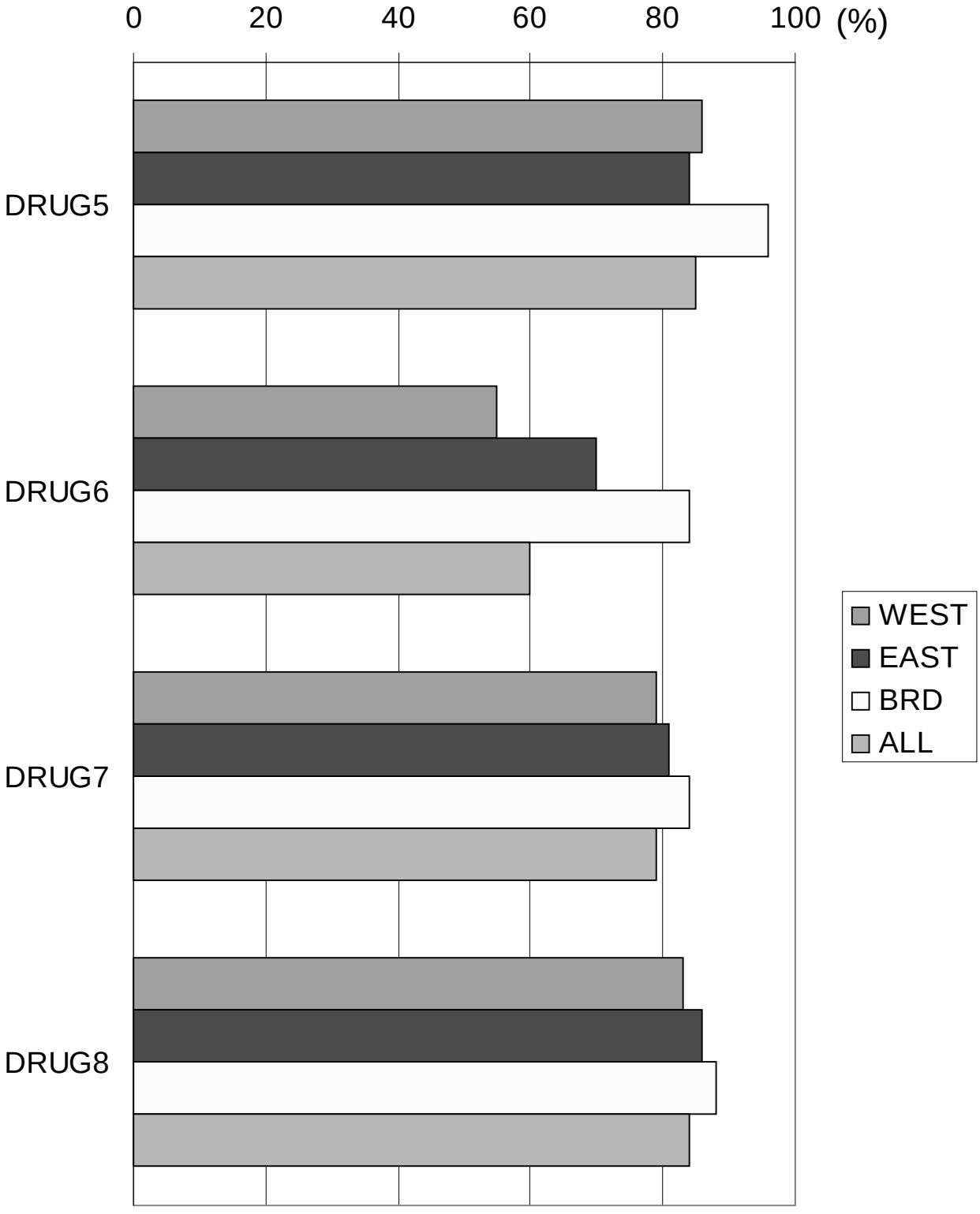
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Present situation (1)



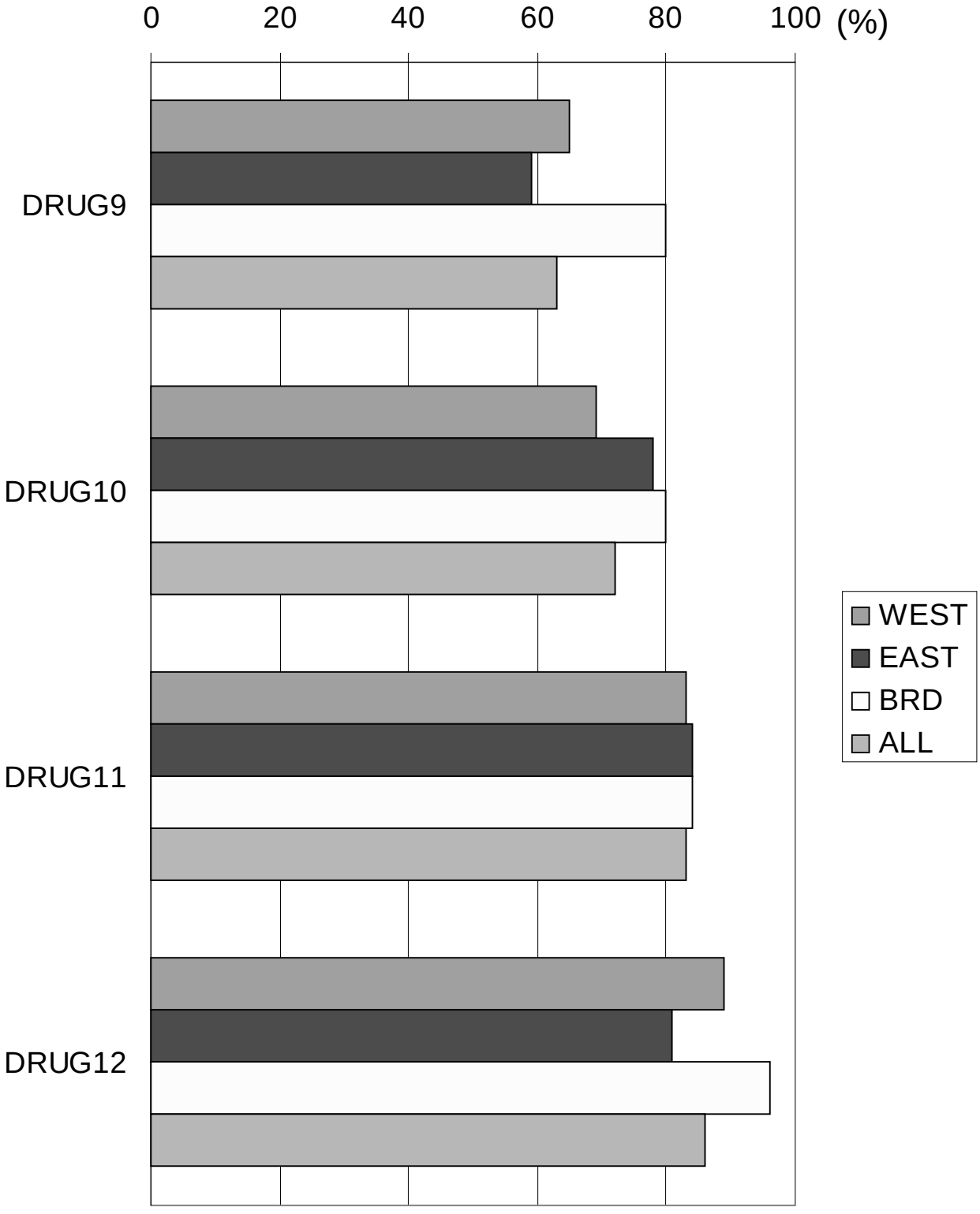
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Present situation (2)



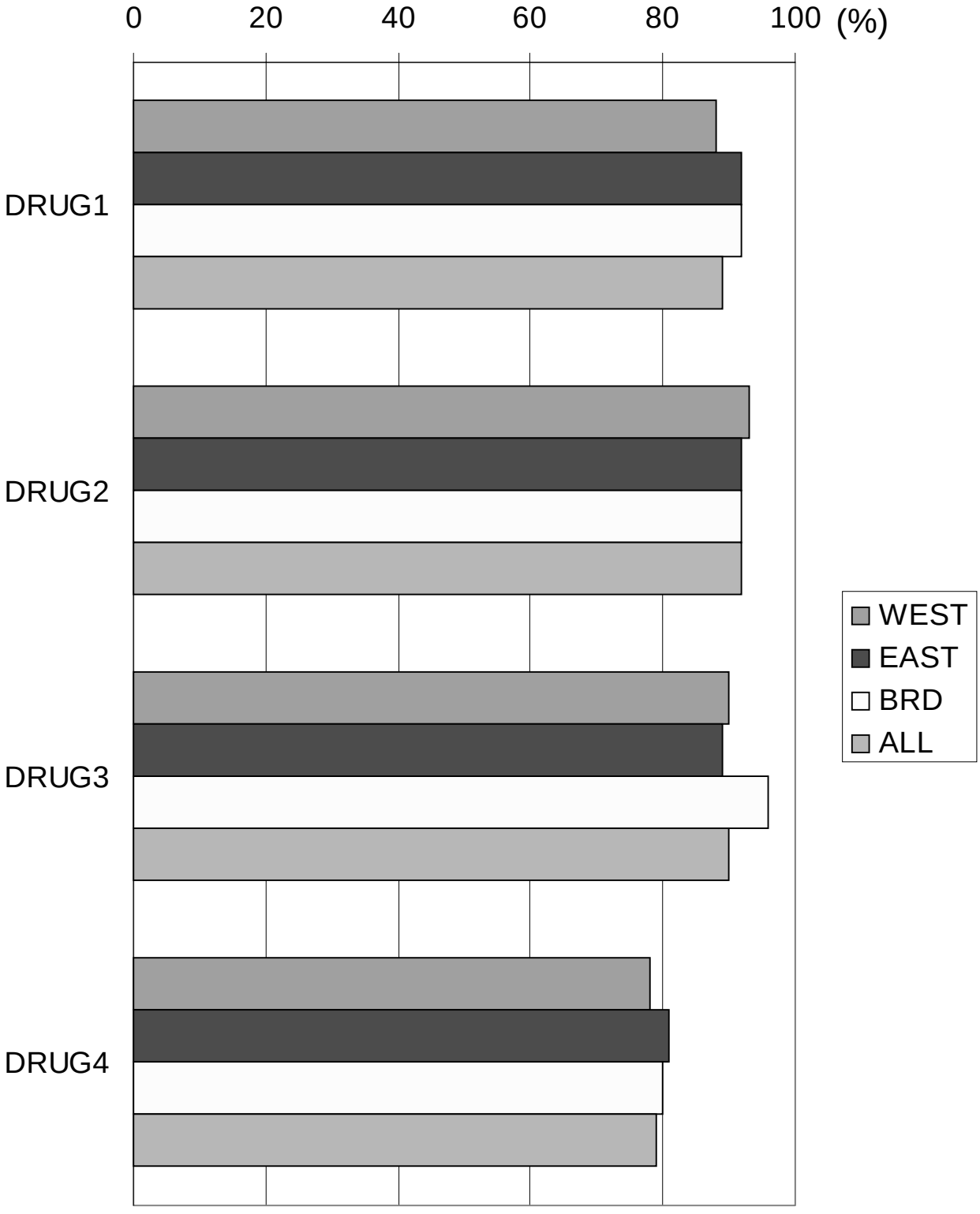
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Present situation (3)



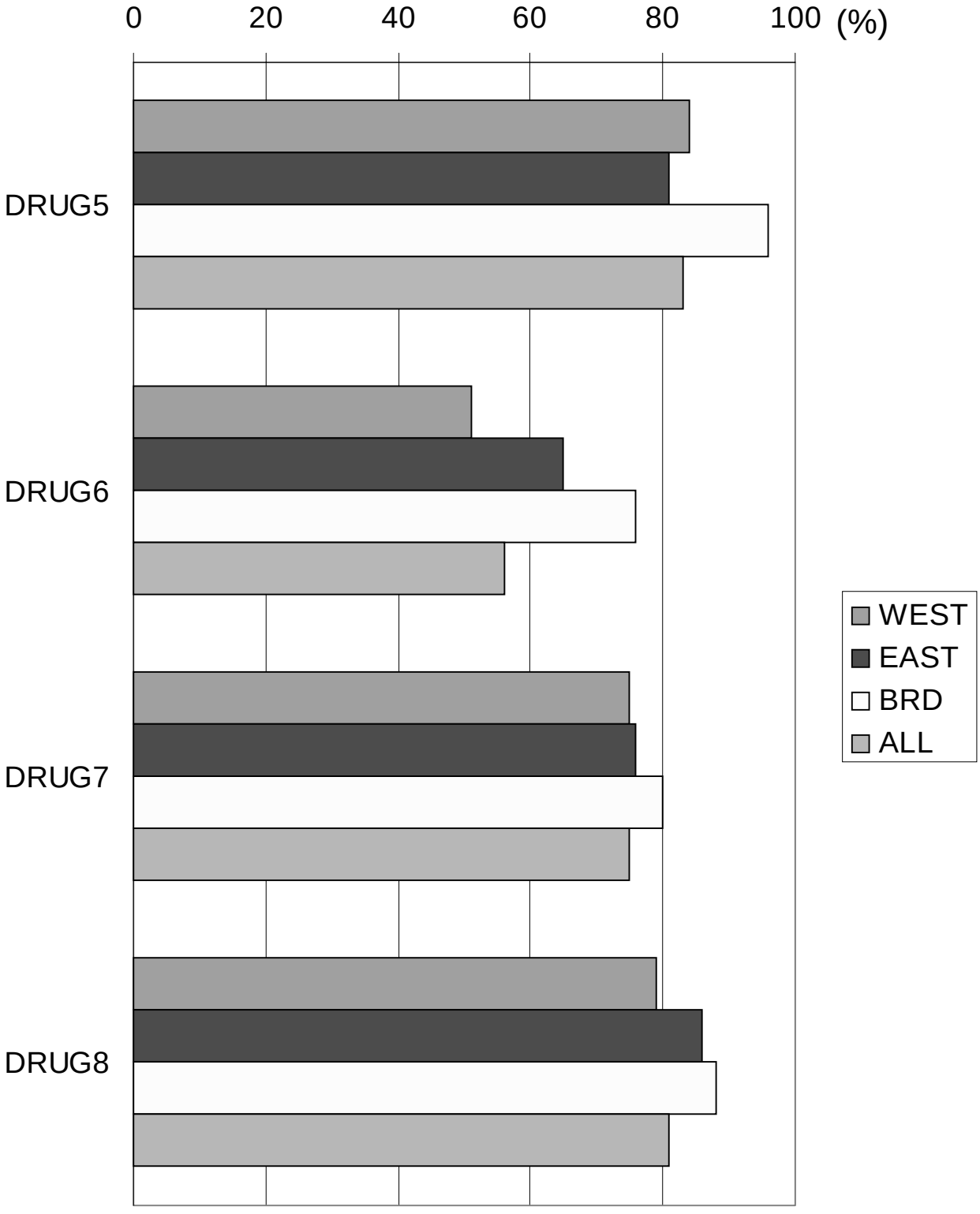
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Lecture (1)



