



Mosquito sample preservation and transport

Purpose: protect the identity, condition and traceability of adult mosquito and larval samples submitted to contracted laboratories. Covers morphology, molecular species identification, pathogen screening and live specimens for susceptibility testing. Eggs, human specimens, culture and virus isolation are outside this protocol.

Release condition: the technical lead and receiving laboratory must agree the route below before collection. A method suitable for species identification may destroy RNA or make a specimen unsuitable for a live bioassay. Use separate labelled specimens for incompatible tests.

1 Confirm the analytical purpose

Requested examination	Preservation route to agree
Adult or larval morphology	Protect diagnostic structures. Adult preservation and larval ethanol route must be accepted by the identifier. See page 2. [1]
Molecular species identification or resistance markers	Laboratory validated DNA preservation route; ethanol or frozen storage may be suitable. This is not the live susceptibility route. See page 2. [1]
Pathogen PCR or RT-PCR	Assay specific cold chain or validated stabiliser. Confirm that adult or larval specimens are accepted for the target. See page 3. [2,3]
Phenotypic insecticide susceptibility	Dedicated viable cohort supplied under the receiving insectary's instructions; never put these specimens in preservative. See page 3. [4]

2 Obtain written laboratory instructions

Confirm specimen type and minimum quantity; individual versus pooled submission; accepted containers; preservative and concentration; specimen-to-preservative ratio; storage and transit temperature; maximum holding and transit times; receipt hours; permissions; reporting scope; and rejection criteria. Record these on page 5. No universal holding time is authorised by this SOP.

3 Assign responsibilities

The technical lead selects tests and reviews acceptance criteria. The collector records sample history and implements the agreed preservation route. A competent shipper classifies and prepares the consignment. The receiving laboratory records condition and decides suitability for each requested test.

Before handling: use task-assessed PPE and avoid bare-hand contact with specimens. Keep ethanol away from ignition sources. Use insulated gloves and eye protection for dry ice, with adequate ventilation. Carry suitable spare containers, durable labels and the approved temperature monitor.

Status: controlled protocol template for technical and laboratory approval. The cited sources provide principles; they do not endorse this document or establish a Mosquito Arabia laboratory partnership.



ROUTES A AND B | ADULTS AND LARVAE | USE THE RECEIVING LABORATORY'S VALIDATED METHOD

Preservation for identification

4 Establish identity before preservation

4.1 / Label first

Assign a unique sample ID to the container body and submission record before transfer. Record site, source or trap ID, collection date and time with time zone, collector, life stage, count and intended test. Keep different sites, dates and sample types separate.

4.2 / Protect specimen quality

Use clean suitable equipment and avoid crushing or rubbing adults. Preserve wings, legs, scales and larval diagnostic structures. Do not use insecticide sprays or contaminated equipment to immobilise laboratory specimens. Photograph source conditions and record damaged specimens.

5 Adult morphology

Agree a dry protected or frozen submission route with the identifier. Use a rigid specimen container that prevents movement and crushing; avoid loose packing material contacting fragile adults. Keep dry preparations dry and protect frozen preparations from warming and condensation. Do not thaw, wet, glue or pin specimens unless the laboratory requests that preparation.

Ethanol can damage or detach diagnostic scales. Do not immerse adult specimens intended for routine external morphology without the identifier's agreement. Some examinations, including male genitalia, have different requirements. [1]

6 Larval morphology

Where accepted by the laboratory, preserve larvae in 70-80% ethanol by volume. Transfer with minimal carryover water so the preservative is not excessively diluted. Keep larvae submerged, do not overcrowd the vial, and use the laboratory's agreed loading and preservative volume. Follow its instructions for any fixation step or preservative replacement. [1,6]

Close a compatible leakproof screw-cap vial and check the seal. Record the actual ethanol concentration and preservation time. Keep larvae from different habitats in separate vials. Pupae and exuviae require a separately agreed preparation if submitted.

