

**A GUIDE TO THE
INTERNATIONAL BIOLOGY OLYMPIAD**

Edition 27.0



**IBO Coordinating Centre, Prague
July 2015**

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July 2015

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Foreword

This guidebook offers information about the International Biology Olympiad (IBO). It contains a description of the structure, organisation of the IBO, guidelines for participating and the Rules of the IBO, which are officially accepted and followed by all IBO members.

The guide also includes a brief history of the IBO with an overview of information for new member countries. A separate document on the IBO website has a guide for future host countries.

The Appendices contain IBO theoretical and practical curricula accepted by member countries.

1 Introduction and History of the IBO

1. Introduction

The International Biology Olympiad (IBO) is a competition for secondary school students. Their skills in tackling biological problems, and dealing with biological experiments are tested. Interest in biology, inventiveness, creativity and perseverance are necessary.

Every member country sends four student competitors, who are the winners of the respective national competitions. They are to be accompanied by two team leaders as representatives of each country.

2. Aims of the IBO

The IBO is a competition for secondary school students who are interested in biology. In bringing together gifted students, the IBO challenges, stimulates students to expand their talents, and to promote science as a career. The objectives of this competition are to:

- Stimulate active interest in biological studies;
- Promote networking and understanding between biology students;
- Promote and exchange ideas about biology education

3. History

The first international biological competition between Czechoslovakia and Poland from 1985 to 1989 provided ground for the future IBO proper. The positive experience during international Olympiads in other natural sciences and mathematics led to the idea of starting an international biology Olympiad. So UNESCO asked the former Czechoslovakia to take the initiative. Six interested countries (Belgium, Bulgaria, Czechoslovakia, German Democratic Republic, Poland and the Soviet Union) founded the IBO in 1989 (Prague and Brno) and participated in the first IBO, which was held in Olomouc in July 1990. Notwithstanding some initial difficulties, this Olympiad was a great success and it was decided to continue with the IBO. In subsequent Olympiads the number of participating countries increased rapidly.

Year	Country	(City)	No. participating countries
1990	Czech Republic	(Olomouc)	6
1991	Russia	(Machatskala)	9
1992	Slovak Republic	(Poprad)	12
1993	The Netherlands	(Utrecht)	15
1994	Bulgaria	(Varna)	18
1995	Thailand	(Bangkok)	22
1996	Ukraine	(Artek)	23
1997	Turkmenistan	(Ashgabat)	28
1998	Germany	(Kiel)	33
1999	Sweden	(Uppsala)	36
2000	Turkey	(Antalya)	38
2001	Belgium	(Brussels)	38
2002	Latvia	(Riga)	40
2003	Belarus	(Minsk)	41
2004	Australia	(Brisbane)	40
2005	China	(Beijing)	50
2006	Argentina	(Rio Cuarto)	48
2007	Canada	(Saskatoon)	49
2008	India	(Mumbai)	55
2009	Japan	(Tsukuba)	56
2010	Korea	(Changwon)	58
2011	Chinese Taipei / Taiwan	(Taipei)	58
2012	Singapore		59
2013	Switzerland	(Bern)	62
2014	Indonesia	(Bali)	61
2015	Denmark	(Aarhus)	61

Immediately after the first Olympiad, a Coordinating Centre was established in Prague and every November, a meeting of appointed coordinators (Advisory Board) assembles in this Centre to prepare new proposals and improve regulations, the content, and preparations of future Olympiads, etc.

A list of countries involved in the IBO is presented in Appendix V.

2 Structure of the International Biology Olympiad

IBO bodies

2.1 Coordinating Centre (CC)

The CC acts as the secretariat of the IBO¹ and fulfils the following functions:

- Provides information for all member countries and related international institutions (UNESCO, IUBS, etc.);
- Coordinates the Advisory Board and the General Assembly, in a non-voting capacity;
- Ensures preparation and distribution of materials to these meetings;
- Promotes contacts with other non-IBO member countries;
- Coordinates the invitation of observers from other non-IBO member countries by the future host country;
- Accumulates relevant documentation about the competition;
- Registers and updates addresses of coordinators, their deputies, observers and of institutions taking part in the IBO;
- Collects materials and information regarding the IBO and other biological competitions, including descriptions of National Biology Olympiads or similar competitions used to select IBO competitors;
- Presents a yearly report about its activities and the financial situation at the General Assembly.

The CC fulfils these activities in collaboration with the IBO Steering Committee, IBO member countries and other organizations in accordance with the aims of the IBO. It organizes the annual IBO Advisory Board meeting. The CC will send an invoice to each country as a PDF by the end of March for members to pay the IBO membership fee.

2.2 Steering Committee (SC)

- The SC is responsible for managing daily IBO events and procedures. It consists of five members plus the head of the CC. Members of the SC serve a four-year period and they can be re-elected². Eligible candidates are country coordinators or team having been present for at least three IBOs before the election year.
- Candidates can be nominated by a single country coordinator or declare their candidacy until the day of election. The election occurs during the General Assembly.
- Each country can vote for a maximum of four candidates in an anonymous poll (maximum one vote per candidate), electing those with the highest number of votes among all candidates. If two or more candidates have received the same number of votes, a subsequent vote is carried out anonymously until all positions have been determined.
- The SC starts its function officially on September 1st following the election.

¹ It has been established at the National Institute of Children and Youth (NIDM) in Prague, Czech Republic and it is currently situated at the Faculty of Sciences of the Charles University in Prague, Czech Republic.

² 2012-2016 Steering Committee: Chairman P. Kasemsap (Thailand), members G. Cobut (Belgium), D. Kappei (Germany), S. Lim (Singapore), M. Oliver (Australia) and T. Soukup (Coordinating Centre)

- The Steering Committee can propose electronic voting if there is an urgent need for a decision on an important issue.
- The SC chooses one of its members to function as IBO Chairperson, to chair IBO meetings, represent the IBO at official occasions, and maintain contact with the CC about its activities. The country delivering the IBO Chairperson is allowed to bring one free extra jury member to the IBO.

2.3 Advisory Board (AB)

The SC, CC, hosts of the two previous and forthcoming IBOs and coordinators from other countries meet annually in November to discuss and plan IBO activities. Coordinators are welcome to submit proposals for discussion. Participants apply to the CC 4 weeks in advance of the AB meeting and submit their proposals at least 14 days before the meeting.

2.4 The General Assembly (GA)

The GA is held during the IBO. One jury member from each country is the 'Coordinator' and participates in the discussion and decision-making process. The aims, objectives and activities of the IBO are discussed, modified and accepted or rejected at the GA. For example, Coordinators approve: changes in the Organization Rules, countries organizing the forthcoming IBO(s), and countries which will participate in subsequent IBOs as regular members.

Topics to be put on the agenda of the General Assembly should be submitted to the members of the Steering Committee at least 14 days before the beginning of the IBO. Decisions are taken on the basis of majority votes, in the presence of at least 75 per cent of the coordinators. Each country has one vote. In case of equal votes, the IBO Chairperson takes the final decision.

2.5 International Jury

Delegates from each participating country form the International Jury, which undertakes translation of the examination papers, deliberates on the questions, evaluation of answers, and allocation of marks within the tasks, the ranking of scores and awards, in accordance with the recommendations for the theoretical and practical tests. This includes verification of the marking process and inspection of the students' scores. These deliberations are kept confidential until the official final announcement.

The Chairman of the jury is from the host country, directs the jury sessions and oversees the discussion and voting procedures. Each country has one vote and in the event of a tie, the Chairman has the casting vote. Decisions of the International Jury are final.

