# FECAL ANALYSIS REPORT

**Prepared for**

**Cascadien, Inc.**
**Corvallis, Oregon**

**January 10, 2005**

**By**

**Pacific Analytics**
**PO Box 219**
**Albany, OR 97321**
**(541) 926-0117**

*Prepared by:*

Pacific Analytics, L.L.C.
Post Office Box 219
Albany, Oregon 97321
Tel. (541) 926-0117
mail@statpros.com
www.statpros.com

---

Gregory Brenner
Senior Associate / Project Manager

The pictures contained in this report are for the exclusive use by Pacific Analytics, L.L.C and its clients. All photographs are copyrighted by Pacific Analytics, L.L.C. and may not be reproduced or used without the express written permission of Pacific Analytics, L.L.C.

# I. TABLE OF CONTENTS

## II. EXECUTIVE SUMMARY

This is a report of the results of analysis of fourteen brown creeper fecal samples. The report contains a short discussion of brown creeper ecology, a description of the laboratory protocols, a presentation of the contents of the fecal samples and a discussion of the results. Pictures for the fragments are also included. A spreadsheet of the sample contents is provided on the enclosed disk.

Brown creeper fecal samples contained fragments largely from small beetles, although some of the fragments contained fragments of spiders and Lepidoptera larvae. The beetles were identified as Staphylinidae, Elateridae, and Curculionidae. The Lepidoptera larvae were identified as most likely Tortricidae. Three hundred and sixty arthropod collection samples were searched for matching specimens. Only two were found. A specimen of each species was mounted and labeled.

The fecal samples were provided by Dr. Juraj Halaj, Cascadien, Inc., Corvallis, Oregon.

# III. INTRODUCTION

Green-tree retention is gaining popularity as a forest management tool in the Pacific Northwest. This practice is mandated on federally managed lands by the Standards and Guidelines of the Northwest Forest Plan. An explicit assumption of this silvicultural model is the preservation of characteristics of late-successional forests to conserve diversity. The Demonstration of Ecological Management Options (DEMO) project is the first attempt to assess the ecological consequences of green-tree retention for a wide range of forest organisms.

One of the organisms being studied in the DEMO project is the brown creeper, *Certhia americana* Bonaparte (1838). The breeding range of this bird extends across North America in northern coniferous forests from southern Alaska to Newfoundland. They breed from Washington south along the coast to California, and in the Rocky Mountains. They also inhabit the Mexican highlands and as far south as northern Nicaragua.

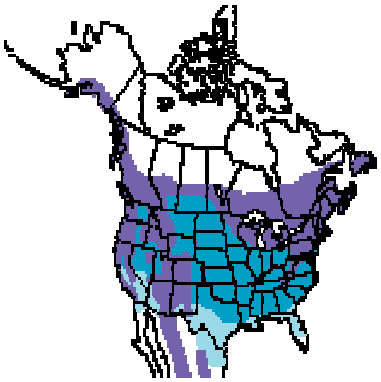
Brown Creeper
by Larry McQueen

Copyright© 2000 Cornell Laboratory of Ornithology

The adults have brown plumage, streaked and spotted with buff, gray and white which provides perfect camouflage against a background of bark as they forage. When threatened by a potential predator, they will freeze, often with outspread wings, and remain motionless for several minutes. At such times they can be nearly invisible.

In Washington and Oregon, Brown Creepers prefer mature, moist, coniferous forests or mixed coniferous/deciduous forests. They are found in drier forests as well, including Engelmann spruce and larch forests east of the Cascades. They generally avoid the rainforests of the outer coast. While they generally nest in hardwoods, conifers are preferred for foraging. West of the Cascades they are most frequently found in Douglas firs (Seattle Audubon 2002).

The Brown Creeper relies on insects and spiders and their eggs for winter food, with only occasional use of vegetable food such as acorns, beechnuts, corn, or seeds. They will also come to feeders to feed on suet. In the summer they are exclusively insectivorous, finding food by intently examining bark crevices as they repeatedly spiral up tree trunks, and then fly down to the base of another tree to start again. When foraging higher up in trees, they creep along the underside of branches in search of food (Cornell 2005).



North American Range
(Kaufman, 2005)

In order to assess the impacts of various silvicultural treatments on Brown Creepers, the DEMO project has sampled the arthropod fauna from trees within stands of known Brown Creeper distribution. To refine the assessment, Cascadien, Inc. contracted Pacific Analytics, LLC to analyze the contents of fecal samples taken from Brown Creepers within the DEMO project study area. Pacific Analytics received fourteen fecal samples in November and December 2004. The primary assigned tasks were to dissect and remove arthropod fragments from the fecal samples, mount them on glass slides, identify the fragments to the lowest taxonomic level possible, and estimate the number of prey items in each fecal sample.

