

HUNGARIAN NATURAL HISTORY MUSEUM, BUDAPEST, HUNGARY

Flying in nature plants and animals

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Part 1 Basic Information

Participant institutions

Hungarian Natural History Museum, 1083 Budapest, Ludovika tér 6. Contact: Judit Holler, tel. 36-1-303-6193, holler@edu.nhmus.hu.

Primary schools

- *Bárdos Lajos*. 1117 Budapest, Baranyai u. 16/18., contact person: Csilla Tímár-Geng, tel. 36-1-385-1788.
- *Herman Ottó*. 1137 Budapest, Radnóti M. u. 35, contact person: Zsuzsa Treiber, tel. 36-1-350-6953
- *Németh László*. 1084 Budapest, Német u. 14, contact person: Erzsébet Dobcsányi, tel. 36-1-314-0642
- *Kőrösi Csoma Sándor*. 1091 Budapest, Ifjúmunkás u. 13, contact person: Judit Németh, tel. 36-1-282-6484
- *Molnár Ferenc*. 1095 Budapest, Mester u. 19, contact person: Gyöngyi Dufek, tel. 36-1-216-0056.

Aims

The activity introduces different aspects of flying to students 8-12 years old. A major advantage of the topic is that it can be easily incorporated into various disciplines (biology, physics, literature, art, music, technology, etc.). However, since the students rely on the resources of the museum, flying in nature was chosen as the central theme. As far as the content is concerned, the main objective of the activity is:

- To familiarize students with why and how different plants and animals fly.
- To find examples of flying in various species.
- To find similarities and differences among the flying structures and techniques found in nature.
- To compare and contrast human and natural solutions of flying.

General methodological aims:

- To familiarize students with object-based learning. The museum's special characteristics determine the adopted approach to the activities. Since the museum is a place with interesting, unique, rare but often ordinary objects as its main attractions, the activities should centre around the objects themselves, the story (or multiple stories) they tell.
- To encourage cooperation.
- To help learning through observation and discovery.
- To work independently.
- To develop problem solving.

Materials

Materials used during the activity are:

- Posters (Flying in the Fairy Tales, Flying in Myths, Flying Mammals, Sequence of Flying, Bird Migration, Predator and Prey).
- Activity sheets.
- Hands-on objects:
 - Bird team: stuffed bird (hawk), feathers, wing, skull of pigeon and marten.
 - Insect team: butterfly, dragonfly, grasshopper and beetle in an insect box.
 - Plant team: winged seeds (maple, pine, and lime-tree), umbelliform seeds, heavy seeds (no "wings").
 - Bat team: stuffed bat with one wing open.
- Pictures: drawing of bird wing and bat skeleton, microscopic photographs of pollens, pictures of flying machines glued on magnetic sheets, silhouette of bird, butterfly, winged seed and bat.

- Magnifying glass (for studying the structure of feathers and insect wings).
- Pencils.
- Double weight paper sheets.
- Paper glue.
- Cellophane sheets.
- Toothpicks.
- Balloon, wooden propeller, origami plane.
- Magnetic board.
- Jug of water.
- Rope.

Part 2 Description of the project

Preparation of the visit

Ideally, both teachers and students should come prepared for the activity. The teachers are informed about the topic and the structure of the activity at a personal meeting in the museum, by phone or e-mail. Before coming to the museum the teachers are asked to encourage students to search for examples of flying in various disciplines and bring them to the museum (they can prepare a poster or an object of crafts, made individually or in a team, learn poems and songs).

Visit to the museum

The activity in the museum starts with a discussion based on the material prepared by the students (drawings, crafts object, poems, songs, etc.). This way the students are personally involved in the activity from the beginning and they are encouraged to draw on their knowledge. The questions asked from the students should lead them to think about what is necessary for flying (Time: about 10 min.).

In the next stage of the activity the students form groups of 4-6 and they go to one of the four work stations where they are given tasks and instructions on activity sheets related to the flying of birds, insects, plants, and bats. Each team is given two groups of instructions and works on different topics with a variety of methods (observation, experimentation, grouping, measurement, creative activity, etc.) (Time: 15-20 min.).

In the first group of questions the students search for the reason why certain animals fly. They can choose from several pre-set answers (e.g. to search for food, to easily escape from predators, etc.) or propose their own ideas.

The second group of instructions and questions is related to the anatomy and technique of flying. The tasks vary from team to team.