During the tests objective inspectors appointed by the jury should be present to check whether the testing conditions are in accordance with the Rules. Inspectors will be recruited among Jury members of past and near future IBO organizers, including members of the SC and newcomers attending the IBO as observer without a team. The host country will provide an initial training for the inspectors and criteria to report on the examinations.

Where there are reasonable grounds to suspect instances of cheating, the SC will investigate and report, without naming individuals, to the jury (see section 5).

3 Description of the Competition

The IBO takes place each year in July in one of the member countries and is organized by the Ministry of Education or by another analogous institution of the organizing country (only the term 'organizer' is used in the subsequent text).

3.1 The Competition and the Competition Tasks

All disciplines of biology are acceptable for the IBO. More widely oriented topics should enable the competitors to apply not only their knowledge and skills, but also their ability to think independently and solve problems.

The competition consists of two parts, theoretical and practical (experimental) examinations that comply with the guidelines and rules. The recommended duration of each part is four to six hours with a break for refreshment. There should be at least one-day interval between the two examinations.

The organizers are responsible for the preparation of the competition and will provide examination papers, solutions and criteria for evaluation of answers. The examination materials become valid only when approved by the International Jury. The competitors receive all tasks translated into their native language.

The individual papers, tasks and answer sheets of the competitors will be assessed and marked by the authors of the competition tasks and solutions. The International Jury makes the final decision concerning classification of the results.

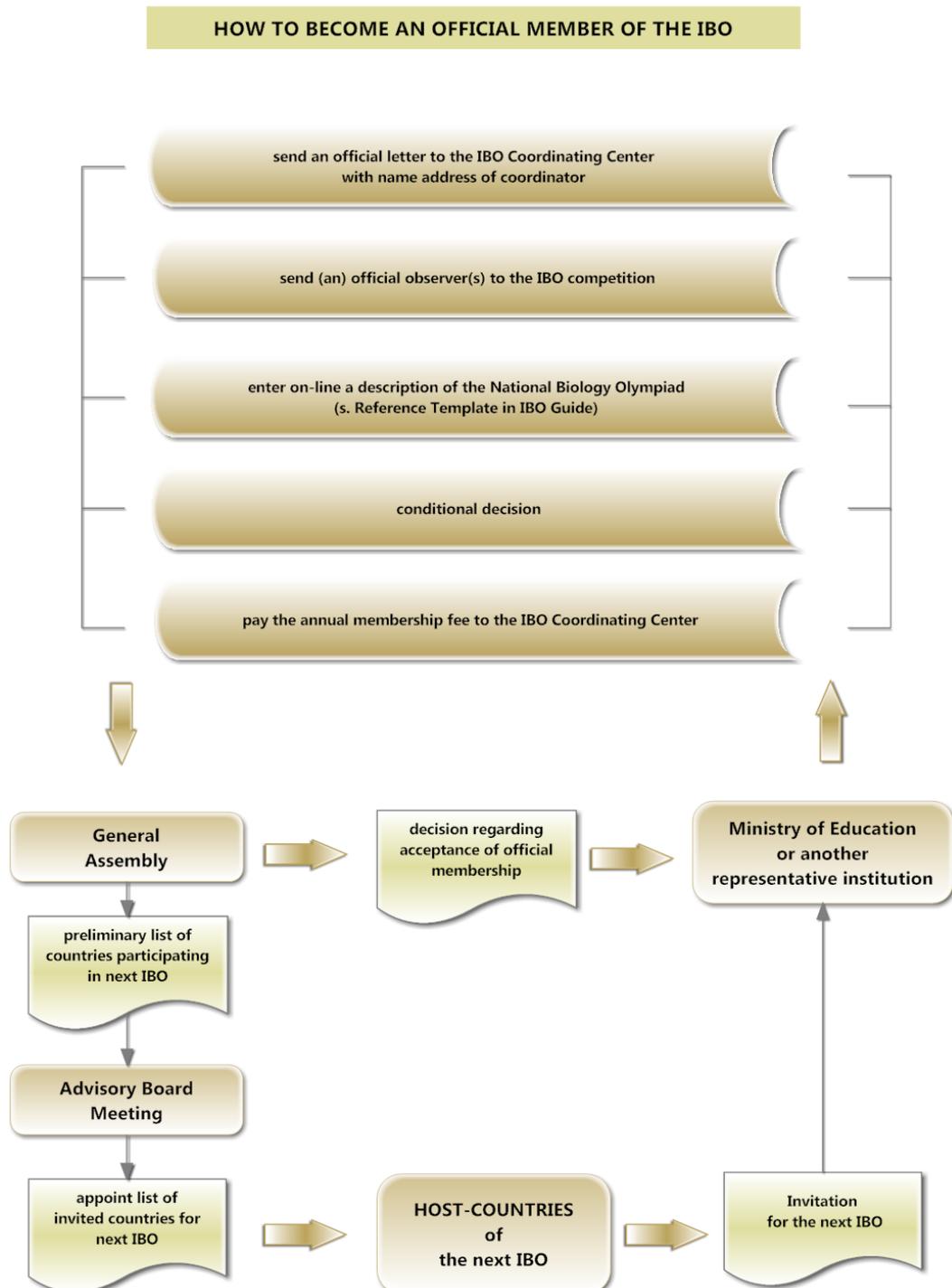
The International Jury should vet and approve the official results together with awards to individual competitors before the official announcement by the host. Medals are awarded based on a mathematical procedure without discussion by the Jury. The results will be proclaimed on an individual basis and not as a national team result. Each competitor will obtain a certificate that recognizes his/her participation in the IBO. In addition to medals, the award of other prizes is possible, if agreed upon in advance by the jury. Medals and prizes must not be of significant material value.

4 Participation in the IBO

4.1 Official membership of the IBO

Official membership starts at the moment when membership duties are fulfilled:

- Supplying a description of their National Biology Olympiad, using the on-line form available on the official IBO-website;
- Providing the CC with an official letter of their Ministry of Education or another representative institution, indicating which person is the official coordinator of the concerned country; and
- Paying the annual membership fee to the CC. (see figure 1 below)



4.2 Future membership, hosts and participation

New IBO member countries can invite an IBO representative to observe and advise about their NBO procedures.

The organizers of the two subsequent IBOs can send two additional jury members providing that these two persons will belong to the official team organizing the future IBO with preferably one of them nominated as the Chairperson of the International Jury.

4.3 Maintaining membership and participation

Every year during the AB meeting the list of countries receiving an invitation for next IBO will be confirmed. Countries not fulfilling their duties will not be invited. Invited countries should confirm their participation by the end of January. The diagram (figure 2) summarizes the duties and rights of IBO members.

The host country will invite all member countries to send an official national team that have fulfilled their IBO requirements (see figure 1).

Each member country is invited to submit test questions for the theoretical part to the host country. Good quality and relevant questions together with the proposed and explained correct answer key should reach the host country by the end of January prior to the actual IBO. Questions are to be copyright-free and available for non-commercial use.