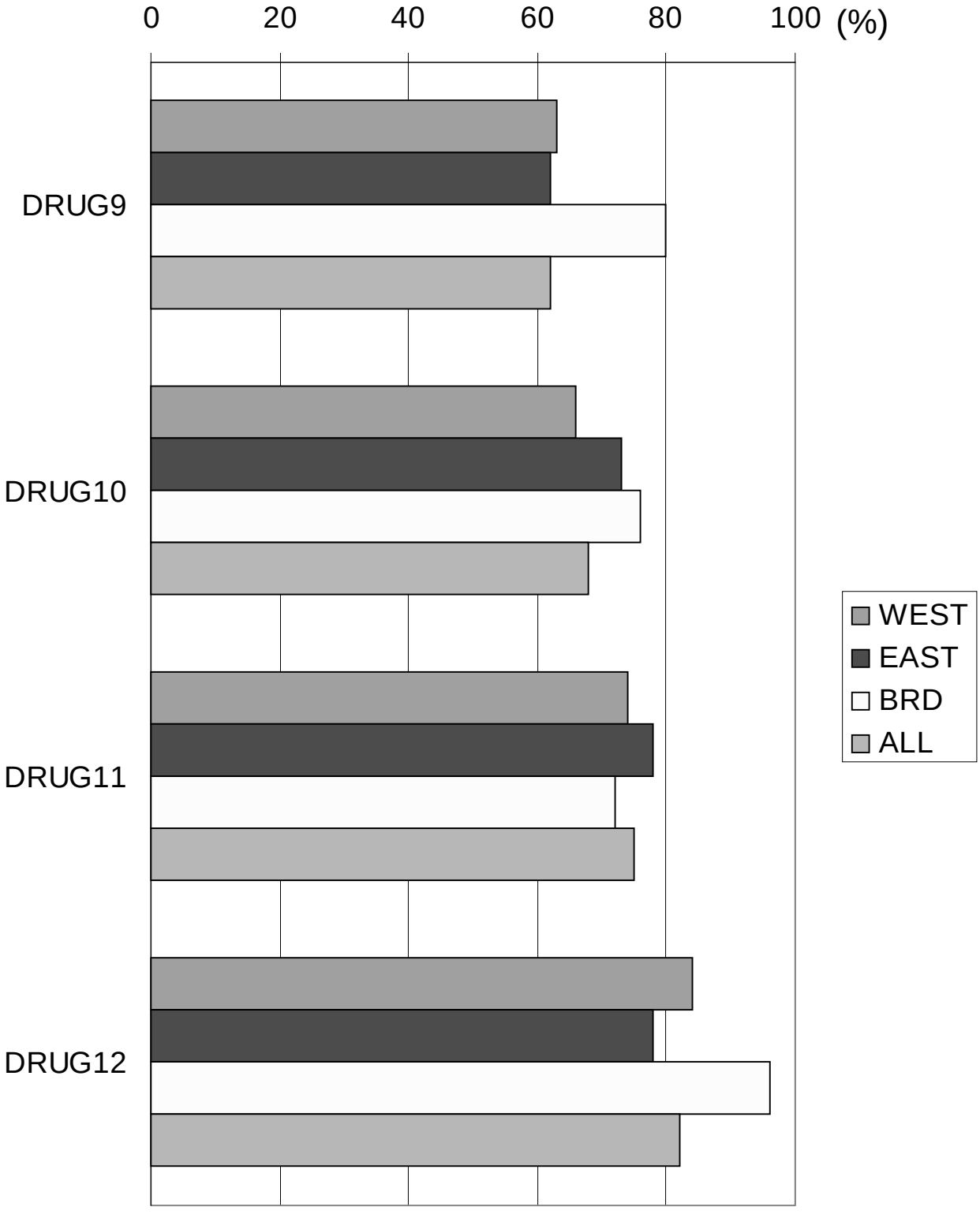
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Lecture (2)



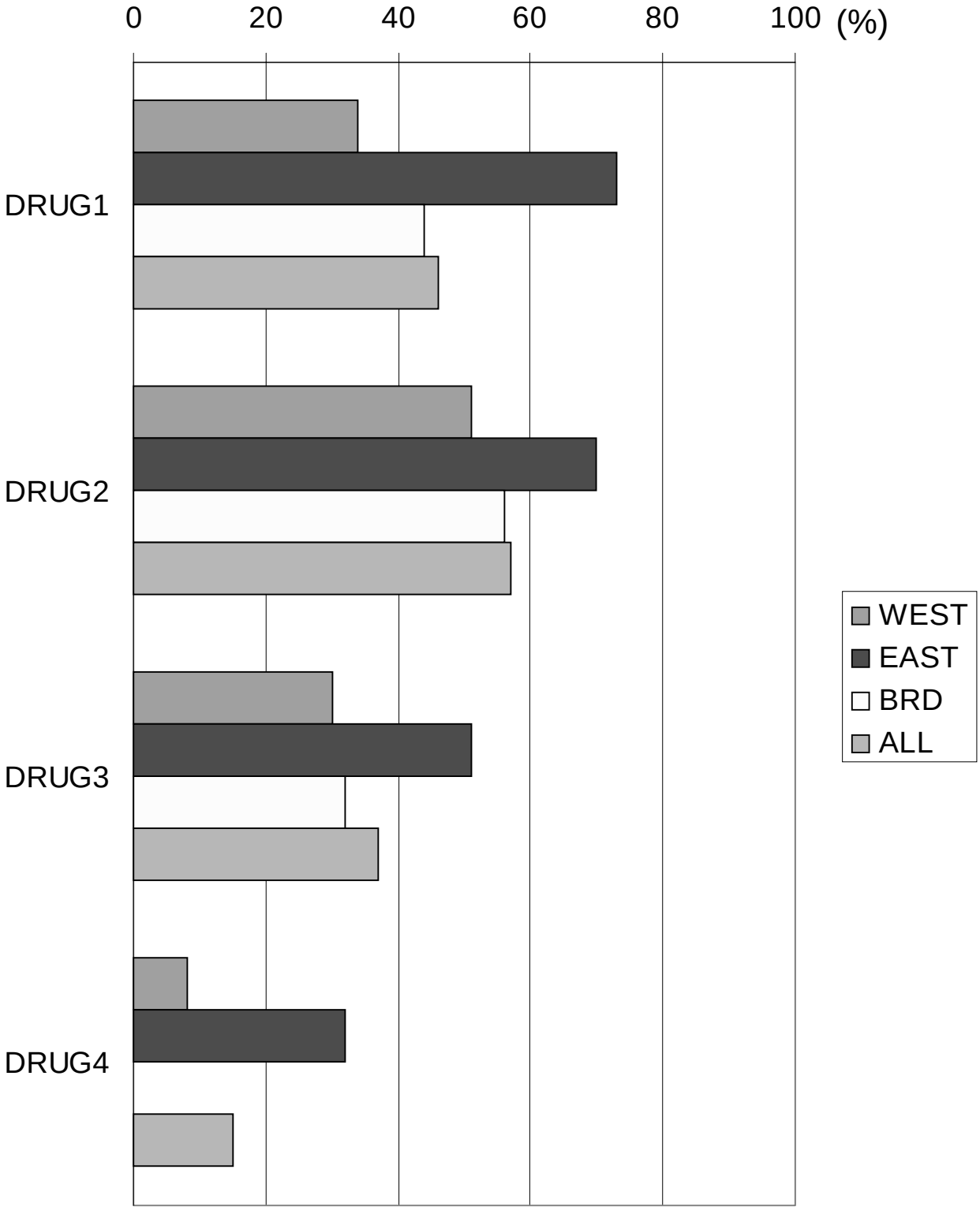
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Lecture (3)



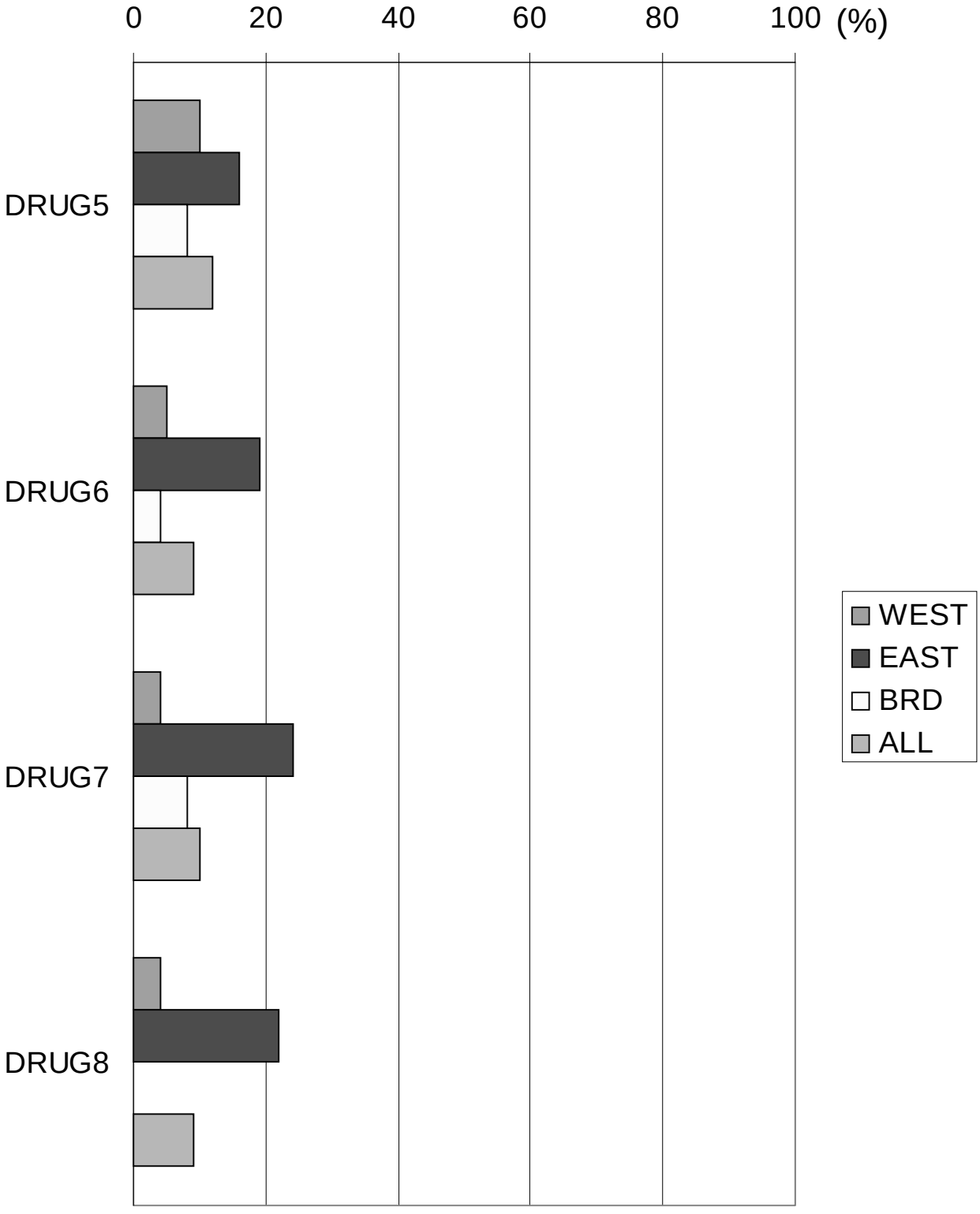
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Practical (1)



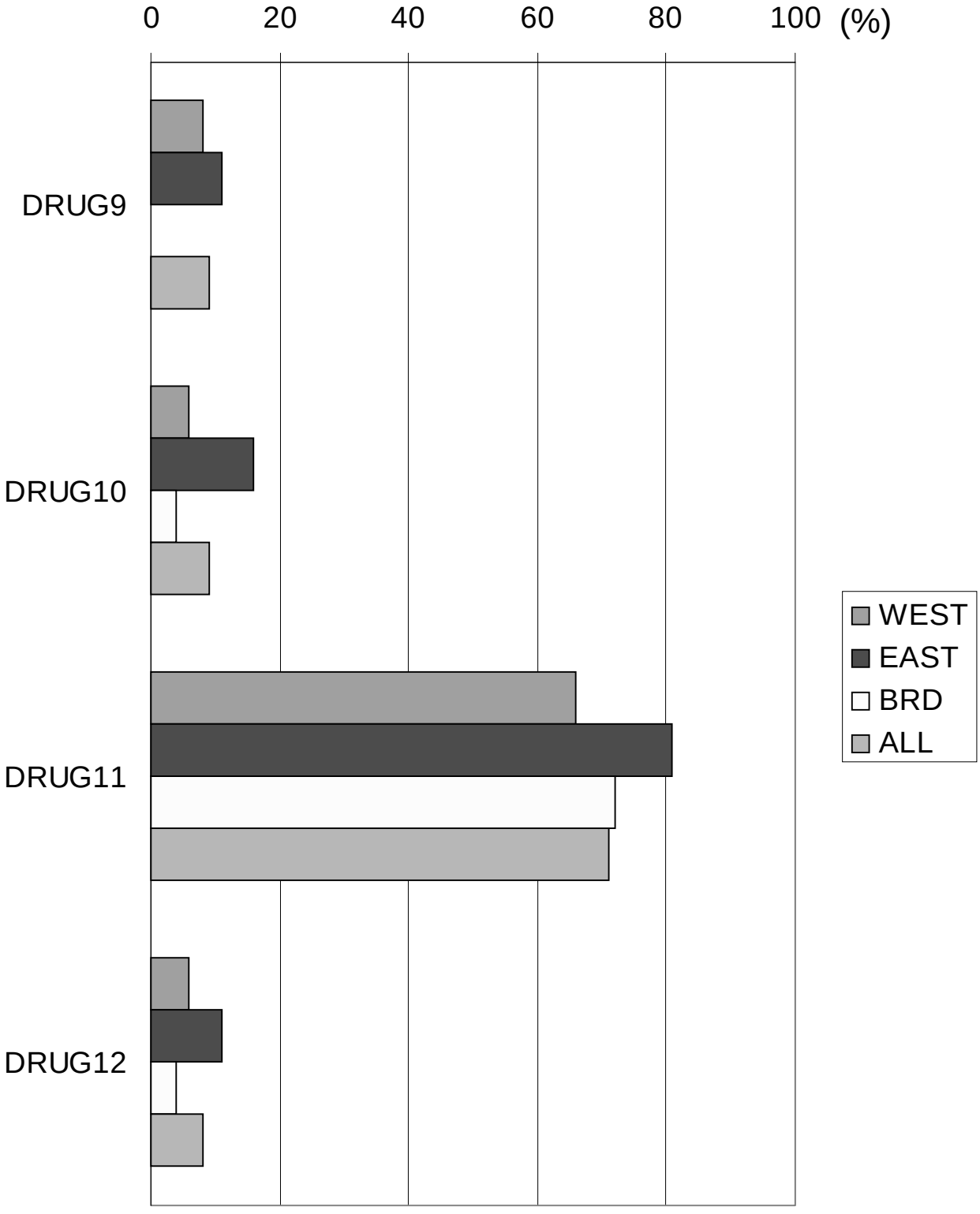
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Practical (2)



