Investigations Related to Bti Efficacy and Larval Black Flies – Elmer Gray

a) UGA – black fly colony
   i) Established 1981 at Cornell
   ii) Moved to Clemson in 1991
   iii) Now the only established black fly colony in the world
   iv) Supported by Abbott Labs – now Valent BioSciences
   v) 9 tanks currently in place
   vi) Currently over 2 million flies in colony
b) Projects
   i) Basic research
   ii) Quality control
   iii) Special requests
c) Black fly
   i) Attach to substrate
      (1) Silk glands – spin a silk pad
      (2) Attach by hooks
   ii) Filter feed in current
   iii) Indiscriminate filter feeders
d) Control
   i) Bti
   ii) Challenges
      (1) Flowing water
      (2) Habitat change through length of waterway
      (3) Water quality
e) Efficacy Study - Antibiotics
   i) Susquehanna River
      (1) Threatened system
      (2) 2 branches join to form a main stem
      (3) Many different kinds of input
      (4) Antibiotic issue (Broderick et al 2006) from agricultural contamination
   ii) Study protocol
      (1) Larvae exposed to antibiotics for 48 and 72 hours in shakers
         (a) Exposed at rates in river
         (b) Exposed in combination
         (c) Exposed at higher rates
      (2) Exposed to Bti
   iii) Results – no loss of efficacy
   iv) Paper accepted for publication
f) Efficacy Study – Turbidity
   i) Suspended solids causing a reduction of >30% in Bti efficacy
   ii) Dissolved particles had no effect on efficacy
   iii) Re-suspension of solids also caused reduced efficacy
   iv) Data suggest that there may be feeding competition between Bti and suspended clay particles
      (1) Bti binds to clays
      (2) However, adding clays to bioassays did not lead to reduced efficacy

g) Efficacy Study – Cations
    i) Could these affect Bti proteins?
    ii) No effect seen
h) Efficacy Study – pH
    i) Ranges from 7-9 in the river
    ii) No pH effect was seen during bioassay
    iii) Some report increased efficacy at higher pH
i) Efficacy Study – Algae
    i) Previous published work shows that green algae can reduce efficacy
    ii) Appears to be related to particle size
j) The work continues!