4.4 The role of the Ministry of Education

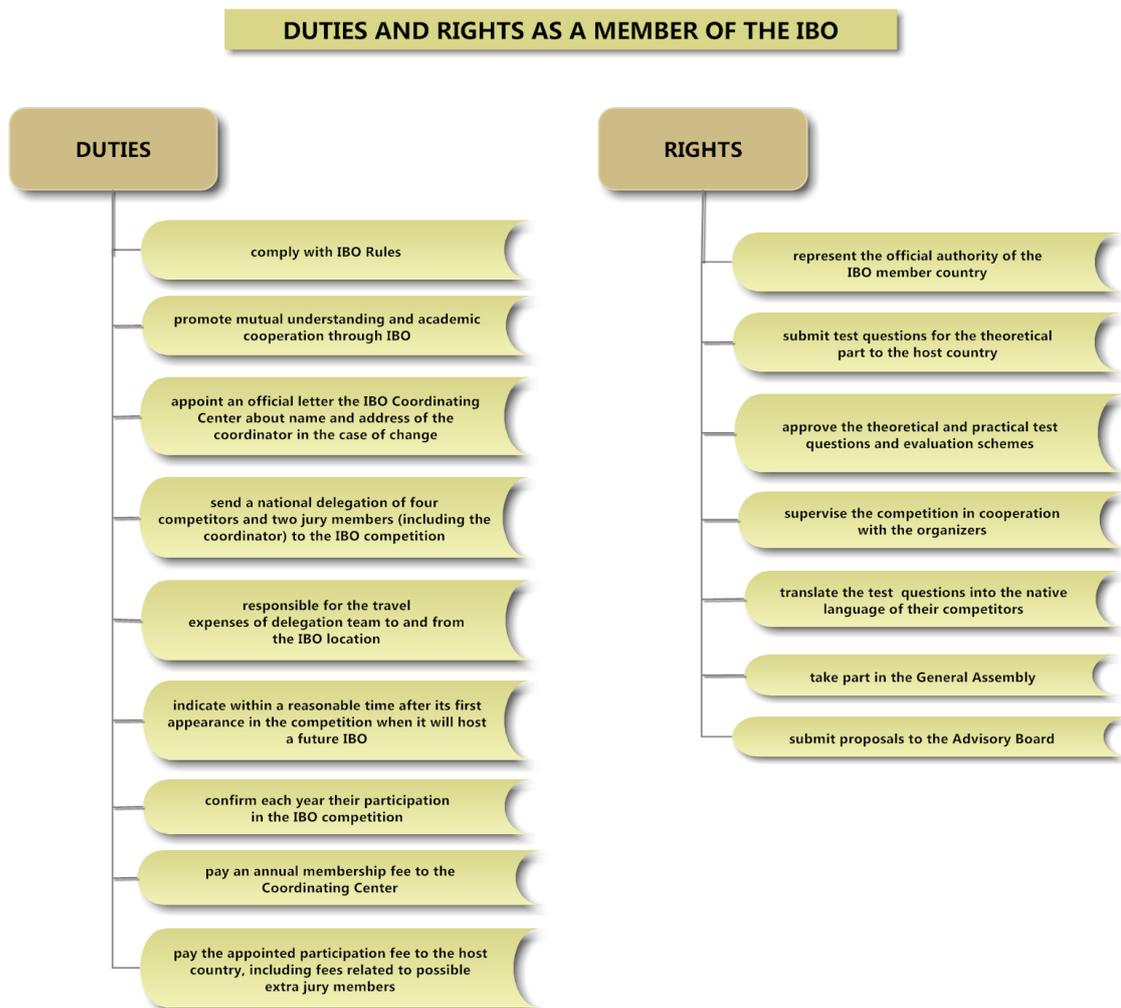
The Ministry of Education, or other equivalent education organization, represents the official authority of an IBO member country, appoints an IBO coordinator and informs the CC. The CC communicates with the officially appointed Coordinator.

4.5 Competitors in the national team

The selected four students participating in the IBO must be participants and winners of the final round of the National Biology Olympiad (NBO), organized in each country in the current school year and in which only students from secondary schools for general education can participate. Within each country, the NBO should be eligible to all schools. International co-operation between countries is possible if clear agreements are formulated in advance and are brought before the Steering Committee (see the Rules in section 4 for further detail).

All delegations participating in the IBO will have to arrange their own travel and insurance for accidents, healthcare and travelling.

Figure 2. Duties and Rights of IBO Members



4.6 The host country

The General Assembly approves the organizing country at least two years ahead. The Ministry of Education or corresponding institution of the organizing country confirms at least one year ahead to the CC its commitment to hosting the IBO.

The organizing country sends an official invitation to Ministries of Education (or the national representative organization) of all member countries. Respective copies should be sent to the CC in Prague and to the coordinators of all invited countries (see the Section on Guidelines for the Host Country for further detail). This letter includes information about the remittance procedure and about any financial consequences of non-payment.

During the IBO, the host country will cover expenses such as accommodation, meals and excursions for competitors and jury members. This includes 3 meals a day except on the official arrival day (only dinner provided) and on the official departure day (only breakfast provided (see Guidelines for the host country for further details).

5. Financial Matters

Each member country is required to pay fees to the CC (equivalent of 8000 CZK) and IBO host country (determined by the host one year before the competition) to participate in the IBO. Non-payment of fees will lead to the exclusion from the competition.

The host country will cover the costs for accommodation and board for delegation members (3 meals per day), and provide for the official Russian translation.

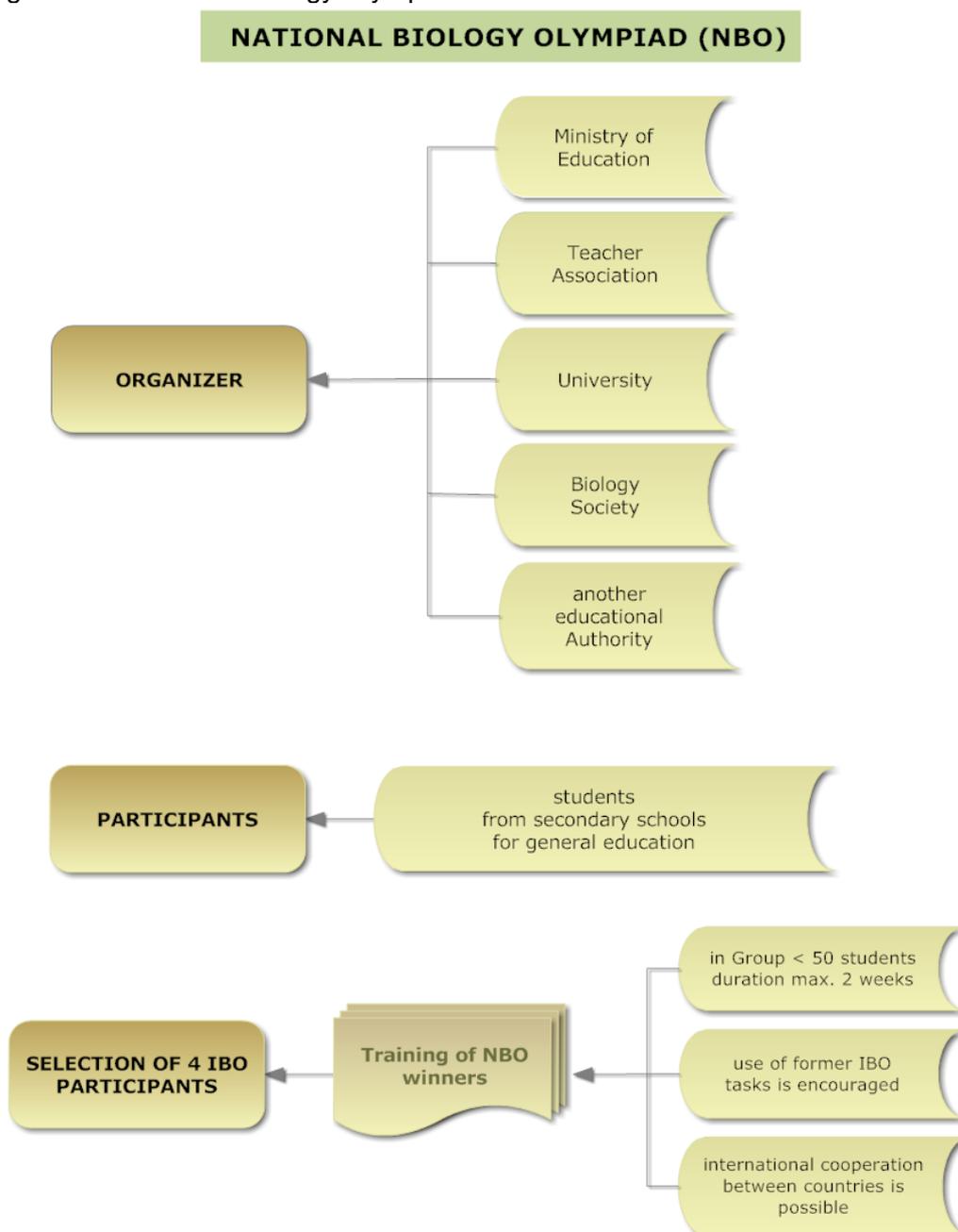
Each participating country has to pay the travel expenses of their competitors and accompanying persons to the competition site in the host country. Expenses of extra jury members and accompanying members are to be covered by the delegating country. This fee is determined by the organizers and specified in the invitation letter.