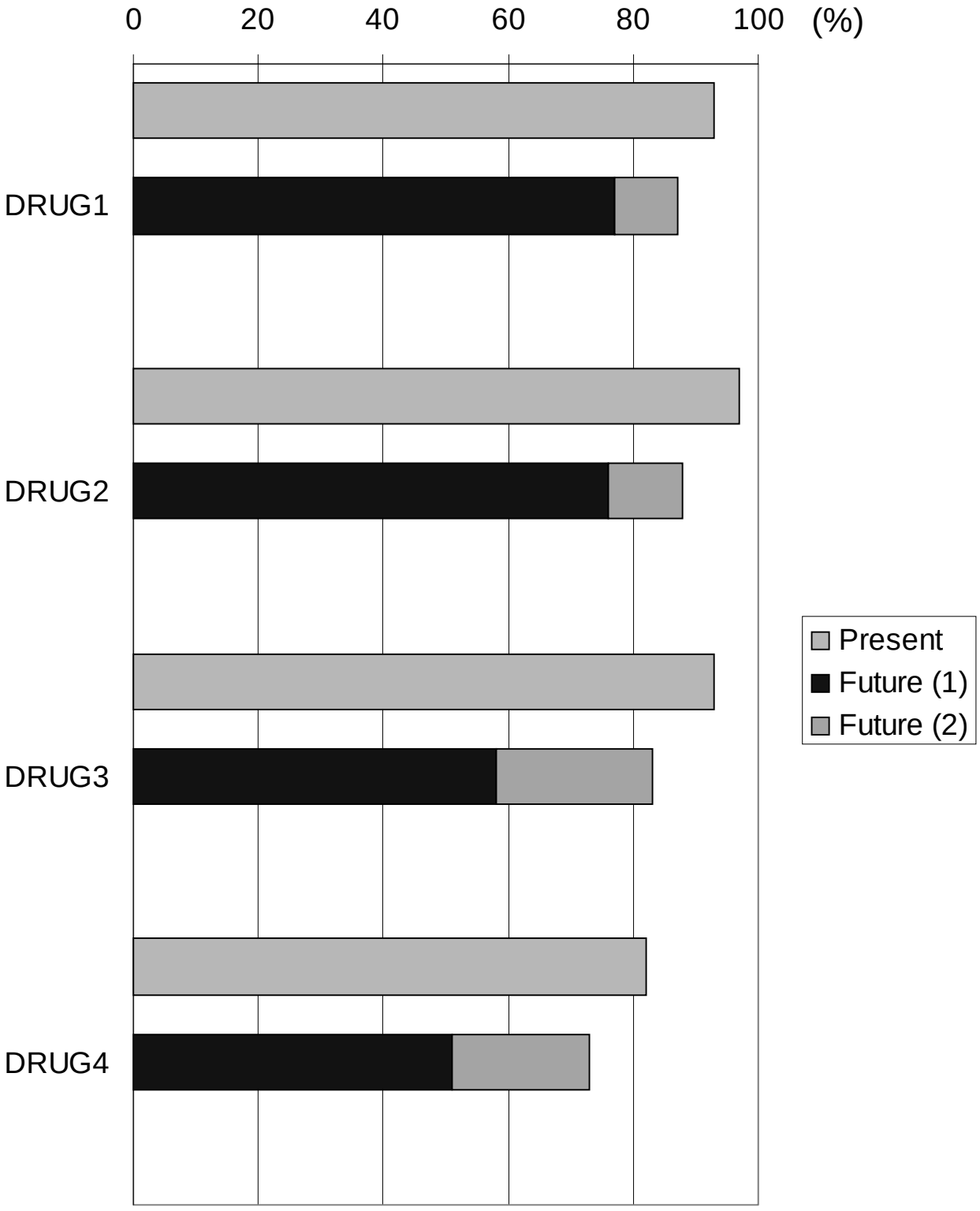
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Practical (3)



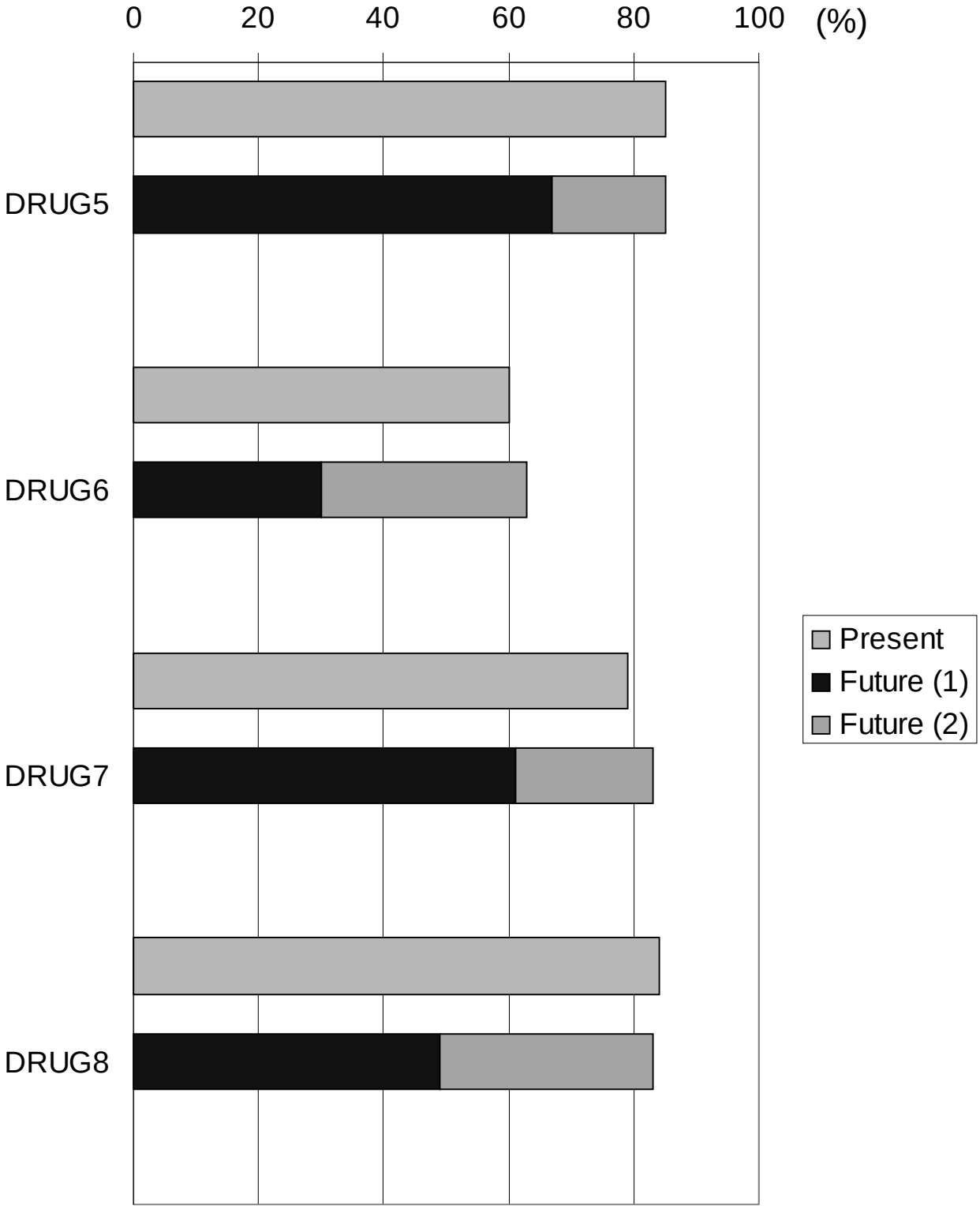
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Future 1



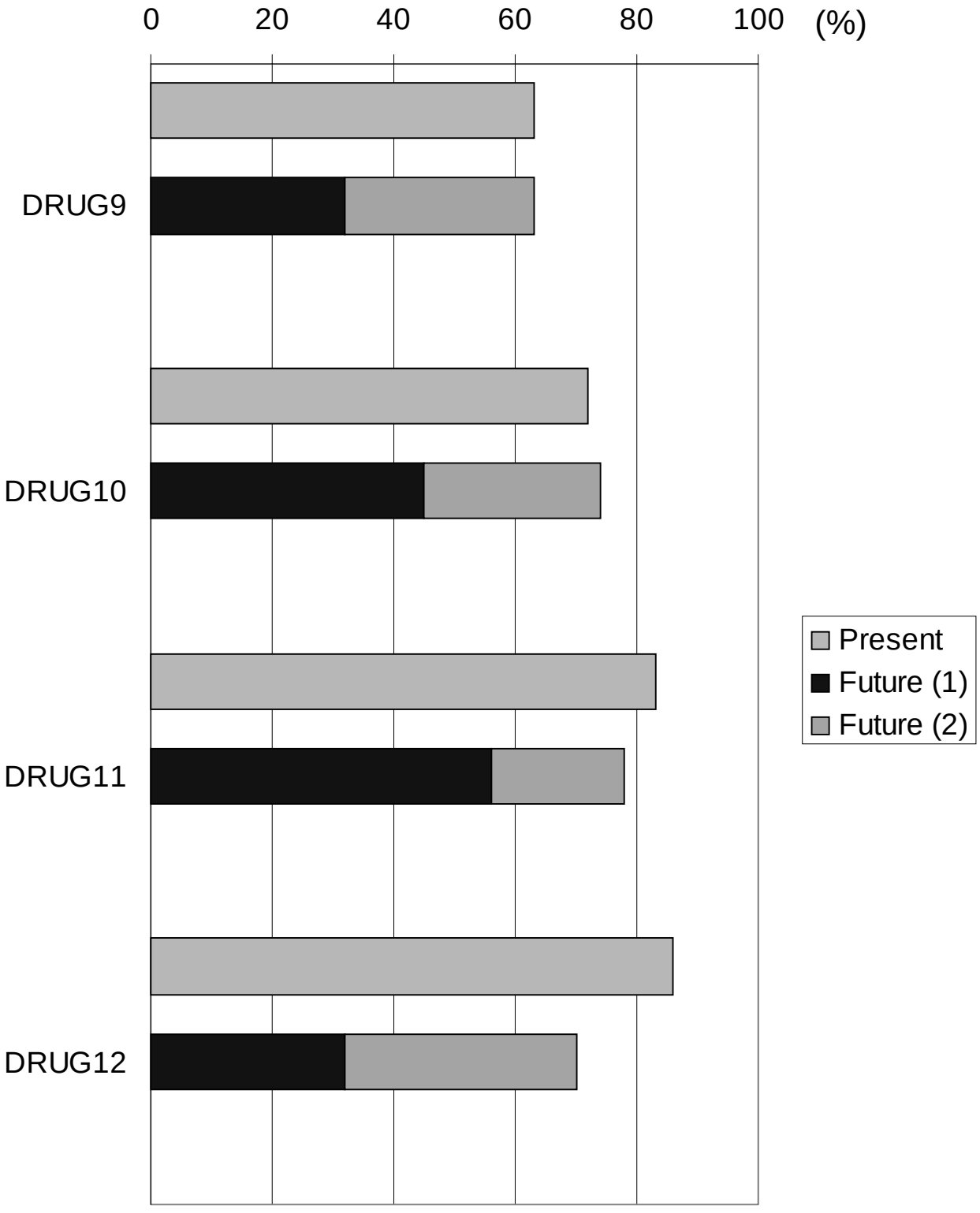
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Future 2



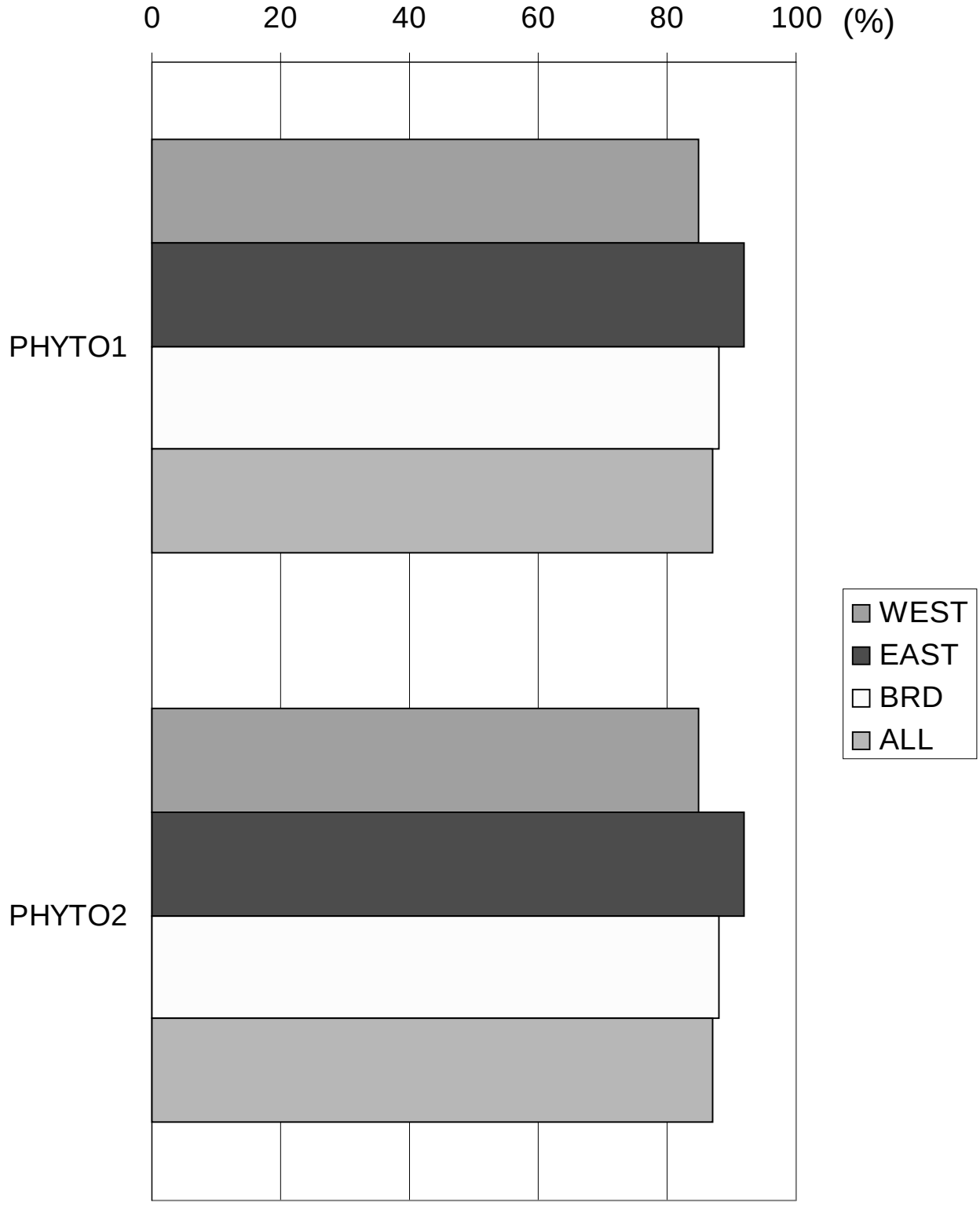
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