# IV. Methods And Protocols

**Laboratory Protocol:**

Fecal samples were diluted with 70% ethanol for microscopic examination. The samples were carefully separated with microforceps under a binocular dissecting scope at 160 times magnification. Arthropod fragments were removed from the sample and placed in 70% ethanol. Photographs of some fragments were taken at this stage of the protocol to provide different views that would not be possible once the fragments were mounted.

After all fragments were removed from the sample and had soaked at least 5 minutes in 70% ethanol, they were transferred to a bath of 95% ethanol and soaked for 5 minutes. Then the fragments were transferred to Euparal essence for 5 minutes for final clearing and removal of any water. Fragments were then mounted in Euparal on glass slides and covered with glass cover slips. After the slides were allowed to cure for at least 3 days, photographs were taken of various fragments for identification.

Fragments were identified to the lowest taxonomic unit possible by comparison to reference collections of arthropods collected on at the DEMO project site and the H.J. Andrews Experiment Forest, and to drawings in taxonomic publications.

Slides are labeled with a four digit number beginning at 0001. A total of forty-three slides were prepared from the fourteen sample vials. Photographs were taken of sample contents. Photos are labeled with a two digit *ROLL* number beginning at 01, and a two digit *PHOTO* number beginning at 01.

**Quantification Protocol:**

The slides for each sample were examined and the number of each fragment type from different (potential) prey items counted for each sample. Using knowledge about arthropod morphology and anatomy, the number of prey items was estimated for each sample.

# V. RESULTS

## SAMPLE 1

### Label Data

05/05/03 BrCr WF5 BY
band # 231071223

### Slides and Photos

| | |
|---|---|
| 0012 | 06-05, 06-06, 06-07 |
| 0013 | 06-08, 06-09, 06-10 |
| 0014 | 06-11, 06-12 |

### Sample Contents

Sample 1 consisted of beetle tarsi, tibia, femur, coxae, antennal segments, elytra fragments, and an eye. It is estimated that Sample 1 contained fragments from at least 3 beetles. One of the beetles was Coleoptera 01 (see mounted specimens). The beetles are generally small in size, most likely less than 1 cm in length.