Financial charges connected with the stay of the representative of the CC are covered.

6. How to set up a National Biology Olympiad

The committee responsible for the NBO may belong to the ministry of education, teacher association, university or even an educational authority such as a foundation for nature preservation, curriculum development or Biology Society (see the following diagram). The four IBO competitors are selected through rounds of local and / or national competition and may be trained together in scientific and biological skills in preparation for the IBO. In order to avoid specialized training, the maximum length of training in a group with fewer than 50 students should not exceed two weeks. The use of complete tasks of former IBOs in national test rounds and for training purposes is allowed, but publication of theoretical and/or practical tasks (particularly on the internet) should not happen within two years after their use in the IBO (see figure 3).

Figure 3. A National Biology Olympiad



7. Rules

7.1 Participation Rules for Member Countries

The Ministry of Education (or similar institution) for each country officially appoints a Coordinator and a deputy, both citizens of that country to lead their competing teams. An official letter to the CC is needed from the ministry (or similar) that confirms the appointment of the Coordinator.

Each Coordinator is to notify the IBO host before 1 May the names and gender of their competitors participating in the IBO. Countries not able to do so should contact the IBO host and clarify their delay. In the case of a change of the national flag of a country the coordinator of this country has to inform the next IBO host and the Coordinating Centre about this change.

Political and/or religious propaganda carried on by teams participating in the IBO is strongly disapproved, judged as a violation of the rules and may lead to exclusion of the delegation concerned. Jury members must not provide any assistance to the competitions during the IBO.

IBO Members need to fulfil the following requirements annually:

- Updated online description of the NBO National Biology Olympiad;
- Payment of the membership fee to the CC;
- Payment of the participation fee to the host country; and
- Communicating changes of the Coordinators to the CC.

The GA decides on acceptance of a country as a regular member of the IBO after the country has sent observers. A country will lose its membership if they do not participate in two consecutive Olympiads, nor offer a reason for their absence, nor conform with the IBO Rules, despite warning from the CC. All principal issues regarding the IBO are debated at the CM. Recommendations of the AB concerning changes to the guide become valid at the end of March each year unless there are objections from other coordinators.

Each member country has to indicate within a reasonable time after its first appearance in the competition when it will organize the IBO.

7.2 Duties of the Organizers (see Guidelines for the host country for further details)

The organizers will ensure:

- Preparation and mailing of invitation letters (including announcement about financial contributions of participants and observers) and information on preparatory tasks of the IBO to member countries and to the CC;
- Preparation of competition tasks, solution and marking of the individual results for the International Jury;
- The marked and assessed original papers, tasks and answer sheets of the competitors will remain in the possession of the organizers who will archive them for a period of two years;
- Material and other requirements necessary for the competition, in accordance with the approved guidelines and rules;
- Observation of secrecy and confidentiality during the competition and safety regulations of all competitors of IBO;
- Supervision during the competition in cooperation with the International Jury;

- Preparation of a final report including evaluation and statistical analysis of the results within one year after the competition.

7.3 Participation Rules for Students

Participation in the IBO is restricted to competitors who:

- Are students of a regular secondary school³ for general education in the country concerned;
- Have not obtained a diploma allowing to study at a university or equivalent institution, before 1 January of the actual competition year;
- Are the winners of the NBO of the current school year in the country they are representing;
- Are not trained or instructed within a selected group of 50 or fewer students comprising the IBO team for a period longer than two weeks;
- Are born on the 1st of July or later of the actual IBO year minus twenty;
- Have not participated already twice in the IBO;
- Have not yet started study at university or an equivalent institution as regular or full time students; and
- Have not participated as observers or jury members in previous IBOs.

Competitors have to bring and sign a declaration confirming the points above (see appendix IV). Coordinators must submit the completed competitor declaration forms to the organizers during IBO registration or may not be permitted to participate in the IBO.

7.4 Participation Rules for Subgroup and Jury Members

The Subgroup comprises at least six Jury members, including the chairperson or another member of the SC *ex officio*, to review the practical and theoretical examinations for at least three working days prior to the IBO week. Practical or paper materials should be made available to the Subgroup, should not leave the meeting room and remain confidential.

The Subgroup will be chaired by the chairperson of the International Jury, who is appointed by the host country of that year. The remaining members will be chosen the previous year by the host country. The host can choose Subgroup members from a list of volunteers, but also keeps the possibility to choose their own members. The stay in the subgroup will be limited to 3 years (counting begins in 2015). Members leaving the subgroup undergo a black-out period of one year.

7.5 Competition Rules

The scientific content of the theoretical and practical part of the competition follows recommendations contained in Appendix I (Content of the Theoretical Part of the IBO) and Appendix II (Basic Skills for the Practical Part of the IBO).

The organizer will inform the GA meeting of the nature of the practical papers for the following IBO, so all countries' Coordinators are informed about the practical areas.

With respect to the practical part:

- Safety regulations need to be observed;
- No experiments should be carried out which cause suffering and / or killing of vertebrates; and

³ The main reference for it is Unesco ISCED-97.

- Handling of species protected by law in the host country or by International Conventions (i.e. CITES) is not permitted.

7.6 Evaluation and Medal Allocation

The final ranking of the competitors is based upon their equally weighted scores for theory and practical tasks according to the t-score method. This is achieved in taking the average of the four standardised t-scores of the practical task and taking the t-score of the total result of the competitors on both theory parts. The final score is the sum of these two. Applying a 'not equal' balance between theory and practical task requires the approval of the International Jury.

Where n = number of competitors, the maximum number of winners = $0.7n + 2$.

Gold medals:

$$w = 0.1n$$

The last gold medal winner is the one preceding the largest gap out of the three which follow the top w competitors.

Silver medals:

$$x = 0.3n$$

The last silver medal winner is the one preceding the largest gap out of the three which follow the top x competitors.

Bronze medals:

$$y = 0.6n$$

The last bronze medal winner is the one preceding the largest gap out of the three which follow the top y competitors.