DRUGS OF BIOL. ORIGIN - Future 3



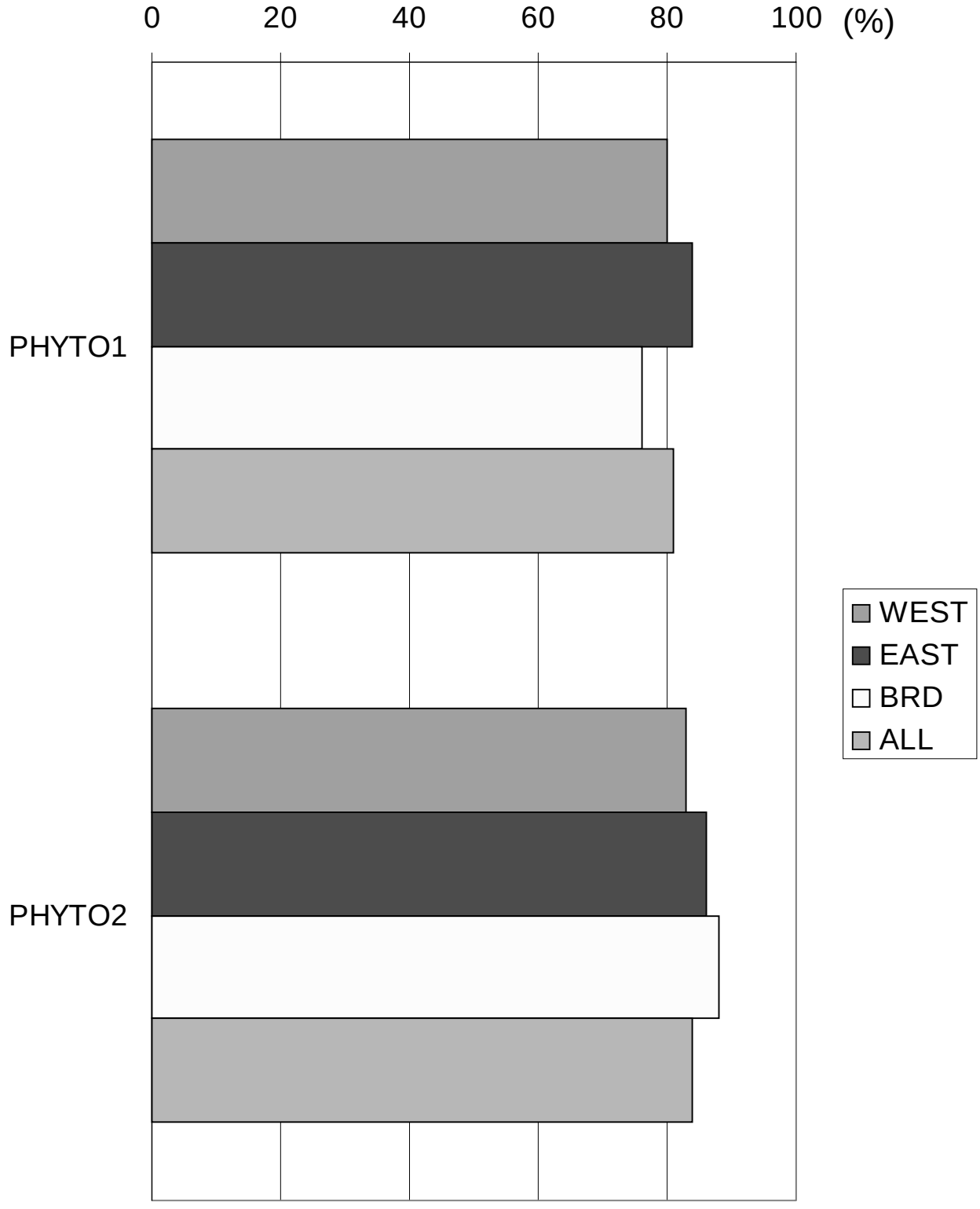
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

PHYTOPHARMACEUTICALS - Present situation



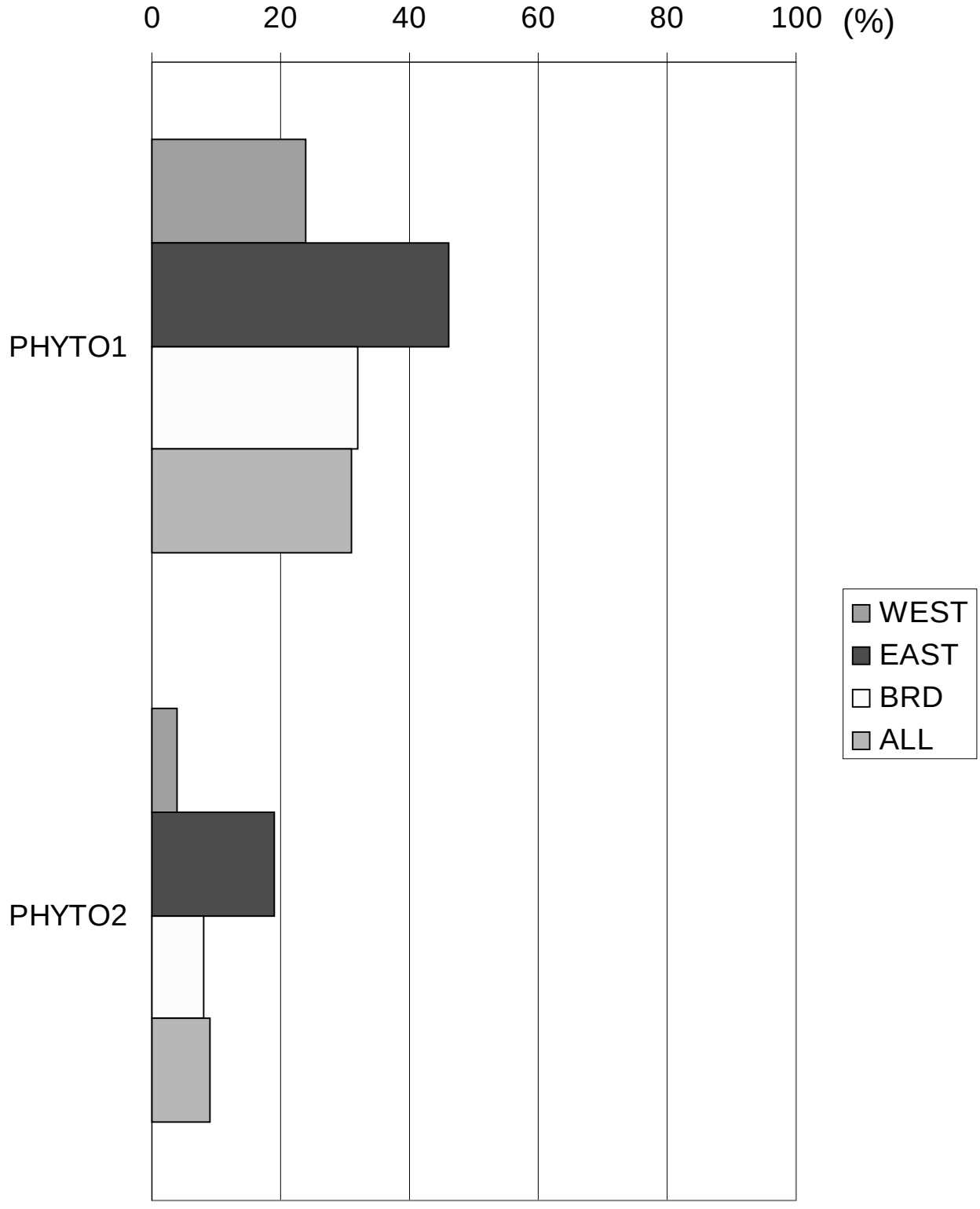
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

PHYTOPHARMACEUTICALS - Lecture



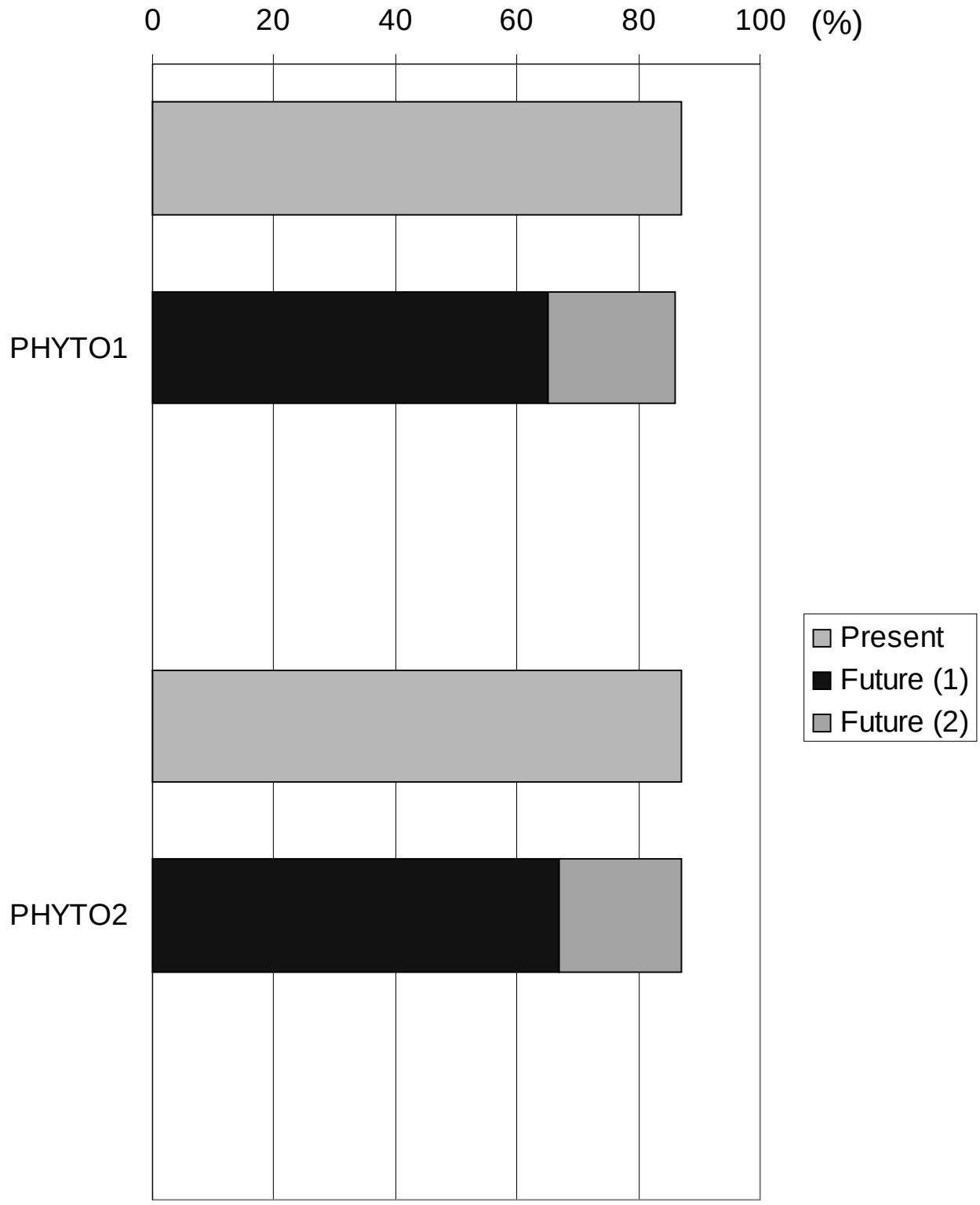
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

PHYTOPHARMACEUTICALS - Practical



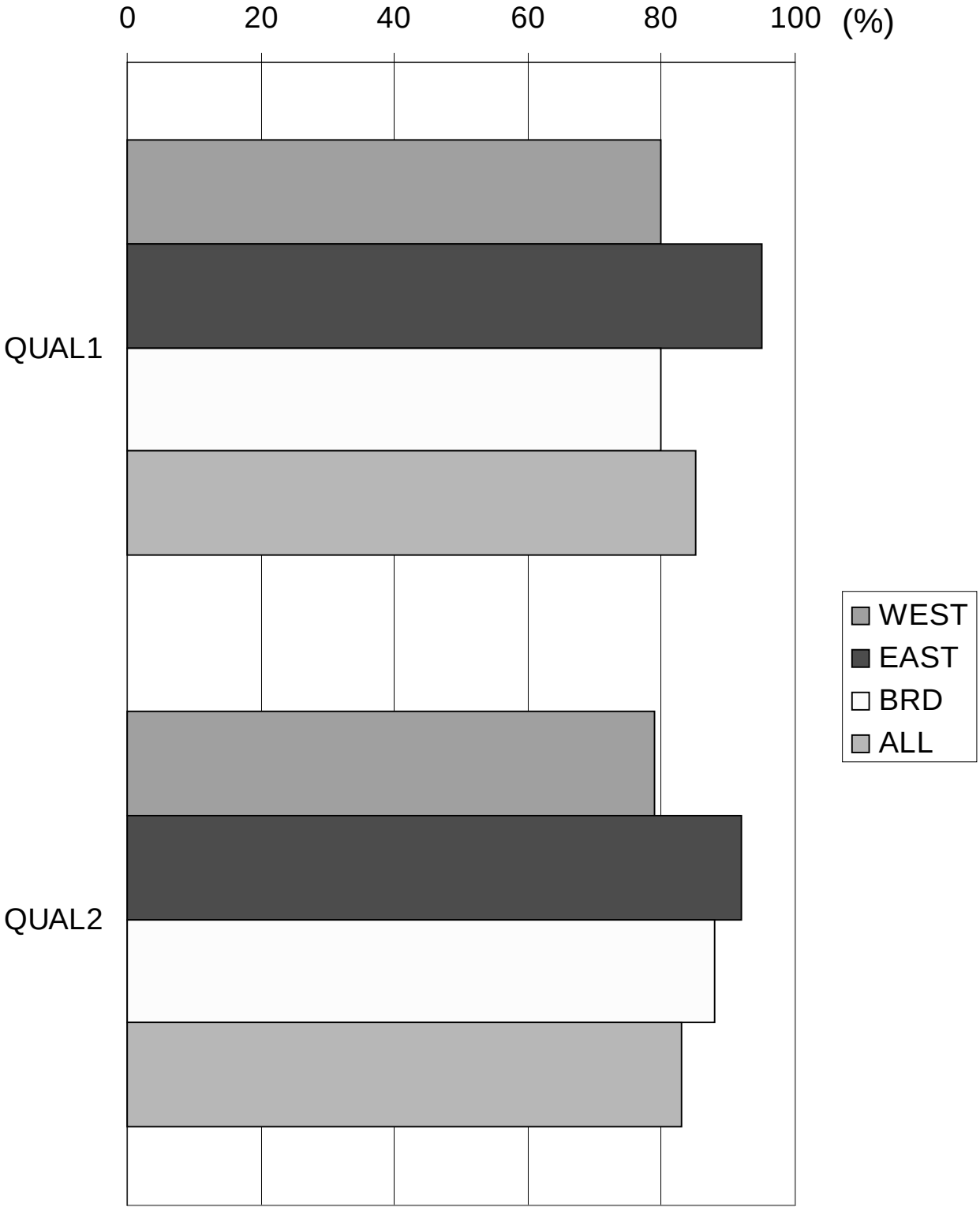
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

