Youth Science Canada
Sciences jeunesse Canada

**Document Name** Use of Vertebrate Animals, Cephalopds & Decapod Crustaceans in Research
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# Policy: Use of Vertebrate Animals, Cephalopods, and Decapod Crustaceans in Research

## 1 Introduction

1.1 Definition of a Vertebrate Animal.

A vertebrate is an animal with a backbone. This group consists of several broad classes: fish, amphibians, birds, reptiles, and mammals. The word vertebrate refers to the bony vertebral column. All classes of vertebrate have developed brains, internal skeletons to which muscles can attach, two eyes, closed circulatory systems, and muscular mouths. (Ref. 1)

a) Cephalopods are invertebrates with large, vertebrate-like central nervous systems, including squid, octopus, and cuttlefish.

b) Decapods are invertebrates and are an order of Crustaceans with multiple nerve centres (ganglia), including crabs, lobsters, crayfish, and shrimp.

c) This Policy applies to vertebrate animals, cephalopods, and decapod crustaceans.

1.2 These rules apply to all live non-human vertebrate animals. In addition, they also apply to (Ref. 2):

a) Live, nonhuman vertebrate mammalian embryos or fetuses

b) Tadpoles

c) Bird and reptile eggs starting three days (72 hours) prior to hatching

d) All other nonhuman vertebrates (including fish) at hatching or birth.

Exception: Because of their delayed cognitive neural development, zebrafish embryos may be used up to seven days (168 hours) post-fertilization and not be considered vertebrate. However, regardless of time of treatment, those surviving past 7 days are considered vertebrate animals and the entire study is subject to Vertebrate Animal rules.

If embryos are incubated until the end of the gestation period, the offspring must be reared normally.

1.3 Gaining an understanding, and contributing to the knowledge, of living processes motivates a relatively large number of students to engage in inquiry-based, project-oriented studies involving biological experimentation with animals. Such studies provide an opportunity to lead students to respect all living things and to educate students on the laws, regulations, and procedures that govern experimental research involving animals.

1.4 Student investigations of biological processes are subject to the prevailing provincial and federal laws, ethics, and regulations, as well as to Youth Science Canada policies and regulations.

1.5 All aspects of a project involving biological experimentation with animals must be within the comprehension and capabilities of the student undertaking the study.

1.6 All STEM projects involving animals must have scientific merit, have educational value, and avoid gratuitous harm.

1.7 Youth Science Canada reserves the right to disallow a project involving experimentation on vertebrates (including cells, animal parts, or embryos), cephalopods, or decapod crustaceans that is of questionable scientific or educational value or is judged to be unethical.

## 2 Definitions of Student Researcher, Adult Supervisor and Scientific Supervisor

2.1 A *Student Researcher* is the person primarily responsible for the project. This student makes observations, takes appropriate data, and analyses it to draw conclusions.

2.2 The *Adult Supervisor*, a parent, teacher, professor or scientist, is responsible for ensuring that the student is aware of the ethical issues involved in the project and provides guidance and advice to ensure that Youth Science Canada policy is followed. The Adult Supervisor is responsible for ensuring that the student's research is eligible for entry into the CWSF and related or other events sponsored by Youth Science Canada. Every project involving the participation of humans or the use of animals requires an Adult Supervisor.

2.3 The *Scientific Supervisor*, who will usually have an advanced degree, is involved in a complex project involving animals, which often takes place in a university, institutional, industrial or government laboratory. The Scientific Supervisor is responsible for ensuring that (a) all provincial and federal laws governing safety, handling of materials, and procedures are followed; (b) all applicable policies concerning research ethics and the use of animals are known to the student and adult supervisor and are followed. The Scientific Supervisor may be the Adult Supervisor.

## 3 Canadian Council on Animal Care (CCAC) Guidelines

3.1 The use of animals in experimental research and the associated care of animals in Canada is subject to the requirements of the Canadian Council on Animal Care (CCAC), a national, peer review organization founded in Ottawa in 1968. (Ref. 3)

3.2 Mandate: Acting in the interest of the people of Canada, the CCAC advances animal ethics and care in science by:

a) developing science-informed standards that incorporate expert opinion, the values of Canadians, and strategies to reduce the need for, and harm of, animals in science, while promoting their wellbeing;

b) encouraging the implementation of the highest standards of ethics and care for animals in science in collaboration with the animal care community and scientists across Canada;

c) providing assessment and certification programs that empower scientific institutions in achieving high standards of animal ethics and care; and

d) providing education, training, and networking opportunities to support individuals, animal care committees, and institutions in implementing our guidelines and sharing best practices in the oversight of animal ethics and care in science. (Ref. 4)

3.3 Ethics of Animal Investigation

a) The use of animals in research, teaching, and testing is acceptable ONLY if it promises to contribute to understanding of fundamental biological principles, or to the development of knowledge that can reasonably be expected to benefit humans or animals. Animals should be used only if the researcher's best efforts to find an alternative have failed. A continuing sharing of knowledge, review of the literature, and adherence to the Russell-Burch "3R" tenet of "Replacement, Reduction and Refinement" are also requisites. Those using animals should employ the most humane

methods on the smallest number of appropriate animals required to obtain valid information.