7 DNA identification or molecular resistance markers

Use the laboratory's approved preservative or frozen route for the assay. If high concentration ethanol is specified, record the required concentration, volume and any replacement step; do not assume the larval morphology route is interchangeable. ECDC describes several possible DNA preservation approaches, so assay validation determines the choice. [1]

Prefer individually traceable specimens unless the assay explicitly accepts pooling. Do not use formalin, household spirit, hand sanitiser or an unapproved additive. Retain an associated morphology voucher where feasible. A resistance marker test does not replace a phenotypic susceptibility bioassay. [4]

Preservative does not automatically make a specimen non-infectious or exempt from transport controls. Ethanol itself may introduce a flammable-liquid transport requirement. [5]



ROUTES C AND D | KEEP THESE ROUTES SEPARATE

Pathogen testing and live cohorts

8 Adult or larval pathogen PCR and RT-PCR

8.1 / Agree acceptance and pool design

Name the target pathogens and confirm that the assay is validated for the submitted stage and species. Dengue and Zika are RNA viruses, generally requiring an RT-PCR method. Do not assume a laboratory accepts larvae because it accepts adults. Agree individual testing or pool size; never combine different species, sites or collection periods without approval.

8.2 / Establish the cold chain promptly

Protect specimens from heat immediately and record the time cold storage begins. Use the laboratory's approved chilled transfer, freezing or stabilisation route. Arbovirus guidance commonly uses frozen storage around -70 °C or colder where testing is delayed; the laboratory must specify the actual limit and allowed delay for this assay. [2,3]

8.3 / Keep the approved state during transport

For a frozen route, use freezer-rated tubes and a validated insulated shipment that maintains the laboratory's required condition until receipt. Dry ice may be appropriate when the shipper and courier approve it. Do not substitute gel packs for a required frozen route without permission. Record time and temperature; avoid repeated freeze-thaw cycles. [2,3]

8.4 / Avoid unapproved processing

Do not add ethanol, formalin, transport medium or RNA stabiliser unless approved for this specific assay. Do not crush or homogenise specimens in the field. Do not add beads or other preparation materials unless instructed. Use separate morphology specimens where preservation requirements conflict.

A positive RNA result does not alone establish viable virus or local human transmission. Negative results are limited by specimen type, sampling, assay performance and preservation history. Document departures so the laboratory can qualify the result. [2]

9 Live specimens for susceptibility bioassays

Use a separate laboratory-approved live collection plan. Record species or provisional ID, life stage, source, date, collection method and any prior pesticide exposure. The receiving laboratory determines viable quantity, age or stage suitability, feeding and water requirements, temperature and permitted journey time. [4]

Do not preserve, freeze or expose this cohort to insecticide. Adults require an approved escape-resistant, ventilated insect container within the laboratory's transport system. Larvae require its specified secure aquatic container and conditions. Do not improvise airtight confinement, add food or chemicals, or use dry ice for live cohorts.

Dispatch live mosquitoes only after the receiving insectary, carrier and relevant authorities accept the route. Check collection, movement, import and export permissions, including cross-border transfers. If approved containment or timely receipt cannot be achieved, do not dispatch. [4,5]



NON-LIVE SAMPLES AND LIVE COHORTS REQUIRE DIFFERENT APPROVED PACKING SYSTEMS

Packing transport and receipt

10 Prepare the consignment

10.1 / Confirm classification before packing

The competent shipper must assess biological risk, preservative, refrigerant, transport mode and national requirements. Do not automatically label every mosquito consignment UN 3373, Category B or exempt. Obtain the laboratory and courier's documented shipping requirements. [5]

10.2 / Pack non-live specimens securely

Use the approved primary receptacle, protective secondary containment and strong outer packaging. For liquid samples, use leakproof primary and secondary containment with sufficient absorbent material for potential leakage. Protect individual tubes from breakage and movement; use compatible packaging and a legible tube inventory. Apply the performance standards required for the assigned classification; Packing Instruction 650 is relevant only where the consignment is assigned to Category B. [5,7]