PHYTOPHARMACEUTICALS - Future



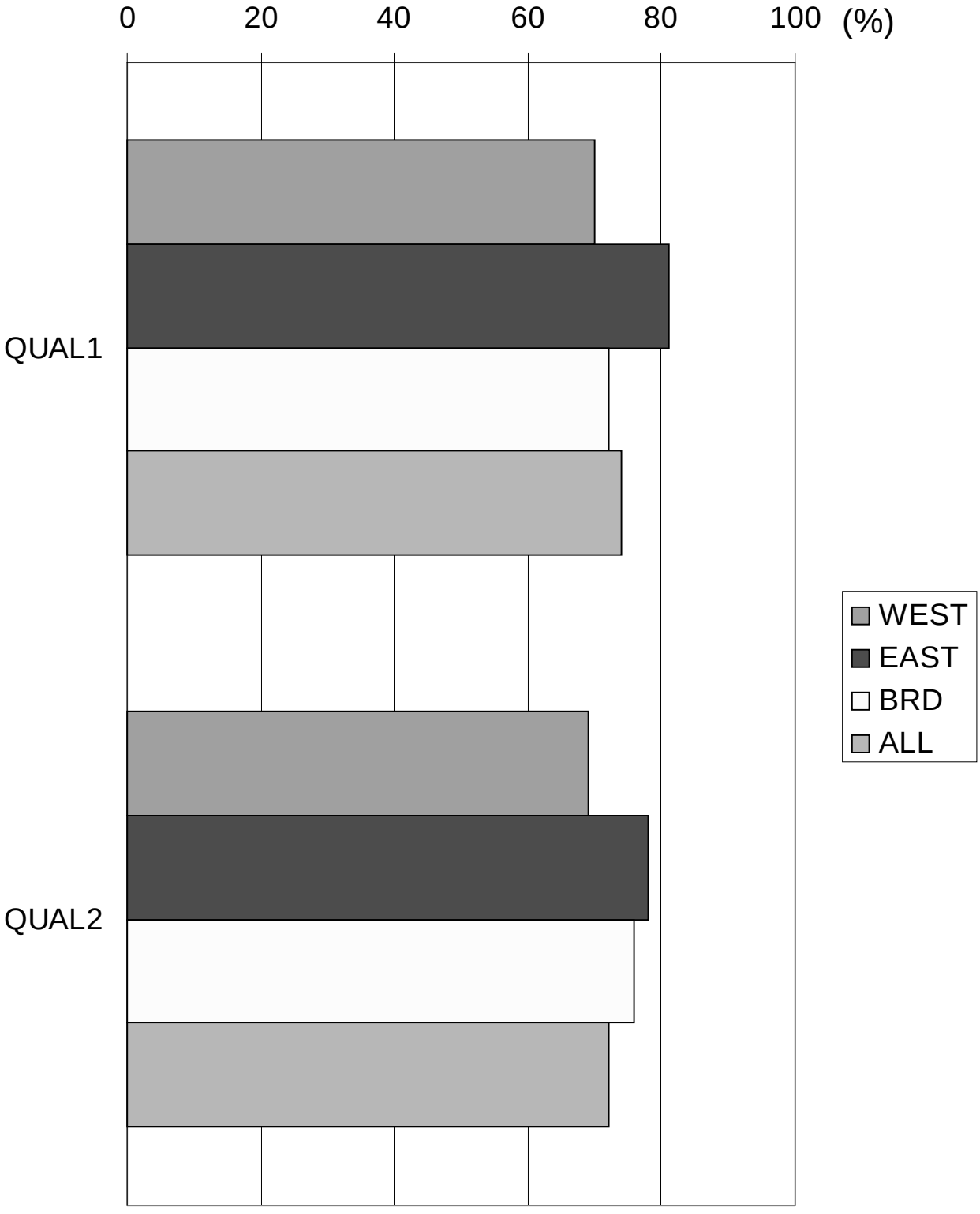
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

QUALITY ASSURANCE - Present situation



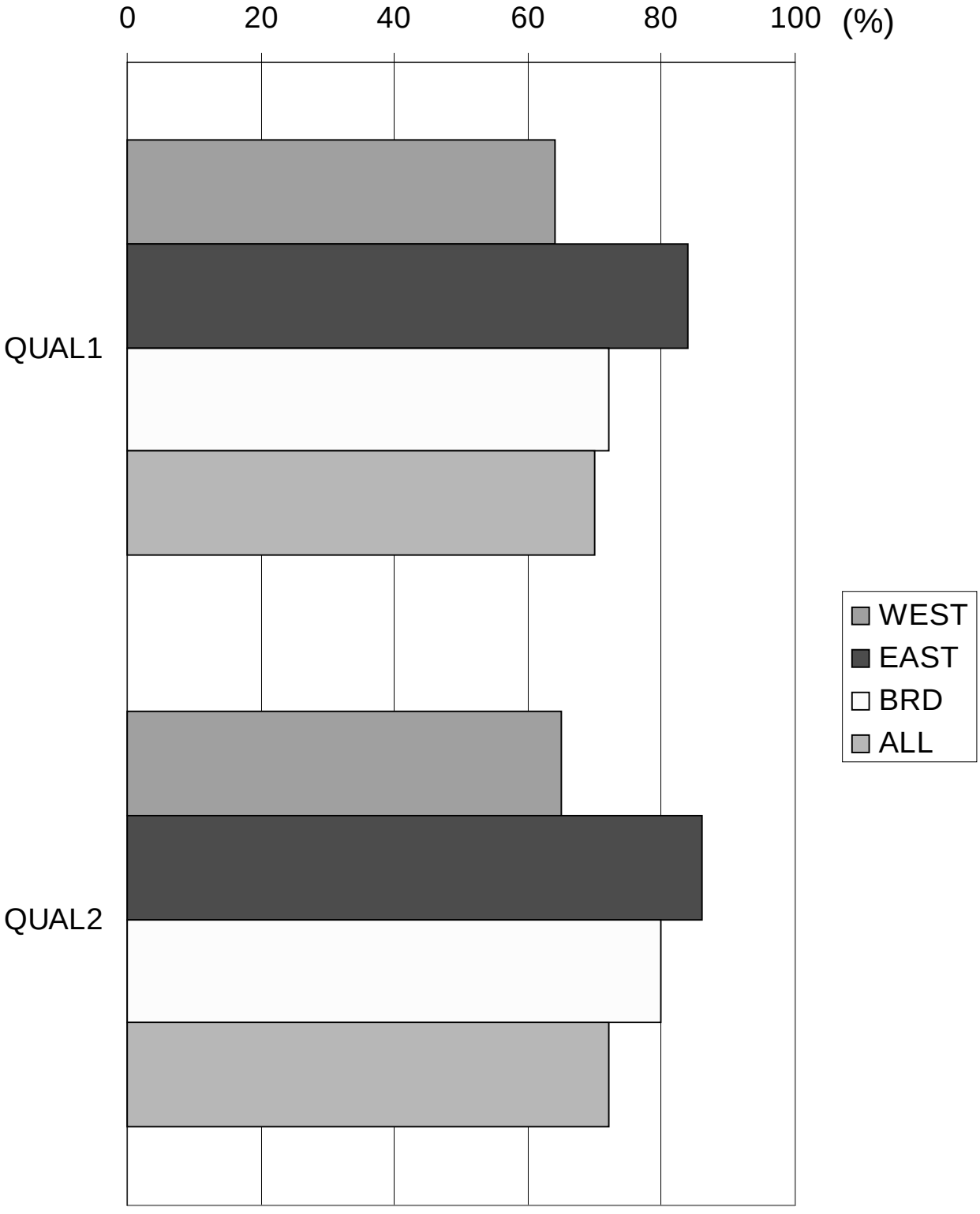
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

QUALITY ASSURANCE - Lecture



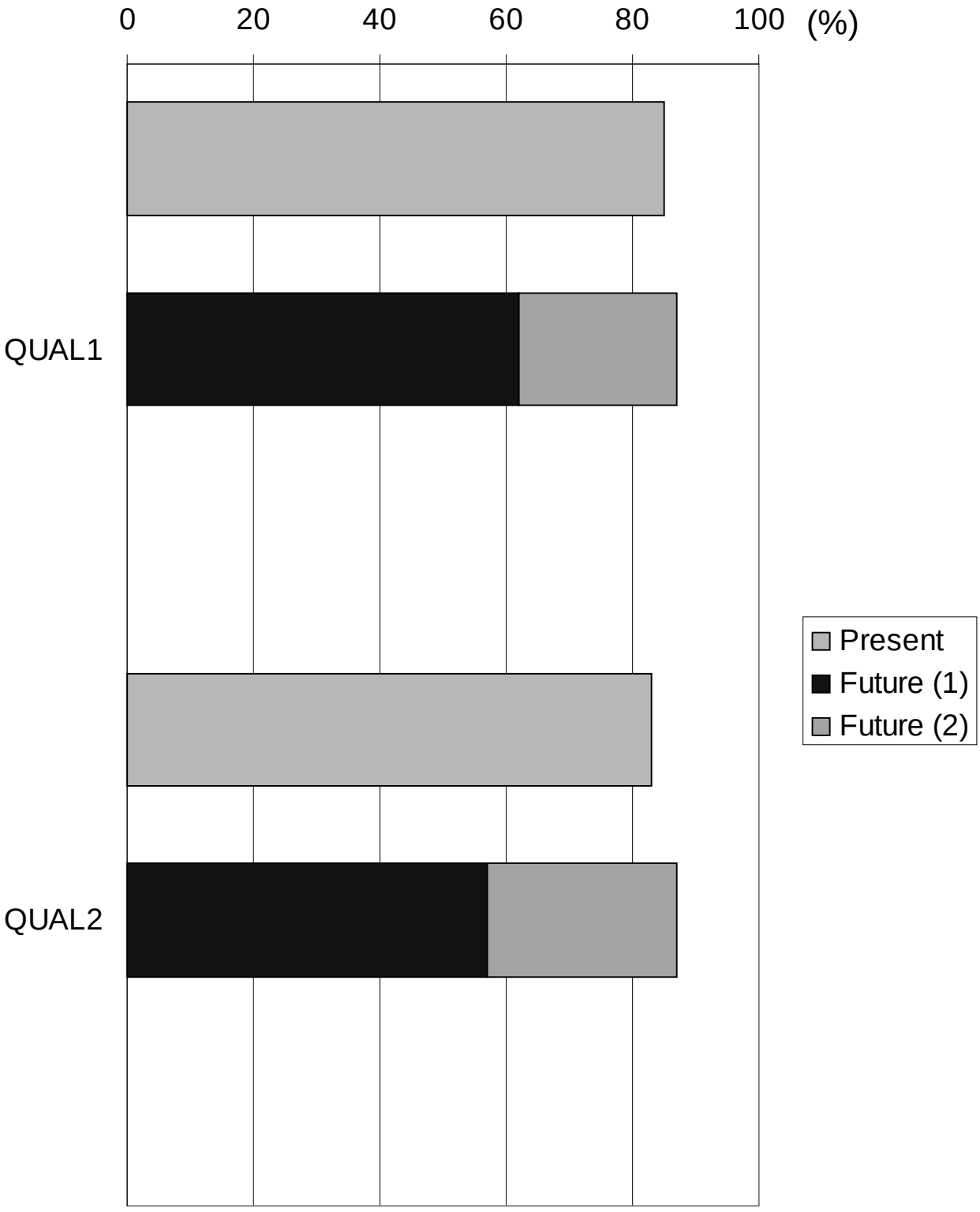
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