3.4 Pre-University Use of Animals

a) Animal use in the school is subject to the requirements of legislation such as the Health of Animals Act (Bill C66), the Criminal Code of Canada, Section 446, Cruelty to Animals, and provincial legislation, where such exists.

## 4 Russell-Burch 3R Tenet - Replacement, Reduction and Refinement

4.1 In 1954, William Russell, a brilliant young zoologist who happened to be also a psychologist and a classical scholar, and Rex Burch, a microbiologist, inaugurated a systematic study of laboratory techniques in their ethical aspect. This led to publication in 1959 of The Principles of Humane Experimental Technique, in which they classified humane techniques under the headings of Replacement, Reduction, and Refinement - now commonly known as the three Rs. In some ways this elegant classification was 25 years ahead of its time. Today the three Rs are widely used by all responsible scientists and one hardly ever reads or hears a discussion on laboratory animal welfare that does not refer to them. The complete text of the book is available online. (Ref. 5)

a) Reduction is a concept that covers any strategy that will result in fewer animals being used to obtain the same amount of information, or in maximizing the information obtained per animal and thus limiting or avoiding the subsequent use of additional animals.

b) Refinement signifies the modification of any procedures that operate from the time a laboratory animal is born until its death, so as to minimize the pain and distress experienced by the animal, and to enhance its wellbeing.

c) Replacement refers to any experimental system that does not entail the use of a whole, living animal.

## 5 Ethics Review Requirements

5.1 Youth Science Canada requires that all projects involving vertebrate animals entered in the Canada-Wide Science Fair, a Youth Science Canada affiliated Regional STEM Fair, or related or other event under its auspices, comply with the CCAC guidelines in the conduct of biological research.

5.2 This policy applies to every project that involves vertebrates, cephalopods, or decapod crustaceans.

5.3 For complex projects, often carried out in a research laboratory licensed to do such studies, the ethics review process must involve (i) the student's Scientific Supervisor, who will usually be a staff member at the laboratory, and (ii) a member of the Ethics Committee of the Regional STEM Fair. This will provide the student researcher with an appreciation of the requirements and safeguards existing in law regarding experimentation involving animals. Projects carried out in a licensed research laboratory must have the approval of the committee charged with approving such projects within the institution, (i.e., the Scientific Review Committee (SRC)). The rules of the research institution may be more stringent than the rules given here and must be followed. Projects may also be referred to the Youth Science Canada National Ethics and Safety Committee. Students and their supervisors involved in projects that use vertebrates, cephalopods or decapod crustaceans must follow the process described in Section 7.

5.4 Laboratories licensed to do studies that involve the use of animals include university, hospital, institutional, industrial or government laboratories.

5.5 The Use of Vertebrate Animals Approval Form must be submitted to the Canada-Wide Science Fair at registration for any project involving the use of vertebrate animals, cephalopods, or decapod crustaceans.

## 6 Use of Animals in Projects

6.1 The Adult Supervisor is responsible for ensuring the safe and ethical conduct of projects involving the use of animals. Youth Science Canada strongly recommends that a Regional STEM Fair Ethics Committee review all proposed research involving animals **before experimentation is started**. Projects involving animals that are deemed to be unethical may be disqualified.

6.2 Student Researchers or their supervisors who are unsure about the acceptability of a proposed project must contact their Regional STEM Fair ethics chair, who can access appropriate authorities familiar with current regulations and with relevant aspects regarding scientific merit, and provide guidance and suggestions in performing the work.

