## OCCURRENCE OF OVARIOLAR DILATATIONS IN NULLIPAROUS MOSQUITOES [1]

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Active interest in techniques for age-grading mosquitoes was generated when Gillies (1958) reviewed significant work by Russian scientists that had not been widely available previously. Of great value to medical enotmologists are the techniques that enable them to distinguish parous females (i.e., those that have laid eggs) from nulliparous females (those that have not) because by making this distinction in examining specimens of a species that transmits disease, important information is obtained toward assessing the potential infectivity of each individual female. However, conditions that we have observed (Bellamy and Corbet, 1973) in the ovaries, of *Culex tarsalis* Coq. show that in this species (and perhaps in others that have a similar pattern of ovarian development) certain of the standard criteria commonly used for diagnosing the parous condition can be misleading unless applied with caution and qualification.

After a mosquito has laid eggs a dilatation commonly forms on the stalk of each ovariole from which an oocyte was shed, in each case marking the position where before ovulation there had been a mature follicle; accordingly, dilatations have been used to recognize mosquitoes that are parous. However, dilatations may also form on other ovarioles if their contemporary follicles fail to mature and are resorbed. These events are well known (Gillies, 1958; Detinova, 1962; Clements, 1963) but the fact that in certain circumstances these phenomena may invite misinterpretation has apparently been overlooked or insufficiently appreciated.

We have confirmed the above sequence of events in *C. tarsalis* and have found that, particularly in females whose ovaries have matured without a prior blood meal (i.e., autogenous females), dilatations resulting from resorbed follicles can be numerous. The point we wish to emphasize is that such dilatations can occur in nulliparous, as well as in parous, females: we found them in gravid autogenous females that had not laid eggs. If without knowing their history we had applied to these mosquitoes age-grading criteria as they are now used, we would probably have classified them as parous. Mosquitoes that mature only a few follicles (a frequent occurrence in autogenous females) are particularly likely to be incorrectly classified as parous since the small number of mature follicles would normally be interpreted as relict (or retained) eggs following a presumed oviposition. Accordingly, we call attention to the likelihood of the presence of dilatations in such mosquitoes being misinterpreted, and caution against the unqualified acceptance of dilatations as invariable indices of the parous condition.

We did this work while at the Canada Department of Agriculture Research Institute, Belleville, Ontario.

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## PHLEBOTOMINE SANDFLIES IN MONTANA: FIRST REPORT

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The species diversity and population density of phlebotomine sandflies is highest in the tropical areas of the world. They become less and less abundant in the temperate zones with an increase in latitude. Until relatively recently, the known northernmost distribution of these flies was Maryland on the east coast and central California on the west coast. These limits have now been extended considerably by the efforts of a few entomologists. For instance, 4 species are known from the state of Washington (Fairchild & Harwood 1961), 3 from British Columbia and southern Alberta (Harwood 1965), and 1 from southern Ontario in eastern Canada (Downes 1972).

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In the summer of 1973, I did a limited survey for these insects in the Bitter Root Valley of western Montana. I set one light trap and a few ground and castor oil traps at 5 sites within a 5-mile radius of the Rocky Mountain Laboratory, Hamilton, Montana (elevation 3600 ft). These sites were selected because of the presence of ground burrows made by ground squirrels (*Citellus* spp.) or woodchucks (*Marmota flaviventris*).

*Lutzomyia vexator occidentis* (Fairchild & Hertig) 1 ♀, 2 ♂, and *L. oppidana* (Dampf) 1 ♀, 3 ♂ were collected on August 18, 22 and September 5 from the same locality on Skalkhado road, 5 miles east of Hamilton. This site consisted of hilly terrain with brush vegetation and a few scattered trees; numerous rock piles were present with an abundance of woodchuck nests beneath them or in nearby bare ground. The other 4 sites were sampled only once and yielded no sandflies; 3 of these appeared to have relatively small ground burrows typical of ground squirrels.

Montana is a large and topographically diversified state. A more extensive collecting effort will very likely yield new distribution records of these 2 species and add more species to the list.

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## THE EFFECTS OF ALTOSID®, AN INSECT DEVELOPMENTAL INHIBITOR, ON THE LAST INSTAR LARVA OF *SIMULIUM PICTIPES* [1, 2]

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Blackflies, unlike mosquitoes, require fresh running water as an environment in which to complete their life cycles. As a result, the types of agents that might be used to control them are limited. Recently, emphasis has been given to the development of insect developmental inhibitors (or juvenile hormones) as an alternative to the conventional control agents used against insects.

Wright (1972), when testing 3 juvenile hormone analogues against the stable fly, found that a 1% concentration of 2 analogues prevented emergence of adults which had been treated in the larval stage. These compounds produced a pupal-adult intermediate that did not eclose properly and, as a result, died.

Jakob and Schoof (1972) consistently observed higher mortality among more mature larvae when comparing third and fourth instars of two species of mosquitoes. Mortality was observed only at the larval-pupal moult.

Schaefer and Wilder (1972) tested several compounds that showed juvenile hormone-like activity against mosquitoes that were resistant to certain organo-phosphate compounds. Among the compounds tested by these workers was ZR515, or Altosid® (isopropyl 11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate). Altosid was reported to have high activity on *Aedes nigromaculis* (Ludlow) larvae at 0.00001 ppm in the laboratory and at 0.125 lb/acre in the field.

In prelimniary field tests with Altosid Cumming and McKague (1973) observed 0% adult emergence of *Simulium decorum* Walker when 2 applications were made at a rate of 0.5 ppm.

The purpose of this study was to test the feasibility of using an insect developmental inhibitor as an alternative to the conventional larvicides used against blackflies.

MATERIALS AND METHODS. Rearing containers consisting of wide-mouth 1 gal glass jars and glass fritted gas bubblers (Model 3953030C Corning) were utilized for laboratory evaluation of Altosid on last instar larvae of *Simulium pictipes* Hagen. To minimize handling of the larvae the glass jars were transported to a *S. pictipes* breeding site. Water from the stream (2000 ml) and 25 last instar larvae were placed in each glass jar. These glass jars were aerated upon return to the laboratory.

The tests were arranged in a random block design with 5 replicates of each treatment level: 0, 0.01, 0.1, 1, and 10 ppm. Treatments were applied directly into the glass jars with a microliter syringe.

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