QUALITY ASSURANCE - Practical



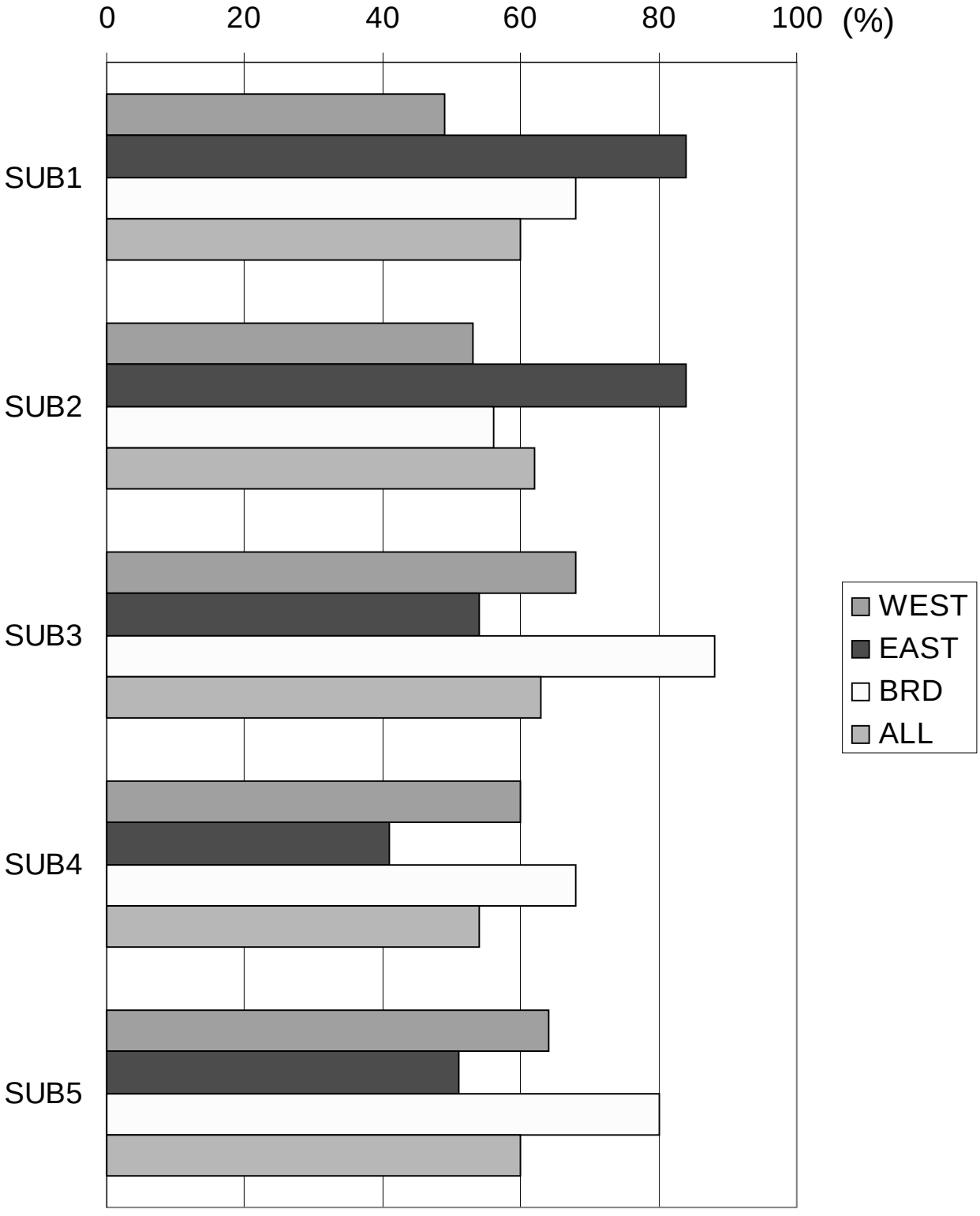
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

QUALITY ASSURANCE - Future



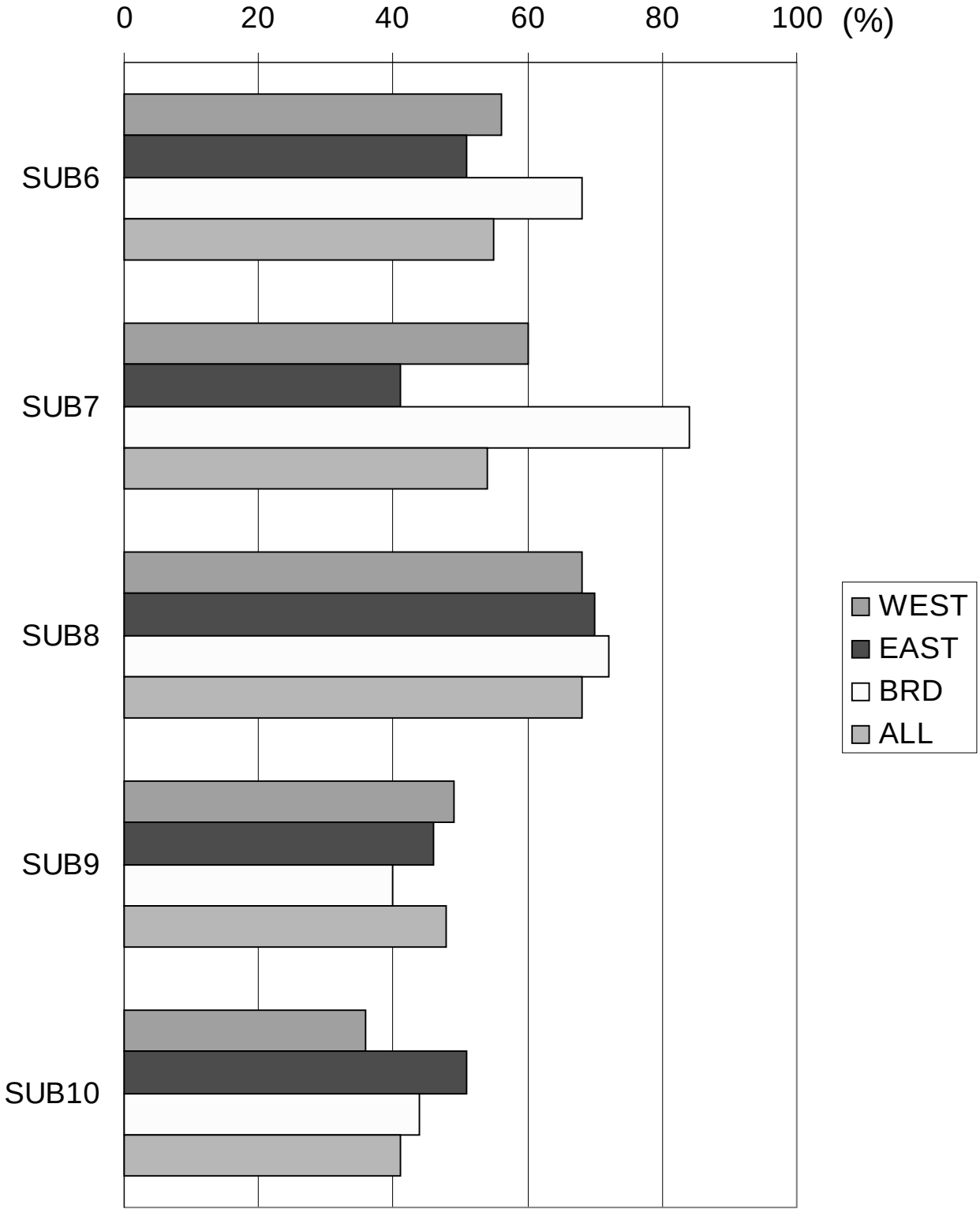
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Present situation (1)



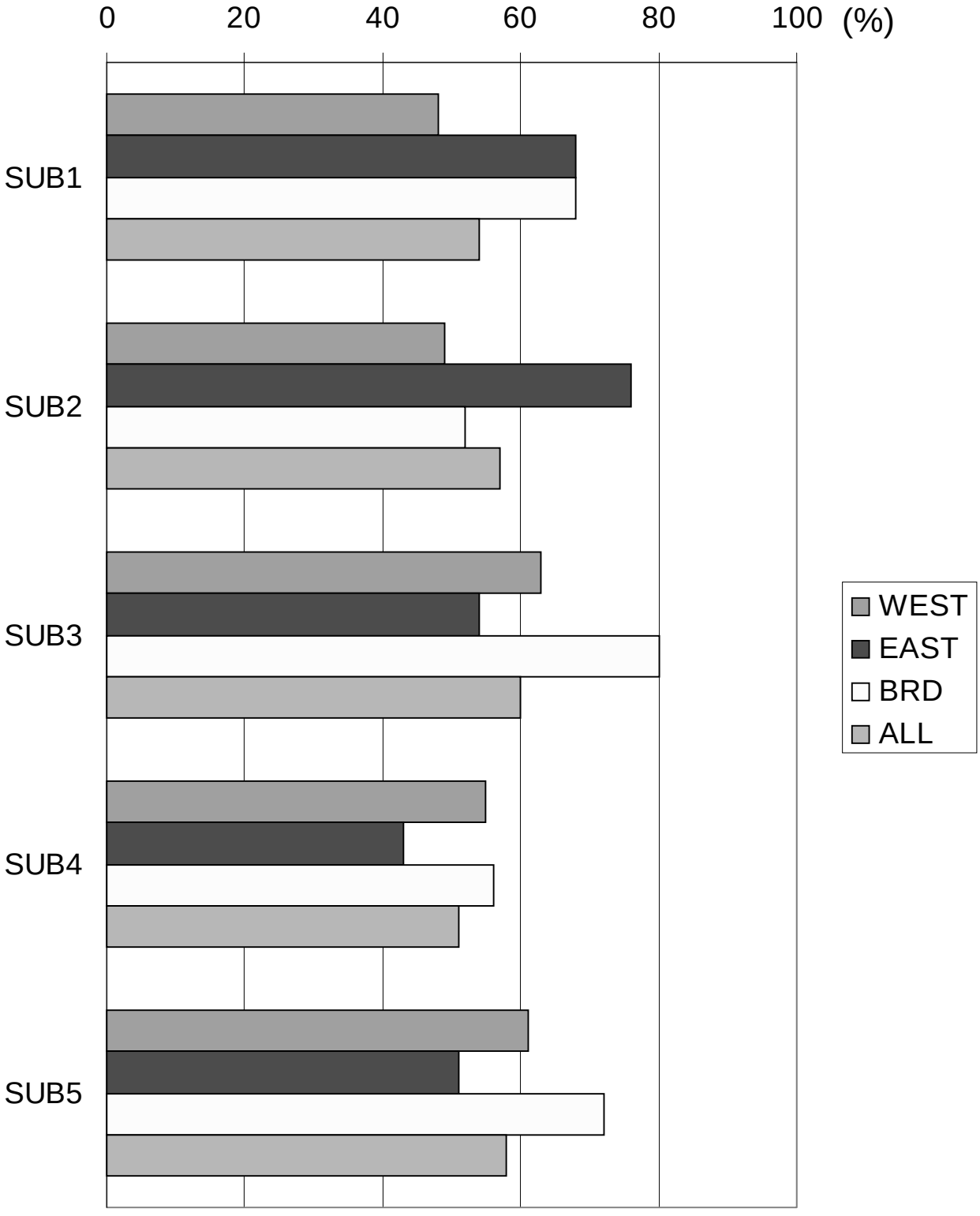
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Present situation (2)



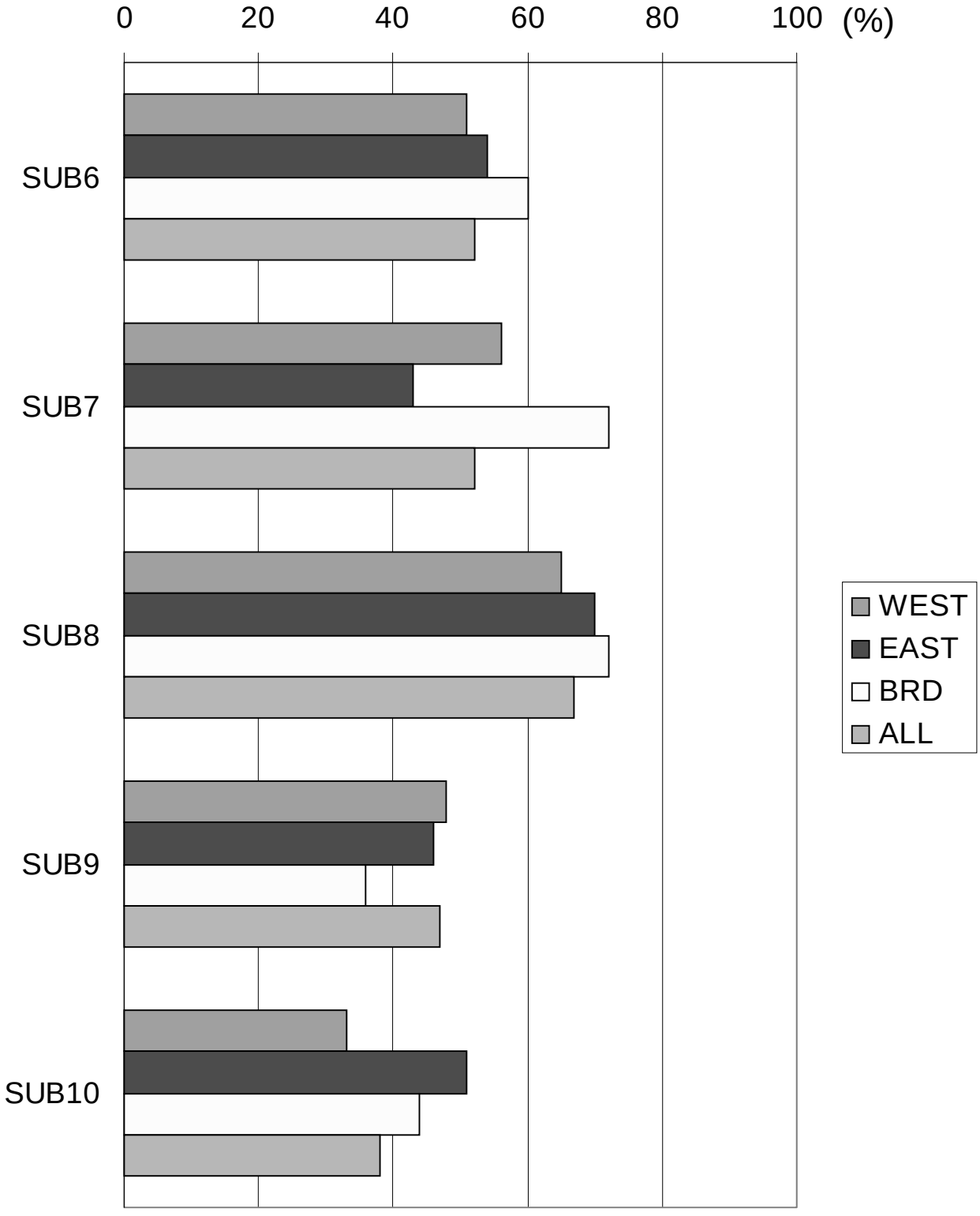
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Lecture (1)