Certificates of Merit:

$$z = 0.7n$$

The last Certificate of Merit winner is the one preceding the largest gap out of the three, which follow the top z competitors.

Note: re-calculation and medal re-determination procedure after the IBO are possible mainly in cases of disqualification, or procedural errors. Re-calculation will not reduce the medals that other competitors received during the IBO

7.7 Future IBO hosts

Criteria for accepting a future IBO host are:

- An official letter from the Ministry of Education or similar governmental body confirming the willingness of the country to host an IBO;
- Naming the organizations and involved bodies (e.g. universities) with their main tasks;
- Naming the institution, that guarantees the availability of the required finance necessary to carry out the IBO;
- The year, prospective site and fee.

The duties and responsibilities for hosting an IBO are more fully elaborated in a separate document.

APPENDIX I

Theoretical part of the IBO

The IBO theoretical examination should concentrate on biological concepts applied to the majority of organisms of the same group. It should not contain specific facts, exceptions or knowledge about local organisms that require special or local experiences.

The majority of questions should test competitors' understanding, science process skills and application of their biological knowledge. The host country should definitely make every effort to deliver theoretical tasks requiring sound biological understanding, rather than being based upon high-end / cutting-edge knowledge. Questions testing only knowledge should be expelled.

The maximum obtainable points for correct answers of each particular question have to be stated in the examination papers. Questions concerning Principles of Scientific Reasoning and Principles of Biological Methods should be included in the Theoretical test, which should cover the following 7 topics in the indicated proportions.

In the IBO tasks the names of organisms will be the national names (no description) together with the scientific names (Latin) in brackets. Any description instead of name is prohibited. The organizers should construct the questions so that the name of the organism is not a key element for answering; otherwise they should use very well-known organisms (general representatives of a group) mentioned in the list for biosystematics.

I **Cell biology :** (20 %)⁴

Structure and function of cells

- Chemical components
 - Monosaccharides; disaccharides; polysaccharides
 - Lipids
 - Proteins: amino acids, three letter symbol; structure of proteins;
 - . chemical classification of proteins:
simple proteins and conjugated proteins
 - . functional classification of proteins:
structural proteins and enzymes
 - Enzymes
 - . Chemical structure: apoenzyme and coenzyme
 - . Model for enzyme action: enzyme binds with substrate
 - . Denaturation
 - . Nomenclature
 - Nucleic Acids : DNA, RNA
 - Other important compounds
 - . ADP and ATP
 - . NAD⁺ and NADH
 - . NADP⁺ and NADPH
- Organelles
 - nucleus
 - nuclear envelope
 - (nucleohyaloplasm)
 - chromosomes
 - nucleoli
 - cytoplasm
 - cell membrane
 - hyaloplasm

4

Percentage representing points in the test

- mitochondria
- endoplasmatic reticulum
- ribosomes
- Golgi apparatus
- lysosomes
- vacuole membrane
- proplastides
- plastides . chloroplasts
- . chromoplasts
- . leucoplasts (e.g. amyloplasts)

Plant cells are surrounded with a cell wall

- Cell metabolism
 - Breakdown of carbohydrates
 - . Anaerobic break down (anaerobic respiration) of glucose: glycolysis
 - . Aerobic break down (aerobic respiration) of glucose: glycolysis
citric acid cycle
oxidative phosphorylation
 - Dissimilation of fats and proteins
 - Assimilation
 - . Photosynthesis
 - . Light reaction
 - . Dark reaction (Calvin cycle)
- Protein synthesis
 - Transcription
 - Translation
 - Genetic code
- Transport through membranes
 - Diffusion
 - Osmosis, plasmolysis
 - Active transport
- Mitosis and meiosis
 - Cell cycle: interphase (replication) and mitosis (prophase - metaphase - anaphase - telophase)
 - Chromatids, equatorial plate, haploid and diploid, genome, somatic and generative cells, gamete, crossing over
 - Meiosis I and meiosis II.

Microbiology

- Prokaryotic cell organization
- Morphology
- Phototrophy and chemotrophy

Biotechnology

- Fermentation
- Genetic manipulation of organisms

II Plant anatomy and physiology

(15 %)

(with emphasis on seed plants)

Structure and function of tissues and organs involved in:

- Photosynthesis, transpiration and gas exchange
 - Leaf : structure; function stomata

- Transport of water, minerals and assimilates
 - Root : structure (endodermis)
 - Stem : structure (vascular bundles)
- Growth and development
 - Apical meristem and cambium
 - Germination
- Reproduction (ferns and mosses included)
 - Asexual reproduction (clone forming)
 - Sexual reproduction
 - . Structure of flowers
 - . Pollination
 - . Double fertilization
 - Alternation of generation in seed plants, ferns and mosses

III Animal anatomy and physiology

(25 %)

(with emphasis on vertebrates and especially man)

Structure and function of organs and tissues involved in

- Digestion and nutrition
 - Digestive tract (including liver, gall bladder and pancreas)
 - Mechanical and chemical breakdown of food
 - Absorption
 - Food components (water, minerals, vitamins, proteins, carbohydrates and fats)
- Respiration
 - Breathing mechanism
 - Gas exchange
 - Respiratory organs
- Circulation
 - Blood : blood plasma, red blood cells, white blood cells, blood platelets
 - Blood circulation : arteries, capillaries, veins, heart
 - Lymphatic system : tissue fluid, lymph
- Excretion
 - Structure of the renal system
 - Urine production
- Regulation (neural and hormonal)
 - Nervous system : peripheral nervous system, central nervous system (spinal cord and brain), autonomic nervous system (sympathetic and parasympathetic), reflexes, sense organs (eyes and ears)
 - Endocrine system : pituitary gland, thyroid gland, islets of Langerhans, adrenal medulla, adrenal cortex, ovaries and testes
- Reproduction and development
 - Structure and function of male and female reproductive systems
 - Ovulation and menstrual cycle
 - Fertilization
 - Formation of ectoderm, mesoderm, endoderm
 - Embryonic membranes
- Immunity
 - Antigens, antibodies

IV Ethology

(5 %)

- Methodology of Ethology
- Innate and Learned Behaviour
- Communication and Social Organization
- Foraging Behaviour
- Defensive Behaviour

- Mating systems and Parental care
- Biological rhythms

V Genetics and Evolution (20 %)

- Variation : mutation and modification
- Mendelian inheritance
 - Monohybrid cross
 - Dihybrid cross
 - Polyhybrid cross
- Multiple allelism, recombination, sex linkage
- Hardy-Weinberg principle
- Mechanism of evolution
 - Mutation
 - Natural selection
 - Reproductive isolation
 - Adaptation
 - Fitness

VI Ecology (10 %)