- Bird team: students examine the wing, the feather and the bones of birds. Then they look at the structure of the feather with a magnifying glass to find out how the small parts are connected to each other. Finally, they compare the weight of the skeleton of flying and non-flying animals of similar size. This team is encouraged to find examples of non-flying birds and think about why these birds cannot fly.
- Insect team: students are asked to find the order of the stages of butterfly metamorphosis and tell on the basis of pictures why in the last stage the animal is able to fly. They are encouraged to examine closely the structure of different insect wings and make comparisons. In the end, they can prepare their own insect wing using toothpicks and cellophane paper.
- Plant team: at this workstation students have to guess which among the shown pods and seeds can fly the longest way. They are asked to give reasons for their guesses. To test their hypotheses, they make an experiment with the help of a pump. Finally, students are given several pods and seeds and they sort out the good flyers and search for characteristic shapes also found among man-made structures. In an optional experiment, students can explore the world of pollens.
- Bat team: this team examines flying mammals, as well as reptiles, amphibians and fish. First, they closely look at a spread bat wing to see its size and structure. On a sketch of a bat skeleton they can draw the skinned area of the wing. Next, they are shown pictures of other "flying" animals and have to decide whether they fly on their own or only can glide.

After the teams finish at the work stations, they take their activity sheets in which they find instructions to search for and compare specific examples related to their topics in different sections of the exhibition. (Time: about 10 min.)

In the summary session, the guide and the students discuss the activity sheets, summarise the major topics and are given the opportunity to compare and contrast flying in nature and human efforts to fly

(man-made flying equipments). In the end, the pupils are asked to stand up and form a feather with the help of a rope. They symbolize the structure of the feather of a flying bird by holding on to each other (to create a homogeneous surface). Together they “fly out” of the activity room. (Time: 15-20 min.).

Follow-up work (in the museum and/or in the classroom)

Most teachers conduct the follow-up work in school. This helps the students combine the knowledge and experience gained in the museum with what they learn in class.

Evaluation tools

The activity was evaluated formally by the teachers. They received a questionnaire asking about the positive and negative aspects of the activity. In some cases, teachers gave a feedback in person, during informal meetings. Unfortunately, we did not collect the pupils opinion systematically, although it is important to know what the children experienced during these visits. However, the teachers were encouraged to reflect on the activity on the basis of their conversation and follow-up work with the students.

Obstacles, facilitators, innovative aspects

There are several lessons to be drawn from this project. First of all, the museum visit is a unique occasion for a school group. If participating in a museum activity corresponds to their first visit in the institution, the students should be familiarised with the museum and its exhibitions first. The activity goes more smoothly if the participants have a basic knowledge of the surroundings.

Obstacles

- If a school group comes for the visit, we have to be prepared for more than 25 children (the ideal number would be 20 or less). It means that the activity should be set up so as the children would be able to work independently in small groups, helped by the guide and/or the teacher. However, in the Hungarian educational system, the majority of primary school students are not used to independent group-work; occasionally even forming groups could cause problems for them.
- We realised that we have to reduce the number of new concepts because their introduction takes more time than available. Since lower primary school children are used to one or two teachers in the course of the school year, hearing unfamiliar instructions and vocabulary can confuse them. Ideally, the teacher not only accompanies the group but gets involved in the activity in order to help overcome these problems.
- The Natural History Museum is filled with static objects (stuffed animals and bones, rocks and minerals, herbarium pages and fossils) which conflicts with the dynamic topic ‘flying’. It required additional material to be prepared: models and tools for demonstrative purposes. These combined with the hands-on objects provided a fuller experience for the students.

Facilitators

- The museum provides a learning environment which is very much different from the classroom experience. It does not want to and cannot replace the school. The museum activities must correspond to this special milieu but are more than mere museum visits.
- It is important to note that students who had dealt with some aspects of the topic beforehand enjoyed the activity very much, and could engage better in the process than those who came unprepared.
- The activity was designed to be flexible. Different age groups can be engaged in an activity by different methods and tools. The level of the activity sheets and the tasks are easily adaptable to the needs of the children. More games and playful tasks were given to the younger students. The older ones could deal with more serious topics as well.
- The hands-on objects provided a special experience for the students. It is not very common that one can touch the skull of a bird and compare it to that of a mammal. To closely examine a bat with a spread wing is not an everyday experience.
- The interdisciplinary aspect of the preparatory and follow-up activities was very useful, since it broadened the students' mind and made them more receptive to the topic.

Innovative aspects

- Creating a co-operative relationship between the museum and schools. We developed the activity together with teachers, which gave an opportunity for both parties to learn more about the working methods of the other. In the early stages of activity design, we consulted elementary school teachers about the European project. We discussed ways of connecting the topic of the

activity to the curriculum. When the major elements of the activity were set up, we invited a group of teachers and museum educators and gave them a demonstration. They filled out a questionnaire in which they gave their opinion on the methodology. Their feedback greatly contributed to the way the activity developed later.

- What's next? The series of museum classes is not over yet. On the basis of the lessons we learned by testing the project we modified the content and structure of the activity, the methods, tasks and activity sheets applied. We are open to more school groups who are interested in participating in this unique form of museum visit.

Appendix

- Activity sheets.