## 7 Vertebrate Animals, Cephalopods, and Decapod Crustaceans

7.1 Vertebrate animals, (e.g., fish, amphibians, reptiles, birds, and mammals), Cephalopods (e.g., squid, octopus and cuttlefish), and Decapod Crustaceans (e.g., crabs, lobsters, crayfish, and shrimp) may only be used in a STEM project if they fall within one of the following four cases:

a) Observation of animals in zoological parks, farm animals, and pets is permitted. Observation of wild animals is permitted, except for those at risk. Species listed as *Endangered*, *Threatened* or *of Special Concern* (Ref. 6) are not suitable subjects for STEM projects unless all observations are remote, there is no interaction with the subjects, and there is no manipulation of the animal environment in any way. Vertebrate animals are not to be used in any active experiments that may be deleterious to the health, comfort, or physical integrity of the animals. If there is any uncertainty regarding a project, then Regional Fairs should obtain clarification from the Youth Science Canada National Ethics and Safety Committee.

b) Observation of wild animals falls within the definition of hunting in some jurisdictions. Students should obtain advice and permission from conservation authorities to ensure that they are not interfering with the animal's life, and to ensure that their project is permissible. A permit may be required.

c) Behavioral experiments with positive rewards are permissible only if the animal is not placed in a stressful situation. Training an animal to travel through a maze to receive a food reward is allowed if the animal is not stressed, (e.g., by withholding food well beyond normal feeding times). All animals must be monitored for signs of distress including weight loss.

d) Projects involving animal experimentation may be conducted under the supervision of research personnel employed by a University, Hospital, Government Organization or Agency, or Industrial Laboratory and where the animal experimentation has been pre-approved by a Scientific Review Committee (SRC or equivalent) in the institution employing the supervisor(s). A copy of the Letter of Approval from the institution's SRC must be included in the documentation submitted to the Chief Judge, CWSF. All projects so approved are eligible for the Canada-Wide Science Fair or other events held under the auspices of Youth Science Canada. If they meet all other requirements of this policy, they do not need further approval by the Ethics Committees of either the Regional STEM Fair or Youth Science Canada. Student researchers may not pursue a

project that leads directly to the death of a vertebrate animal. Studies that are designed or anticipated to cause vertebrate animal death are prohibited.

Projects that are not described by one of these four cases are not permitted to participate in any STEM fair.

7.2 Cells and animal parts, including organs, tissues, plasma, or serum may be used in STEM projects. They may be obtained only in three ways:

a) from a biological supply house;

b) from research facilities at a laboratory licensed to do animal studies (section 5.4); or

c) salvaged from the food industry.

Evidence of the source of the materials must be available at registration and the project display.

## 8 Cultural Considerations

8.1 Youth Science Canada recognizes that there are cultural communities within Canada that hold their own values, beliefs, and practices. We encourage any student or mentor from these communities to consult with the Youth Science Canada National Ethics and Safety Committee who will work collaboratively so that STEM projects can be developed that respect both the intent of this policy as well as the culture of the community.

## 9 Drugs

9.1 A “drug” includes any substance or mixture of substances manufactured, sold, or represented for use in:

a) the diagnosis, treatment, mitigation or prevention of a disease, disorder, abnormal physical state, or its symptoms, in humans or animals,

b) restoring, correcting, or modifying organic functions in human beings or animals,

c) disinfection in premises where food is manufactured, prepared, or kept. (Ref. 7)

9.2 Drugs may be used in an experiment involving vertebrate animals, cephalopods, or decapod crustaceans only if carried out in a laboratory licensed to do animal studies (section 5.4) under the direction of a Scientific Supervisor. The study must be pre-approved by the appropriate Scientific Review Committee that reviews the research at the Institution, and this must be documented by a letter that forms part of the application to the School, Regional or Canada-Wide Science Fair. No other vertebrate animal studies involving the use of Drugs, as defined above by Federal Regulations, may be exhibited at any STEM Fair.

## 10 Principles and Guidelines for the Use of Animals in Elementary or Secondary School Education

10.1 The Institute for Laboratory Animal Research (USA) outlines ten principles that define the ethical use of animals in a school or STEM fair setting. (Ref. 8) Youth Science Canada endorses these ten principles, and all students doing a STEM project involving animals must be familiar with them.

## 11 Forms

11.1 The Vertebrate Animal Approval Form must be submitted to the Regional STEM Fair and Canada-Wide Science Fair at registration for any project involving the use of Vertebrate Animals, Cephalopods or Decapod Crustaceans.

All forms are available from the National Ethics and Safety Committee web site.

## 12 References


1. Biology Dictionary
2. International Science & Engineering Fair Rules Accessed 27 October 2022
3. Canadian Council on Animal Care Accessed 27 October 2022
4. CCAC VIsion Mission and Mandate Accessed 27 October 2022
5. The Principles of Humane Experimental Technique by Russell & Burch Accessed 27 October 2022
6. Canadian Wildlife Species at Risk Accessed 27 October 2022
7. Definition of a Drug The definitions are in alphabetical order on this page. Look for “Drug”. Accessed 27 October 2022
8. ILAR_Animals_in_Pre_College_Education Accessed 27 October 2022