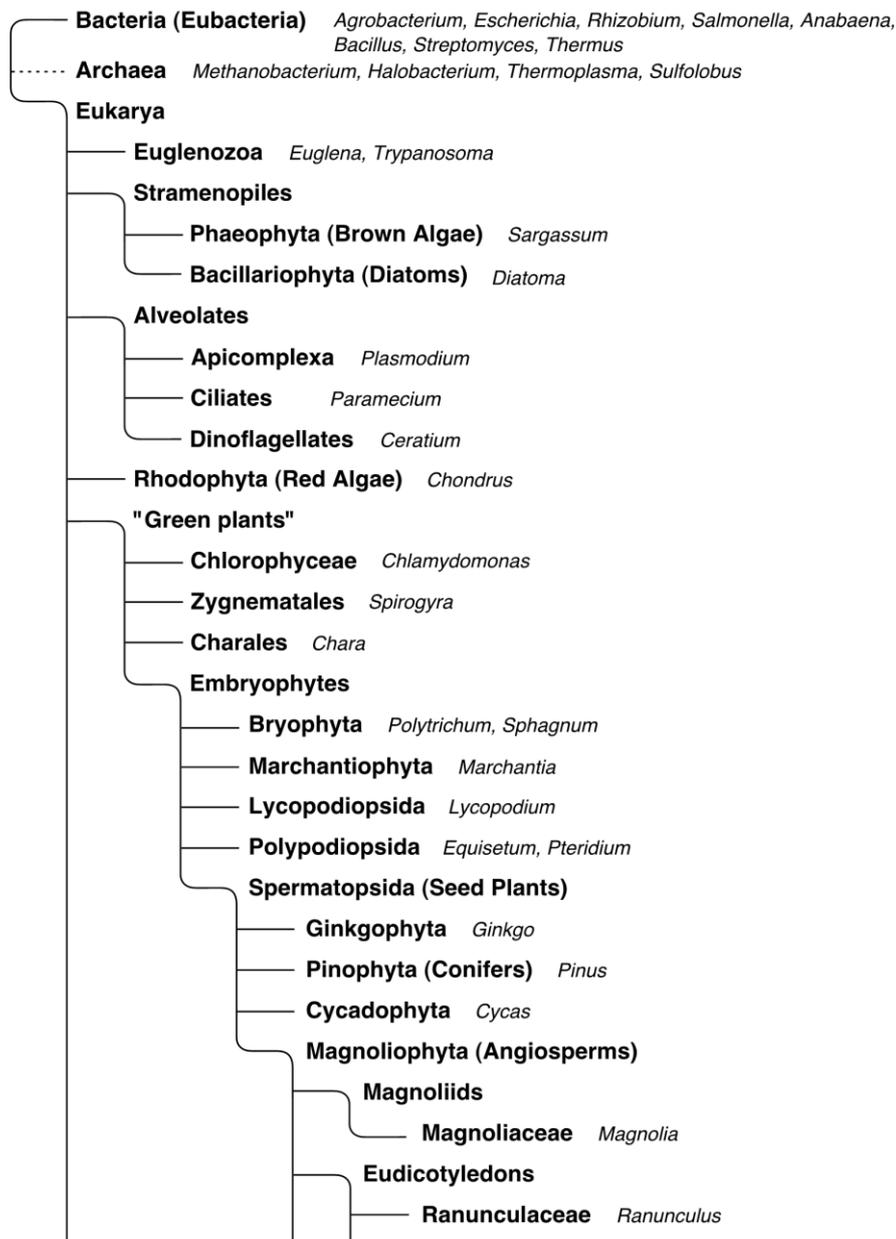
- Individual Organisms
 - Unitary and modular organisms
- Population
 - Population structure
 - . dispersion, age, size and sex structure
 - Population dynamics
 - . birth rate, death rate
 - . exponential and logistic growth, carrying capacity
 - Population regulation
 - . metapopulation dynamics
- Biotic Communities
 - Species richness and diversity
 - Niche, competition exclusion principle
 - Interspecific Interactions
 - . competition, predation, symbiosis
 - Community dynamics
 - . succession
 - Terrestrial biomes
 - Aquatic biomes
- Ecosystems
 - Trophic structure
 - . food webs
 - Trophic levels
 - . producers, consumers, decomposers
 - Energy flow
 - Productivity
 - . gross and net primary productivity
 - . energy transfer efficiencies
 - Matter flux through ecosystems
 - Global biogeochemical cycles
- Biosphere and man
 - Human population growth
 - Pollution
 - . threats to biodiversity
 - . in situ conservation
 - . ex situ conservation