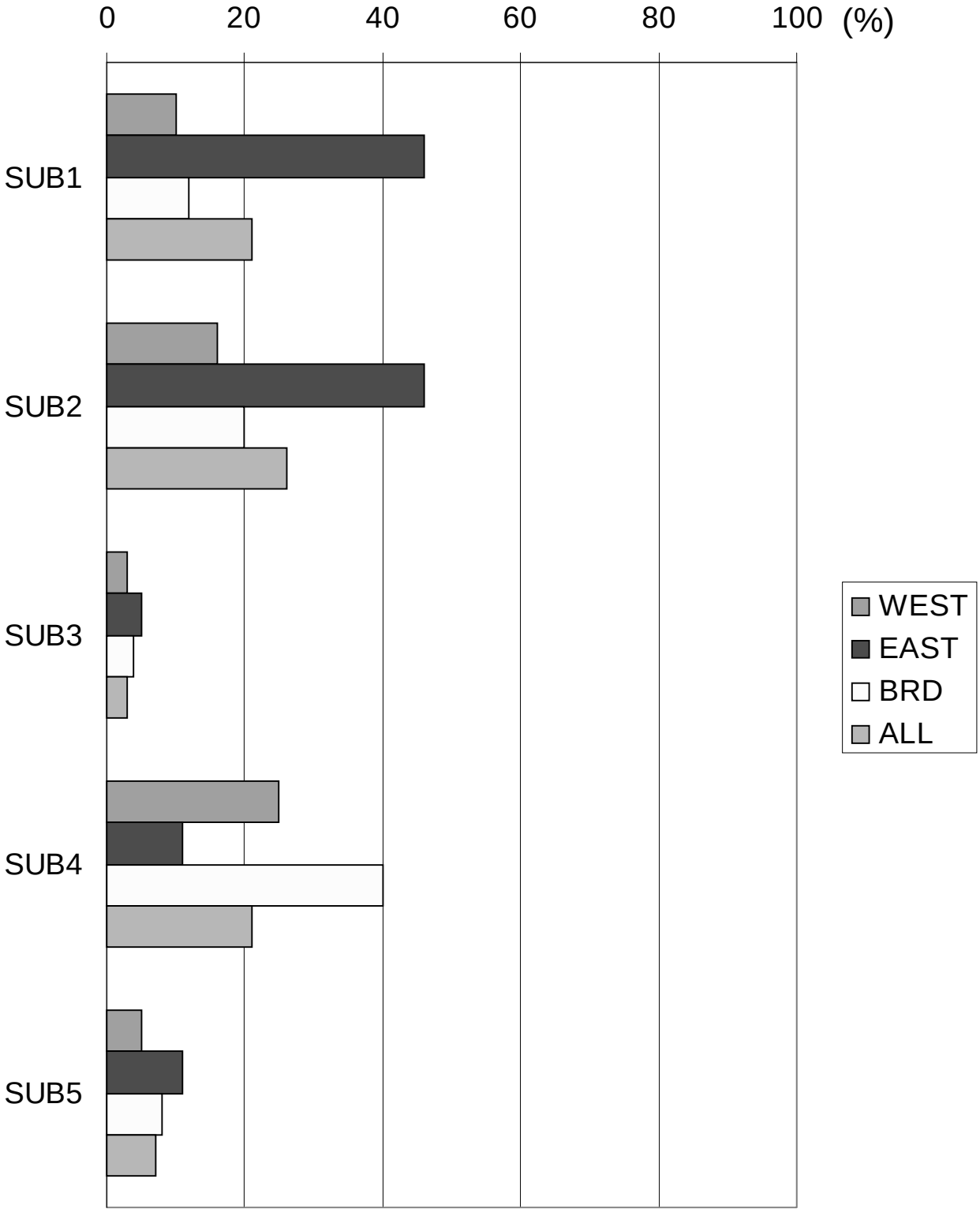
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Lecture (2)



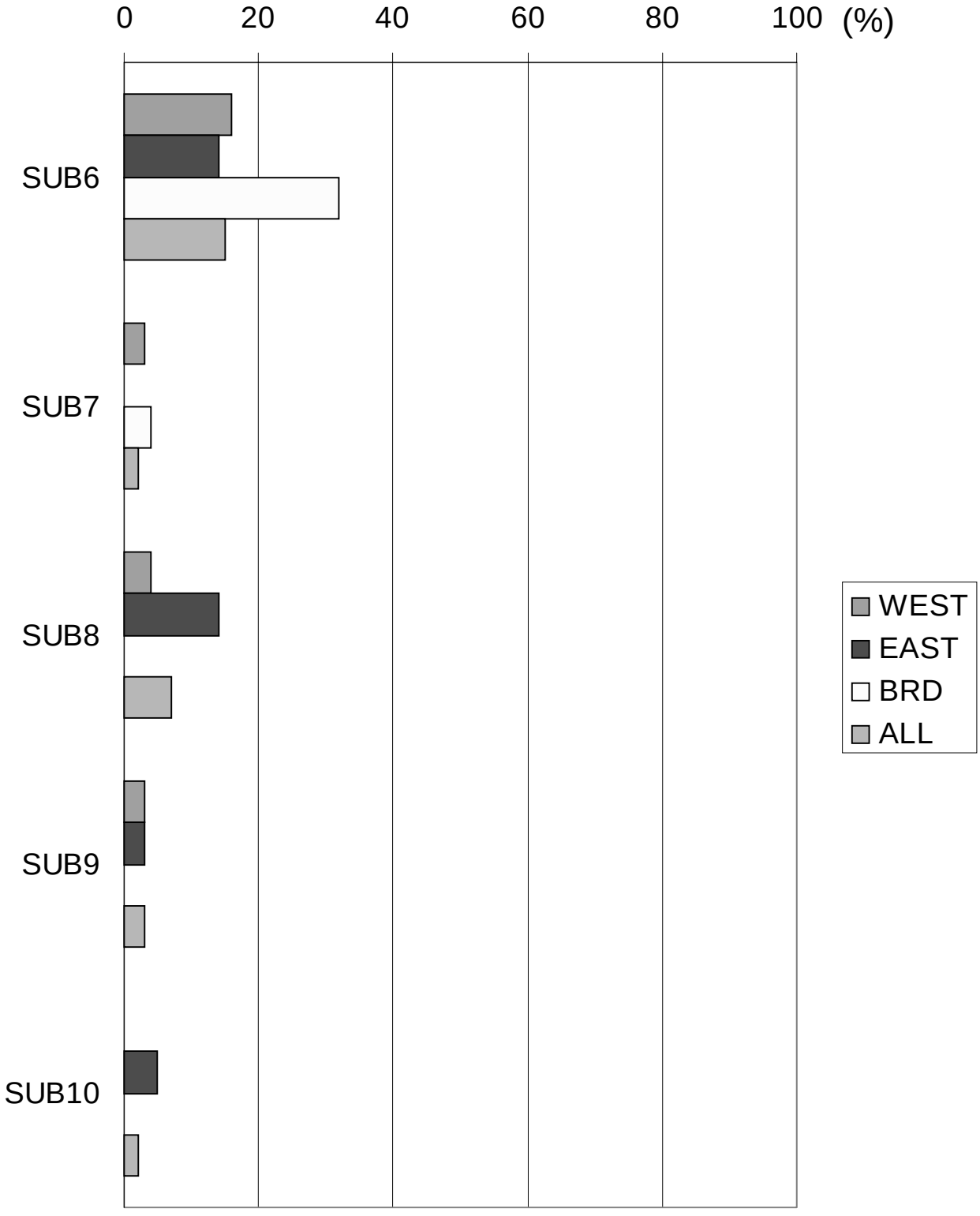
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Practical (1)



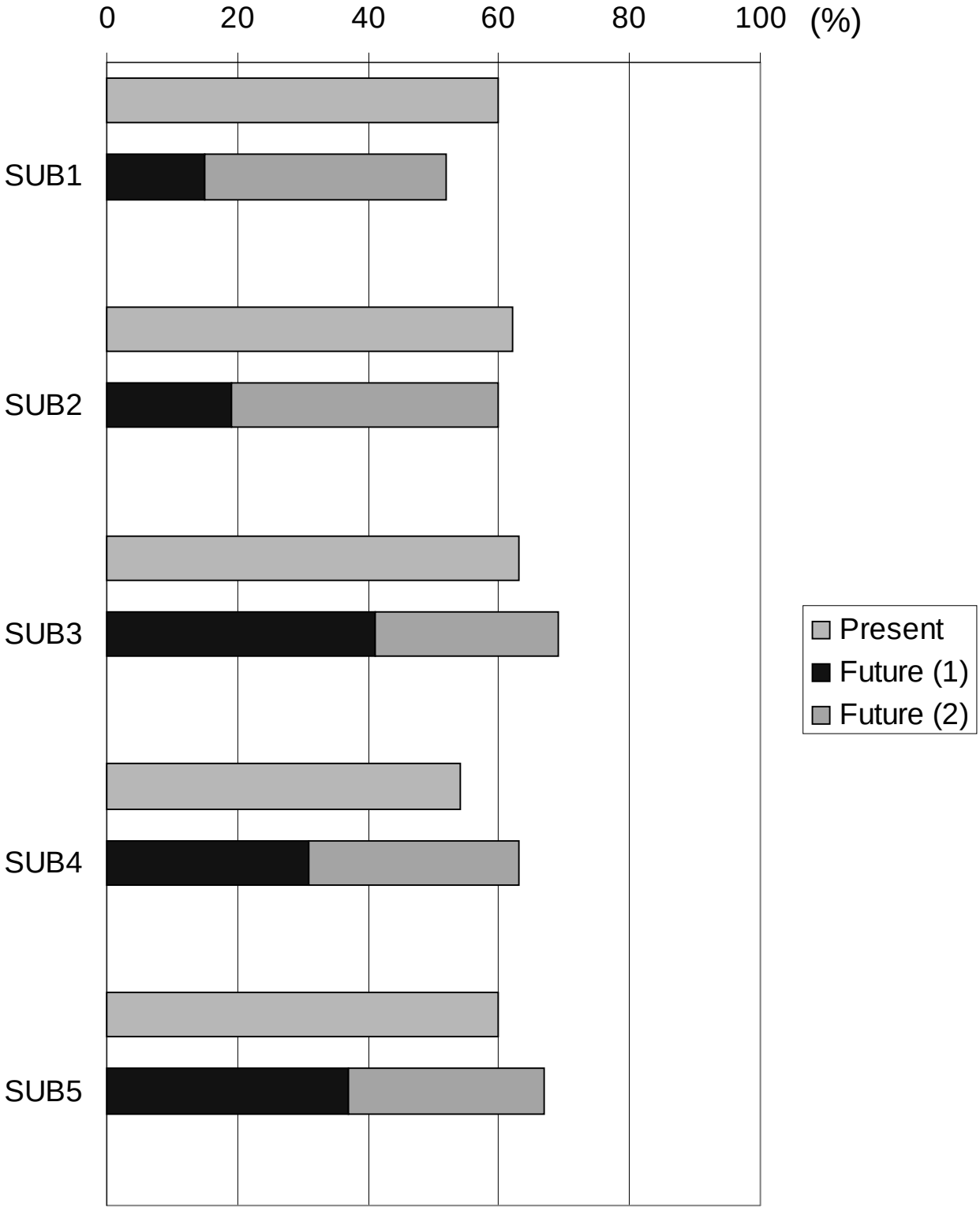
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Practical (2)



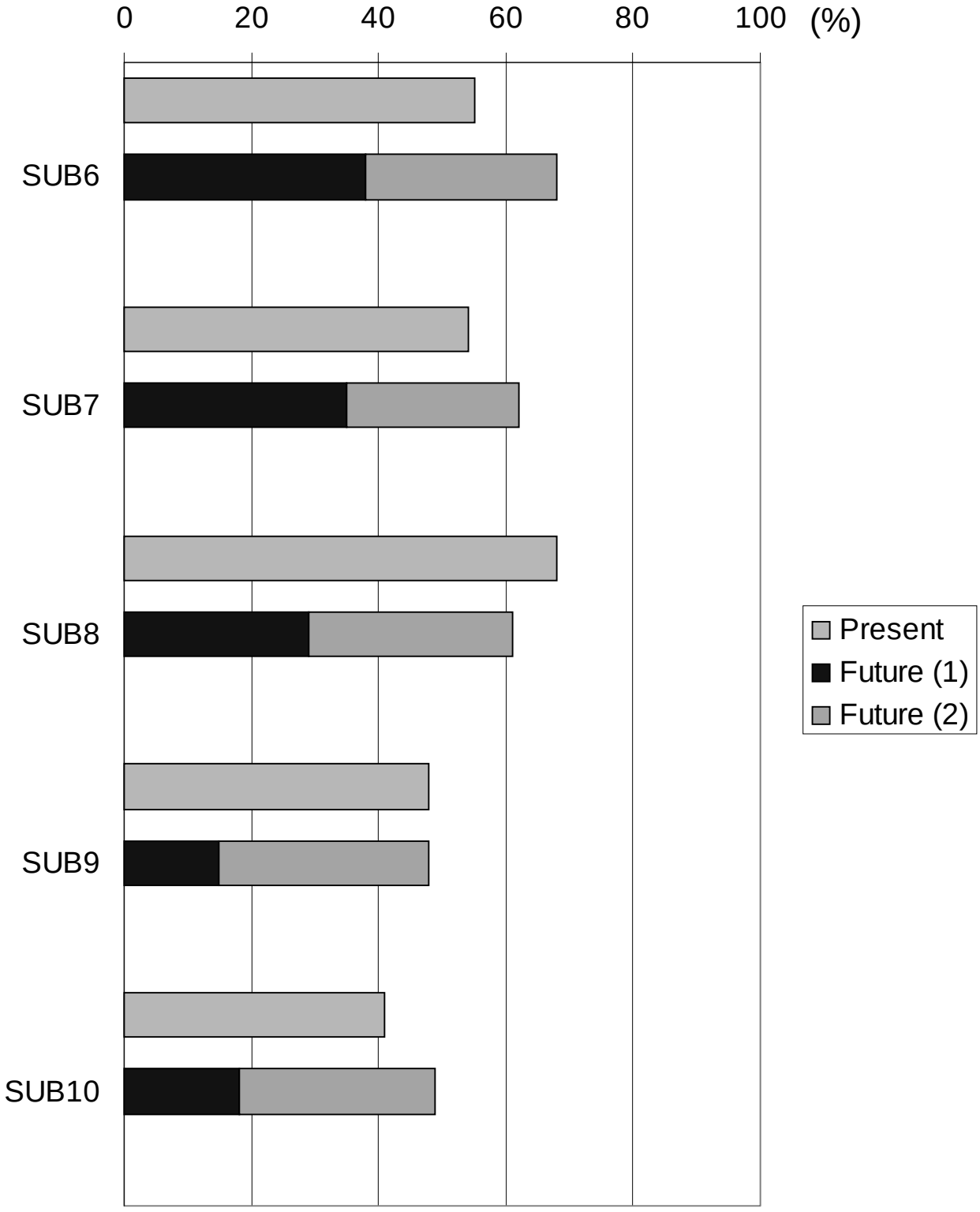
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Future 1