10.3 / Maintain temperature without compromising containment

Separate coolant from specimen tubes as required by the validated pack. Keep primary containers closed. If dry ice is used, the insulated shipping package must allow carbon dioxide release; never enclose dry ice in an airtight space. Do not place it inside a sealed specimen receptacle. A trained shipper determines quantity, marking and documentation for the route. [5,7]

10.4 / Separate records from specimens

Keep the printed submission form and tube map in a protected document sleeve, separate from specimen containers. Match IDs and quantities to the electronic record. Include receiving and emergency contact arrangements required by the carrier; do not place patient information in this entomological submission.

10.5 / Book delivery and monitor progress

Confirm laboratory receipt hours and avoid dispatch into weekends or holidays unless acceptance is arranged. Send the sample inventory, preservation history, tracking number and expected arrival to the laboratory through the agreed channel. Track delivery and escalate delays before the preservation limit is exceeded. [3]

11 Laboratory receipt and non-conformance

The receiver records arrival date and time, specimen IDs and counts, packaging integrity, temperature record or condition, preservative condition and any escapes or mortality in live cohorts. Confirm acceptance, qualified acceptance or rejection separately for each requested test.

Quarantine a discrepant consignment under the laboratory's procedures and contact the technical lead. Record label mismatch, leakage, damage, inadequate specimen numbers, unapproved medium, temperature excursion, delay or loss of viability. Do not silently relabel, discard or report a compromised negative result without laboratory review.

For a leak, damaged outer package or escape concern: restrict access, avoid opening or improvising a clean-up, and follow the organisation's incident and courier procedures with the receiving laboratory. Preservative and dry ice hazards require their own safety controls. [5]



COMPLETE ONE RECORD PER CONSIGNMENT | DUPLICATE THE SAMPLE INVENTORY AS NEEDED

Laboratory agreement and dispatch record

Required field	Record before release
Project and receiving laboratory	Project / consignment ID: _____ Laboratory / contact / approval reference: _____
Tests and route agreed	Morphology / DNA / pathogen RT-PCR / live bioassay Targets and stage accepted: _____
Preservation and limits	Container / medium / concentration / volume: _____ Storage and transit temperature: _____ Maximum hold / transit time and excursion rule: _____
Sample history	Collection / preservation / freezing times with time zone: _____ Storage history / prior exposure / deviations: _____
Shipment release	Classification / permits / trained shipper: _____ Courier / tracking / departure / expected receipt: _____

Sample ID and source	Stage species count	Preservation and times
_____	_____	_____
_____	_____	_____

Collector and handover date/time: _____ Receiver and receipt date/time: _____

Condition on receipt / temperature / discrepancies: _____

Acceptance for each test / action / laboratory reviewer: _____

Technical lead approval of this SOP and laboratory-specific instructions: _____ Date: _____

Sources and review

- [1] ECDC. Invasive mosquito surveillance guidelines (2012), specimen identification and DNA preservation sections.
- [2] CDC. West Nile virus surveillance and control guidelines, specimen handling and diagnostic context.
- [3] CDC. Shipping entomologic specimens for arbovirus testing (24 March 2026). Receiving laboratories may differ.
- [4] CDC. Resistance and efficacy testing. Live cohort requirements are set by the contracted testing laboratory.
- [5] WHO. Transport of infectious substances guidance 2025-2026, applicable from 1 October 2025.
- [6] ECDC. Surveillance of native mosquitoes in Europe (2014), larval specimen preservation guidance.
- [7] IATA. Dangerous Goods Regulations 67th edition, Packing Instruction 650 (2026). Apply only to correctly classified Category B consignments.

Sources checked 21 October 2026. Review annually and whenever the laboratory method, transport route or applicable requirements change. No universal shelf life or pathogen inactivation claim is made.