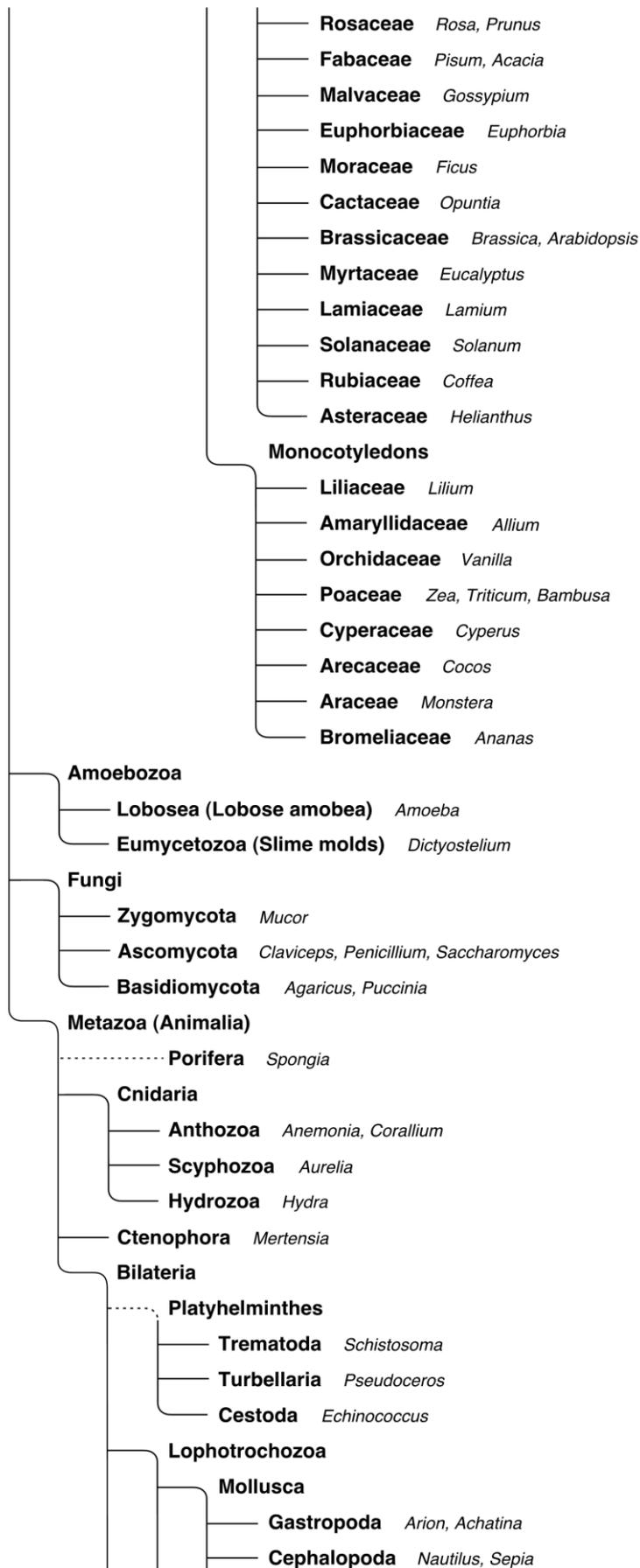
VII BIOSYSTEMATICS**(5 %)**

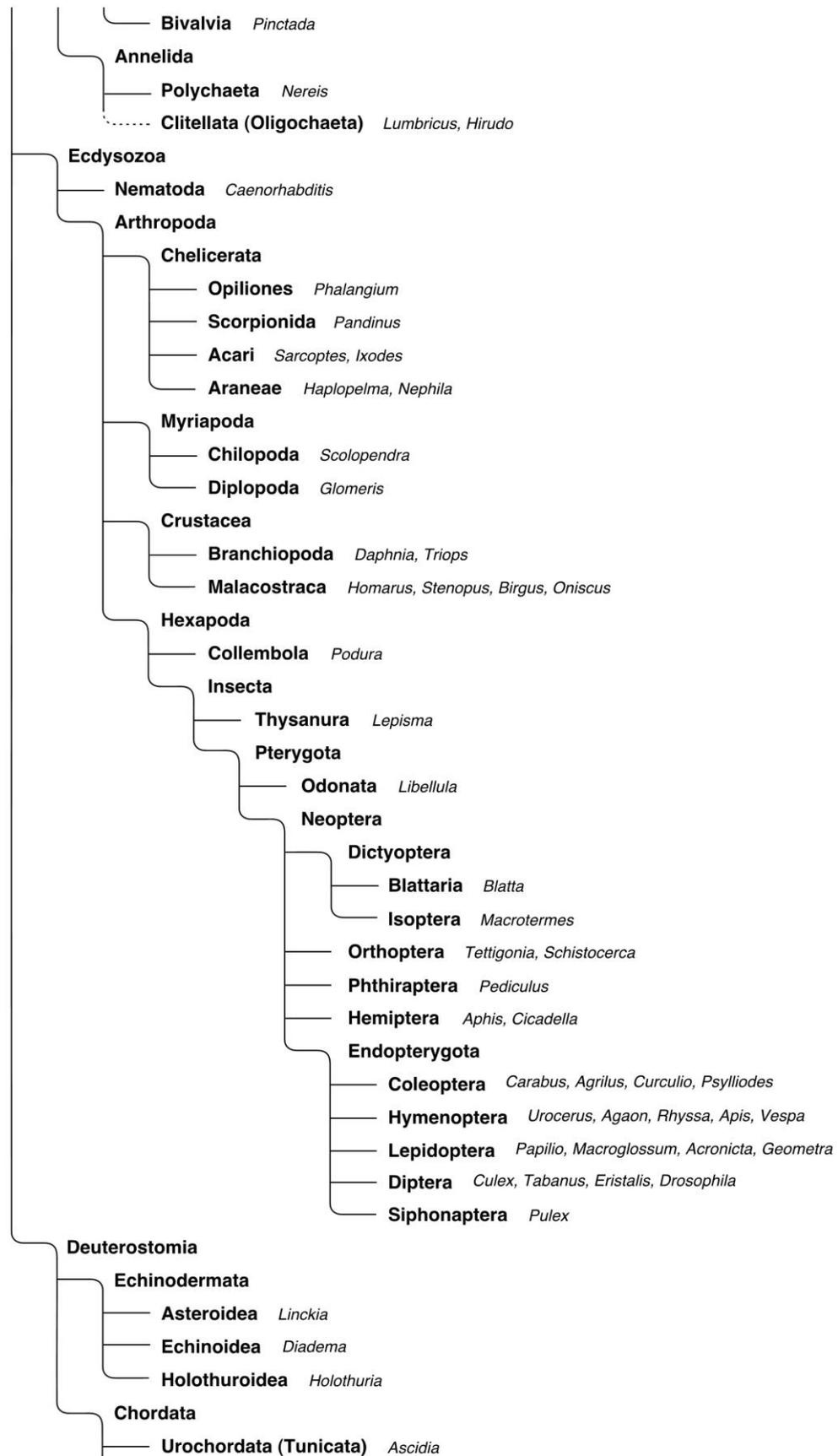
Structure and function, evolutionary and ecological relationships among typical organisms in the following groups. Knowledge of scientific terms will not be required for successful solution of the tasks. However, competitors should know what the named representatives of genera mentioned below look like.

The IBO biosystematics list is an integral part of chapter VII in Appendix I of the IBO-Guide. The list encloses a selection of the most relevant groups of organisms to be known by the IBO competitors. Each of the groups is exemplified by one or several typical genera. The list reflects the current view of the phylogeny of life (June 2011). Its major reference is the Tree of Life web project (<http://tolweb.org>). The list is to be periodically updated.

Please note that the tree represents the relationships between parent and child groups, but not between groups shown on the same hierarchical level.







APPENDIX II

Basic Skills for the Practical Part of the IBO

The IBO practical examination should concentrate on the evaluation of competitors for their ability to solve given biological problems using the following skills.

In the IBO tasks the names of organisms will be the national names (no description) together with the scientific names (Latin) in brackets. Any description instead of name is prohibited. The organizers should construct the questions so that the name of the organism is not a key element for answering; otherwise they should use very well-known organisms (general representatives of a group) mentioned in the list for biosystematics.

I Science Process skills

- 1 Observation
- 2 Measurement
- 3 Grouping or classification
- 4 Relationship finding
- 5 Calculation
- 6 Data organization and presentation: graphs, tables, charts, diagrams, photographs
- 7 Prediction / projection
- 8 Hypothesis formulation
- 9 Operational definition: scope, condition, assumption
- 10 Variable identification and control
- 11 Experimentation: experimental design, experimenting, result/data recording, result interpretation and drawing conclusions.
- 12 Representing numerical results with appropriate accuracy (correct number of digits)

II Basic biological skills

- 1 Observation of biological objects using magnifying glasses
- 2 Work with a microscope (objective max. 45 x)
- 3 Work with a stereomicroscope
- 4 Drawing of preparations (from a microscope, etc.)
- 5 Exact description of a biological drawing using tables of biological terms marked with a numerical code

III Biological methods

Competitors in the IBO should know the following methods and be able to use them. If any method requires extra specific information concerning procedures that depend on special technical equipment, instruction will have to be provided.

A Cytological methods

- 1 Maceration and squash technique
- 2 Smear method
- 3 Staining of cells and slide preparation

B Methods to study plant anatomy and physiology

- 1 Dissection of plant flower and deduction of flower formula
- 2 Dissection of other plant parts: roots, stems, leaves, fruits
- 3 Free - hand sectioning of stems, leaves, roots
- 4 Staining (for example lignin) and slide preparation of plant tissues
- 5 Elementary measurement of photosynthesis
- 6 Measurement of transpiration

C Methods to study animal anatomy and physiology

- 1 Dissection of invertebrates.
Dissection of fish or parts or organs from vertebrates bred for the consumption is allowed, too.
Animals being used, as dissection material should be dead before being submitted to the competitors.
- 2 Whole - mount slide preparation of small invertebrates
- 3 Elementary measurement of respiration

D Ethological methods

- 1 Determination and interpretation of animal behaviour

E Ecological and environmental methods

- 1 Estimation of population density
- 2 Estimation of biomass
- 3 Elementary estimation of water quality
- 4 Elementary estimation of air quality

F Taxonomic methods

- 1 Use of dichotomous keys
- 2 Construction of simple dichotomous keys
- 3 Identification of the most common flowering-plant families
- 4 Identification of insect orders
- 5 Identification of phyla and classes of other organisms

IV Physical and chemical methods

- 1 Separation techniques: chromatography, filtration, centrifugation
- 2 Standard tests for monosaccharides, polysaccharides, lipids, protein (Fehling, I₂ in KI(aq), biuret)
- 3 Titration
- 4 Measuring quantities by drip and strip methods
- 5 Dilution methods
- 6 Pipetting, including use of micropipettes
- 7 Microscopy, including use of counting chambers
- 8 Determination of absorption of light
- 9 Gel electrophoresis

V Microbiological methods

- 1 Preparing nutrient media
- 2 Aseptic techniques (flaming and heating glass material)
- 3 Inoculation techniques

VI Statistical methods

- 1 Probability and probability distributions
- 2 Application of mean, median, percentage, variance, standard deviation, standard error, T test, chi-square test

VII Handling equipment

Due to differences in the equipment between IBO member countries, these skills can only be evaluated if the competitors have been informed beforehand about the algorithm, how to use the equipment, how to proceed with a particular experiment...