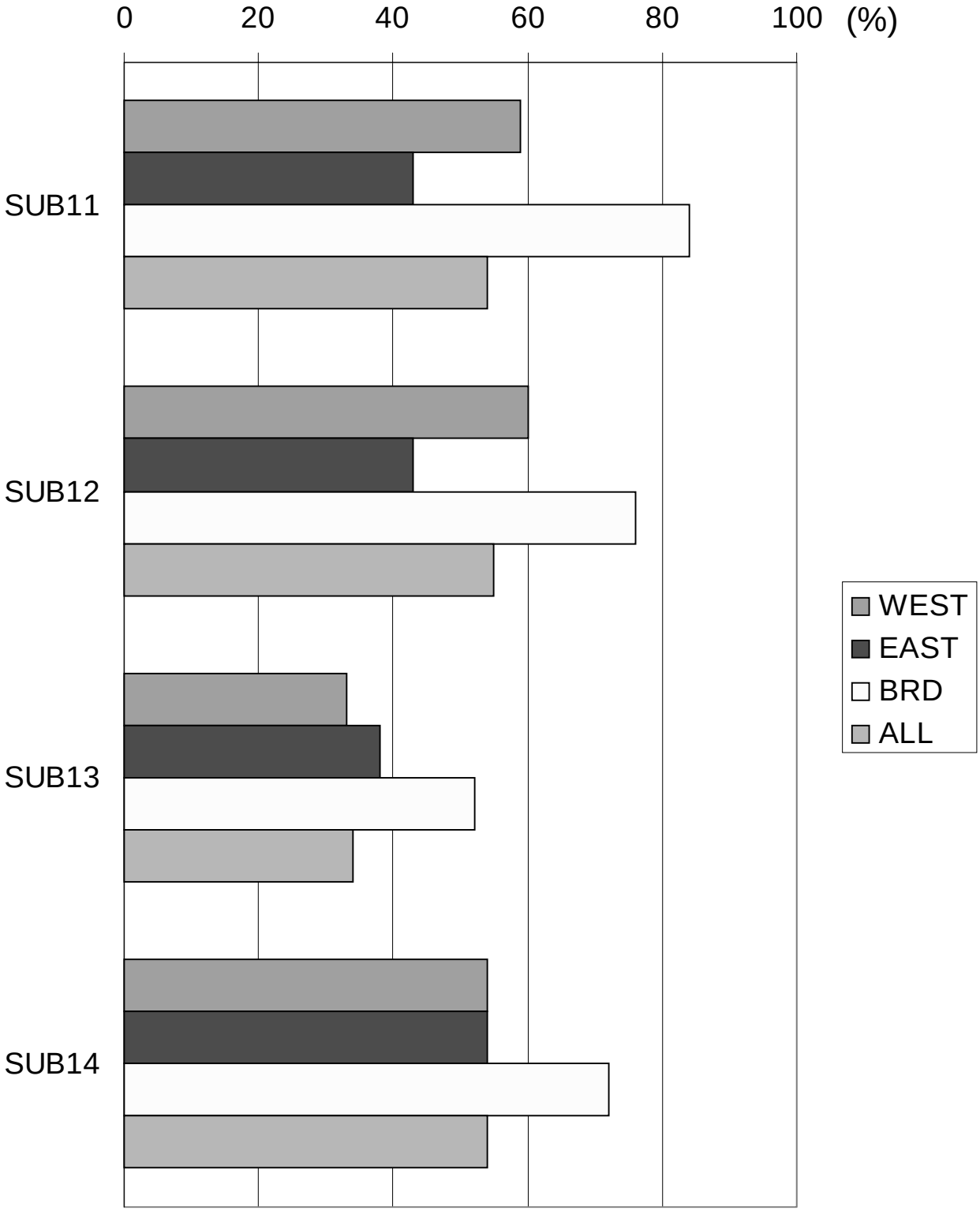
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

FURTHER SUBJECTS - Future 2



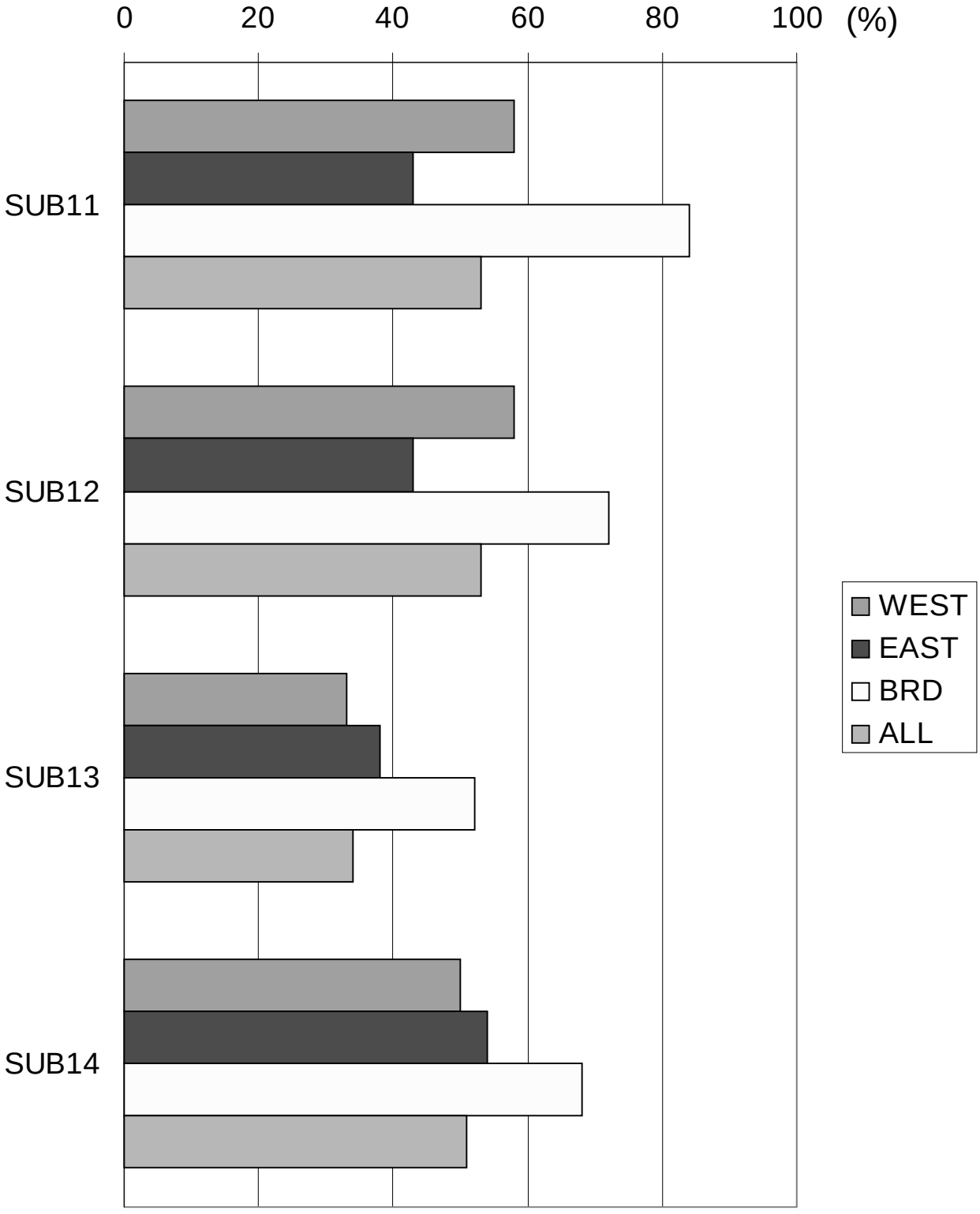
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

OTHER SUBJECTS - Present situation



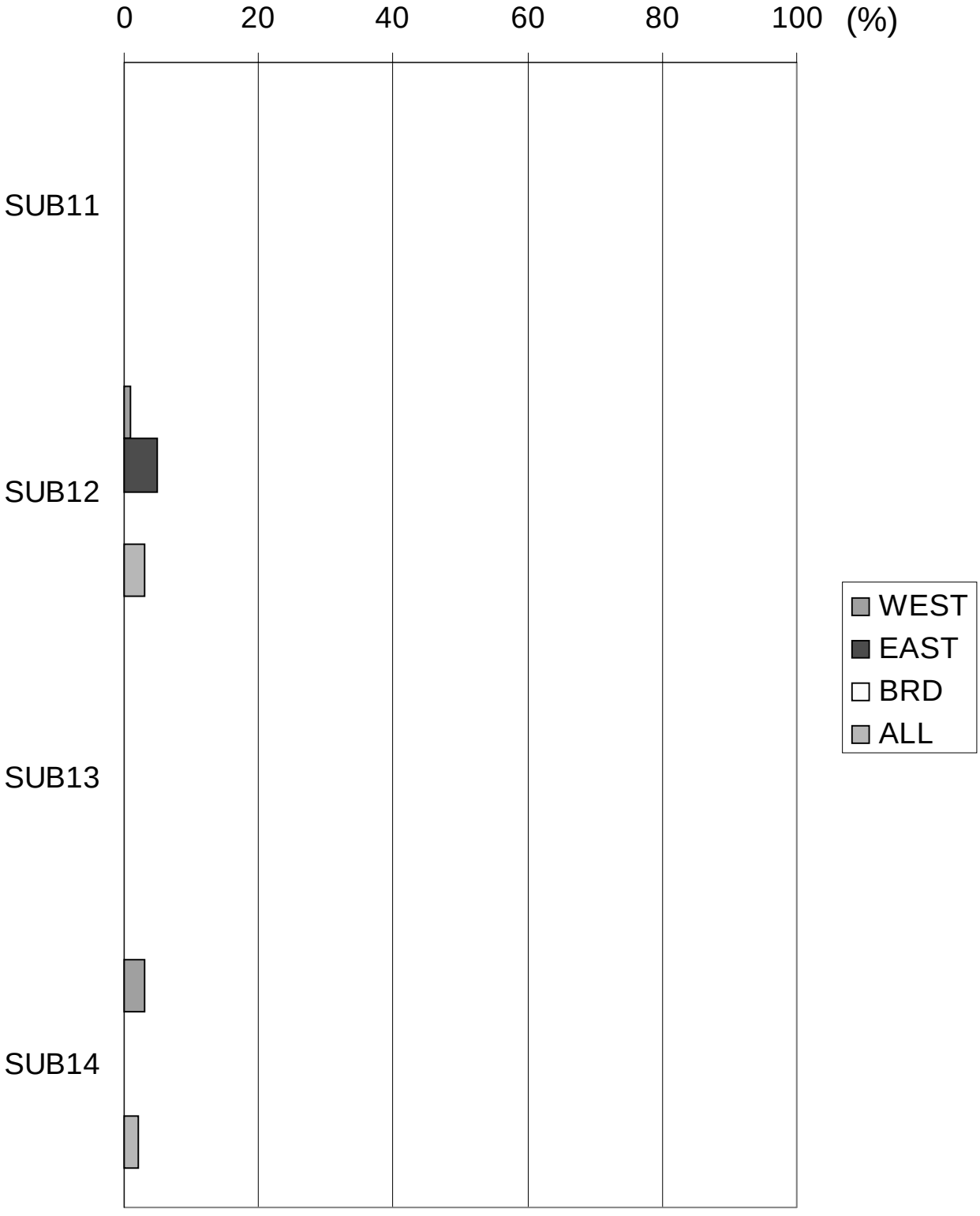
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

OTHER SUBJECTS - Lecture



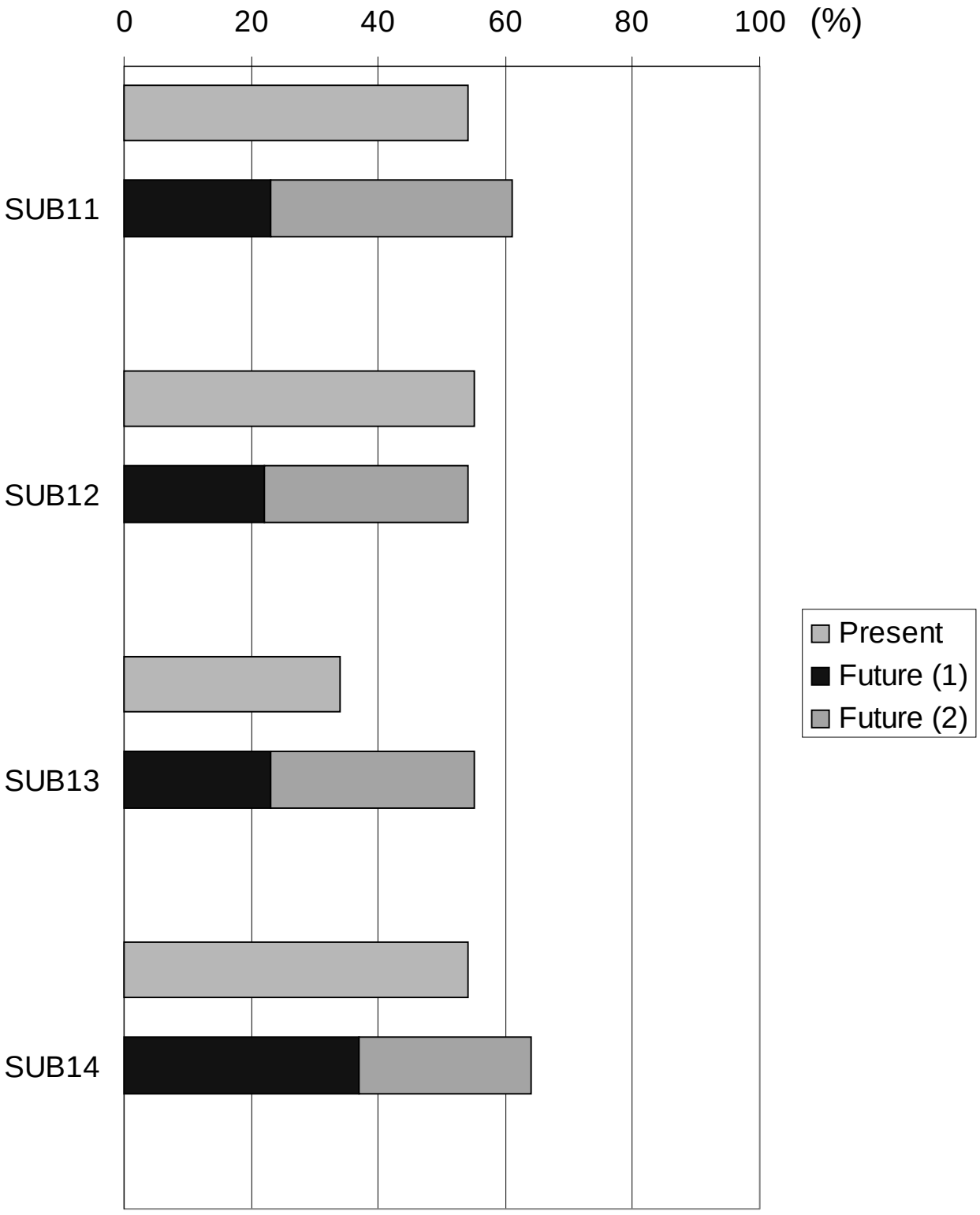
B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

OTHER SUBJECTS - Practical



B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna

OTHER SUBJECTS - Future



B. Kopp, Ch. Wawrosch, Institute of Pharmacognosy, University of Vienna