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]

GLEN I. GARRIS [3] AND T. R. ADKINS, JR.[4]

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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RESULTS AND DISCUSSION. The percentages of larval mortality after 4 days exposure to Altosid were 33.2, 36.8, 86.0, and 93.6 in 0.01, 0.1, 1, and 10 ppm, respectively. The greatest mortality was observed in the 10 ppm treatment with 1 ppm giving the next highest larval mortality.

Fewer larvae pupated as a result of exposure to Altosid. The 0.01 ppm treatment resulted in a 20% suppression of pupation (calculated by a modified Abbott's formula, % suppression=% pupated in 0 ppm—% pupated in treatment/% pupated in 0 ppm x 100). Less pupation was observed with higher concentrations.

As a result of exposure to Altosid a high percentage of pupae were found to be abnormal. It was observed that 34.1% of the pupae were abnormal in the 0.01 ppm treatment and 100% were found abnormal in 1 and 10 ppm treatments. One abnormality was the retention of larval characteristics in the pupa, which resulted in a larval-pupal intermediate, a similar condition as that described by Wright and Spates (1971). This larval-pupal intermediate had balloon-shaped wing pads and adult-like mouth parts. Both mouth parts and wing pads were not closely appressed to the body. This form was also characterized by a larval-like abdomen (with a white spot being retained on the last segment) and a pupal-like thorax and head. Other abnormalities observed included retention of the larval proleg on the pupa and malformation of the pupal cocoon. The pupal cocoon is normally a boot-shaped structure; but in this case, it was a narrow band spun just over the thorax of the larval-pupal intermediate.

Last instar larvae were affected by Altosid in three ways. Some remained larvae longer than normal (controls), greater larval mortality occurred as the concentration increased, and a high percent of those that pupated were deformed. No adults were collected because of mortality in the pupal stage.

Altosid caused morphogenetic abnormalities and mortality only when applied in relatively high concentrations. The ineffectiveness of Altosid at low concentrations makes it an impractical control method for last instar larvae of *S. pictipes*.

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A GYNANDROMORPH IN *AEDES HENDERSONI* COCKERELL [1]

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Records of gynandromorphs in mosquitoes have been summarized by Roth (1948). Subsequently there have been reports of this phenomenon in several *Aedes* species including *A. triseriatus* (Say) (Ezenwa and Venard, 1973). We have not seen reports, however, of gynandromorphs of *Aedes hendersoni*.

A colony of *A. hendersoni* has been maintained at the Department of Entomology, University of Wisconsin through 9 generations by the induced copulation method of Ow Yang, *et al.* (1963). While preparing a number of F_7 males for induced copulation, a gynandromorph was noted. It was not used for induced copulation and it would not probe for blood on a bare arm. This is the only one that has been seen since this colony was begun in the fall of 1972, although approximately 2000 adults have been examined.

The gynandromorph has the typical female body size and wing disposition (large body, wings covering abdomen, Figure 1). The external genitalia, however, are typically male. The left antenna is female while the right is male (Figure 2); however, the right maxillary palp is like that of a normally developed female but the left palp is like that of a male with the terminal segments shortened and malformed. The proboscis is the size

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