

ASU Fact sheet

The use of transgenic arthropods in research and teaching

The use of transgenic or genetically modified arthropods, including fruit flies, bees, ants and butterflies, in research is governed by the NIH [Guidelines for Research Involving Recombinant and Synthetic Nucleic Acid Molecules](#), or NIH Guidelines. The NIH Guidelines detail procedures and practices for the containment and safe conduct of various forms of recombinant DNA research, including research involving genetically modified or transgenic arthropods. All researchers at ASU must comply with the NIH Guidelines even if their individual projects are not funded by NIH.

At ASU, the [Institutional Biosafety Committee](#), or IBC, oversees all research utilizing recombinant and synthetic nucleic acid molecules, as well as genetically modified organisms. The IBC reviews and approves recombinant and synthetic nucleic acid molecule research for compliance with the NIH Guidelines, ASU policies and best laboratory practices. The ASU IBC reviews the handling of all recombinant and synthetic nucleic acid molecule research, even if it is exempt from the NIH Guidelines, so that ASU, acting through the IBC, can ensure that all recombinant and synthetic nucleic acid molecule research is appropriately reviewed and classified. ASU also requires the review of teaching activities by the IBC.

Principal Investigators, or PIs, are responsible for compliance with the NIH Guidelines during the conduct of research with recombinant and synthetic nucleic acid molecules, including genetically modified or transgenic arthropods. PIs must submit a disclosure to the IBC for review and approval before beginning work with these materials. Additionally, while conducting research subject to the NIH Guidelines, the PI must notify the IBC before modifying recombinant and synthetic nucleic acid molecule research already approved and report any problems pertaining to the operation of containment practices and procedures, violations of the NIH Guidelines or any research-related incidents injuries and illnesses.

Description of specific practices under the NIH Guidelines

- The **purchase or transfer** of transgenic arthropods **is not** exempt from the NIH Guidelines.
- The **creation, generation, breeding and propagation** of transgenic arthropods are covered under Section III-D-4 of the NIH Guidelines. These activities **are not** exempt from the NIH Guidelines and must be reviewed by the IBC.
- Section III-D-5 describes experiments involving genetically modified **arthropods in conjunction with whole plants, including** which may have the potential for detrimental impact to agriculture or ecosystems. Section III-E-2-b-(5) describes experiments involving genetically modified arthropods in conjunction with whole plants which have no recognized potential for detrimental impact to ecosystems or agriculture.
- Experiments involving **genetically modified plants with any arthropod** is covered in III-E-2.

- Experiments involving **recombinant microbes in conjunction with any arthropod** is covered under Section III-D-1-a or III-D-4-a.
- Per Section III-F-4 of the NIH Guidelines, experiments may be exempt when they involve **recombinant or synthetic acid molecules that are entirely from a eukaryotic host** (such as an arthropod), including its mitochondria or plasmids, when propagated only in that host or a closely related strain of the same species. However, at ASU, this research must also be submitted to the IBC for review.
- If you are manipulating arthropods that have mutations or genetic modifications that are the result of **natural variation, chemical mutagenesis or radiation exposure**, and that have not had any molecular manipulation, these may not need to be reviewed by the IBC. Please contact ASU Safety Partners to discuss the details of your research.
- **Knock-out**, gene silencing, gene ablation etc., **organisms** may be exempt from NIH Guidelines if the method used to generate the knock-out does not leave any “new” genetic material or any markers behind in the genome after the procedure. All recombinant organisms used in research at ASU are registered with the IBC.
- If there is any **genetic marker from another** source, not your arthropod, such as GFP, or if the genetic material is put into *E. coli* to amplify it, this research is subject to review by the IBC, these experiments are covered under III-D-4-a and III-D-4-b. Also, research or teaching activities involving the insertion of sequence elements which are engineered and did not originate in an organism or insertion of genes from another species that does not naturally exchange with your research species, must be submitted for review by the IBC.
- Recombinant and synthetic nucleic acid molecule **modifications to the somatic cells** of non-transgenic arthropods may also be subject to the NIH Guidelines and review by ASU IBC.
- Research that involves the use of **PCR with arthropods** is exempt from NIH Guidelines; however, this research must be submitted for review by the ASU IBC.

If you have any questions about whether your research with genetically modified arthropods is subject to review by the ASU IBC, please contact research.integrity@asu.edu.

A final note: A **permit** from the USDA is required for work with plant or animal pathogens and arthropods considered plant pests. An APHIS permit is required for the importation, movement or environmental release of genetically modified arthropods. Appropriate containment or confinement of the transformed organism is required whether the organism is released, imported or moved interstate.

Questions? Contact ASU Environmental Health and Safety at 480-965-1823 or email asuehs@asu.edu.

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