APPENDIX III

Reference template for on-line National Biology Olympiad description (www.ibo-info.org)

This document describes the information a national coordinator should collect for filling-in a convenient on-line description of your National Biology Olympiad.

Name of the country

...

Name of the NBO

...

Established

In which year the NBO was established.

Website URL

<http://>

Website language

...

Olympiad promotion

- How and when are teachers, students, schools, press informed about NBO?
- Indicate what kind of stuff (letters, posters, leaflets, brochures, etc.) are used to promote participation in NBO
- Who is sending this information?

Organization, structure, categories and rounds

- Which institution is the main organizer?
- How many rounds do you have?
- When is the 1st, 2nd, 3rd,... round?
- Which institution is the host of the final round?

Tests

What type of tests do you have in round 1, round 2, round 3, etc.? (multiple choice, essay, oral, portfolio, practical, etc.)

- Which institution or group is producing the tests for round 1, round 2,..etc?
- Where do students take the test of round 1, round 2, round 3, etc. e.g. school, university, biology camp, etc.)?

Student training

In preparing for NBO and IBO student do extra study and receive extra training. Estimate how many days extra training + study the students have:

- At home:
- At school:
- At special training camp:
- Bio summer camp:
- University:
- somewhere else:

Study materials

What kind of special materials are developed or available for students helping them to score better in the National rounds or to prepare for the IBO? (e.g. high school textbooks, special designed NBO syllabus, university textbooks (Campbell, etc.), syllabus of lecturers, web based courses, tests (former IBO's and NBO's).

Awarding of students, prizes

What kind of award and prizes do you offer NBO-winners and or schools? Which value? Money? Examples: medals and certificates, free entrance to university, science books, PC, DVD player, camera, microscope, scholarships, money.

Media coverage

Indicate which media are involved to inform people, schools, students etc. about the biology Olympiad procedures, results of students and/or schools, medals at IBO... Think about local/national TV, journals, newspapers, etc.

Support / resources

- Which institutions are sponsoring and
- How do they support (e.g. money, prizes, organization, lectures, study materials,)
Remark: Include support of Ministry of Education?

IBO coordinator

name, address and email are required

Official institution

Name and address of prominent representative national institution *appointing* the Coordinator (not just the university / college where the coordinator is working)

Statistics over the year

Which % of schools/students participated in the last five years in the NBO?

Standard school year

From: (Month of the school year beginning)

To (Month of the school year ending):

Biology hours/week

Minimum: Maximum:

(Common for the students going for the NBO).

Logo & Files

Description of attached images

Describe what kind of letters, posters, leaflets, brochures, etc. are used to promote participation in the NBO.

Logo

If possible, attach an example of the NBO logo.

Poster

If possible, attach an example of the NBO poster (as image or pdf).

Leaflet

If possible, attach an example of the NBO leaflet (as image or pdf).

APPENDIX IV⁵

IBO host
Logo

INTERNATIONAL BIOLOGY OLYMPIAD Declaration form for competitors



Please fill in CAPITAL LETTERS.

Country: _____
First name: _____ Family name: _____
Date of Birth: _____ (dd-mm-yyyy)

I, as a competitor of the IBO _____ in _____ declare that:
(year of IBO) (location of IBO)

- I am (I was until _____) a student of a regular secondary school for general education in the country concerned
- I have not obtained a diploma allowing to study at a university or equivalent institution before the 1st of January of the actual competition year;
- I am one of the winners of the National Biology Olympiad of the current school year of the above-mentioned country;
- I was not trained or instructed within a selected group of 50 or fewer students comprising the IBO team for a period longer than two weeks;
- I was born on the 1st of July of <the IBO year minus 20> or later;
- I have not participated already twice in the IBO;
- I have not yet started study at university or equivalent institution as regular or full time student;
- from 14:00 on the day before the Practical task until the end of the Theoretical task I will have registered and hand in my personal electronic communication devices;
- I agree to be photographed or filmed during the IBO; the organizers may use those images freely for IBO promotion purposes (no commercial use);
- I understand that I can be disqualified if I don't comply with one of the above-mentioned declarations.

Date and signature of competitor _____

SCHOOL INFORMATION

Name of school _____
School address _____
School phone and fax _____
School e-mail _____
Name of school principal _____

I as the principal of this school declare that the information given by the above mentioned student is entirely correct.

Date and signature of the principal _____

(Please certify with the school stamp)

⁵ At least a PDF copy of this filled-in form must be provided to the IBO organizing country.

APPENDIX V: List of member countries

The year of the first participation in the Olympiad is indicated in brackets.

Belgium	(1990)	Iran	(1999)
Bulgaria	(1990)	Mexico	(1999)
Czechoslovakia	(1990-1992)	Chinese Taipei	(1999)
Germany	(1990)	India	(2000)
Poland	(1990)	Indonesia	(2000)
Soviet Union	(1990-1991)	Singapore	(2001)
The Netherlands	(1991)	Slovenia	(2001)
Sweden	(1991)	Cyprus	(2002)
Thailand	(1991)	USA	(2003)
Australia	(1992)	Canada	(2004)
Belarus	(1992)	Brazil	(2005)
Turkey	(1992)	Denmark	(2005)
Russia	(1992)	Greece	(2005)
Ukraine	(1992)	Japan	(2005)
China	(1993)	New Zealand	(2005)
Czech Republic	(1993)	Nigeria	(2005)
Slovak Republic	(1993)	Spain	(2006)
Azerbaijan	(1994)	Pakistan	(2006)
Kazakhstan	(1994)	France	(2007)
Kuwait	(1995)	Liechtenstein	(2007)
Kyrgyzstan	(1994)	Lithuania	(2007)
Latvia	(1995)	Italy	(2008)
Tajikistan	(1995)	Sri Lanka	(2009)
Turkmenistan	(1995)	Armenia	(2009)
Argentina	(1996)	Hungary	(2010)
Vietnam	(1996)	United Arab Emirates	(2010)
Finland	(1997)	Georgia	(2011)
Mongolia	(1997)	Montenegro	(2012)
Romania	(1997)	South Africa	(2012)
Estonia	(1998)	Costa Rica	(2013)
Ireland	(1998)	Portugal	(2014)
Korea	(1998)	Syria (accepted but absent in 2015)	
Moldova	(1998)	Luxembourg	(2015)
United Kingdom	(1998)	Malaysia	(2015)
Switzerland	(1999)		

New member countries accepted in 2015 and invited to participate for the first time in 2016 (provided fulfilling the associated duties) are: Bangladesh, Egypt, Iceland, Norway. The list of countries having organized an IBO in the past can be found on page 6 (History).

The next scheduled organizers are Vietnam (2016), UK (2017), Iran (2018), Hungary (2019) and Japan (2020). A list with addresses can be obtained from IBO website.

APPENDIX VI: List of GHS hazard pictograms

SGH01		Explosive
SGH02		Flammable
SGH03		Oxidizer
SGH04		Gas under pressure
SGH05		Corrosive
SGH06		Toxic
SGH07		Toxic, irritant, sensitizing, narcotic
SGH08		Sensitizing, mutagenic, carcinogenic, reproductive toxicity
SGH09		Danger for aquatic life