### Slide 0012

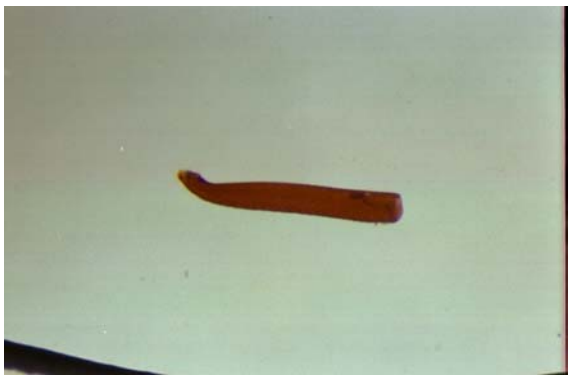


**Photo 06-05**

**Photo 06-06**

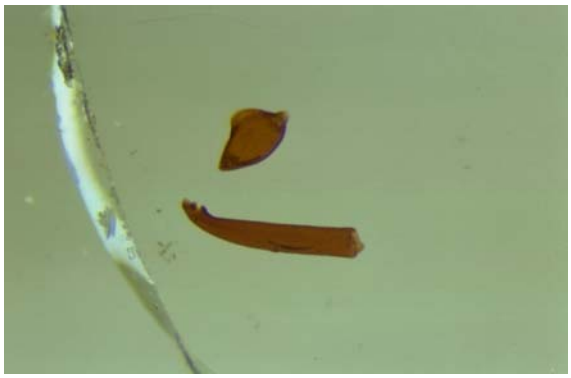


**Photo 06-07**

**Slide 0013**

**Photo 06-08**

**Photo 06-09**

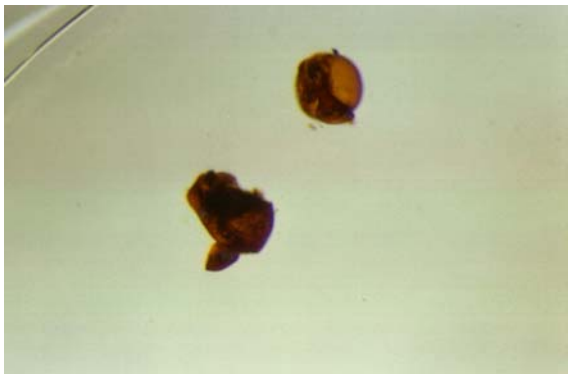


**Photo 06-10**

**Slide 0014**

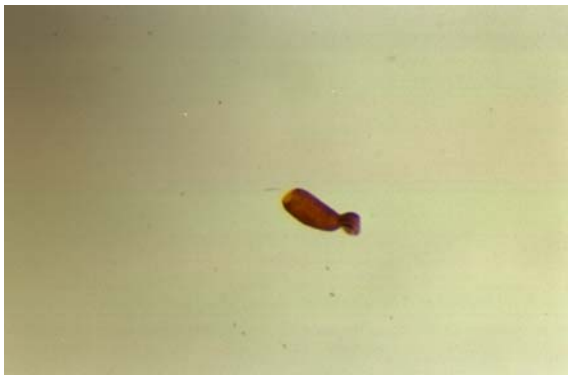


**Photo 06-11**

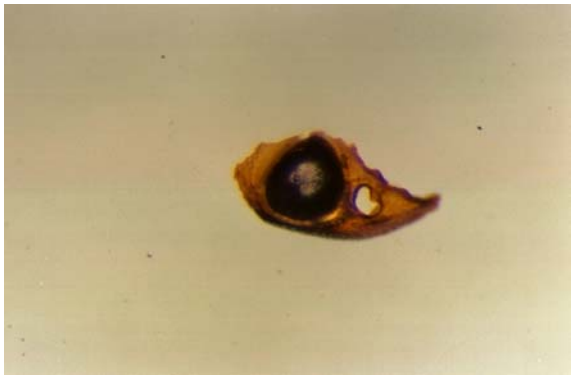


**Photo 06-12**

## SAMPLE 2

**Label Data**

05/17/03 WF5 Color: BO
Bd # 231071202

**Slides and Photos**

| | |
|---|---|
| 0004 | 01-22, 01-23 |
| 0005 | 01-19, 01-20, 01-21 |
| 0006 | 05-12, 05-13 |
| 0007 | 01-24, 01-25, 05-14, 05-15 |
| 0008 | 05-16, 05-17, 05-18 |
| 0009 | 05-19, 02-20, 05-21 |
| 0010 | 05-22, 05-23, 05-24, 05-25 |

**Sample Contents**

Sample 2 consisted of spider tibia, patella, tarsi, and chelicerae, and beetle tarsi, tibia, femur, coxae, heads, pronota, sterna, and tarsal claws. It is estimated that Sample 2 contained fragments from at least 2 beetles and one spider. One of the beetles was Coleoptera 01 (see mounted specimens). The beetles are generally small in size, most likely less than 1 cm in length.

**Slide 0004**

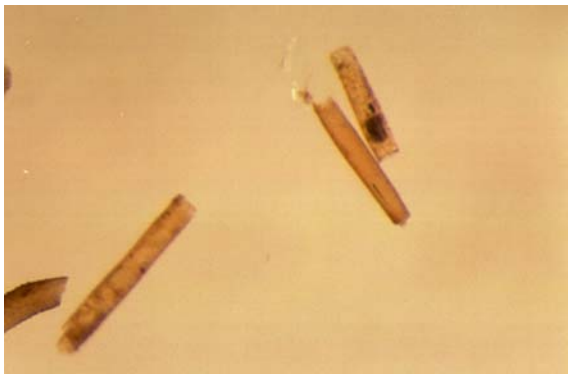


**Photo 01-22**

**Photo 01-23**

**Slide 0005**

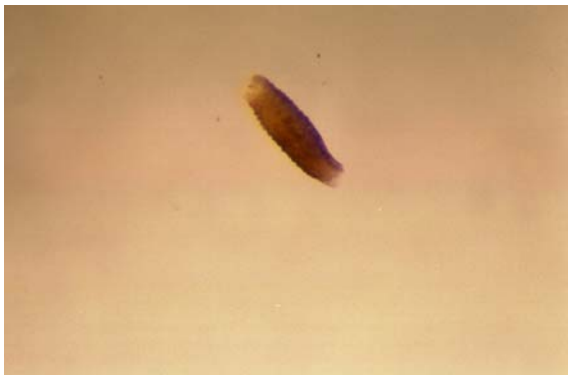


**Photo 01-19**

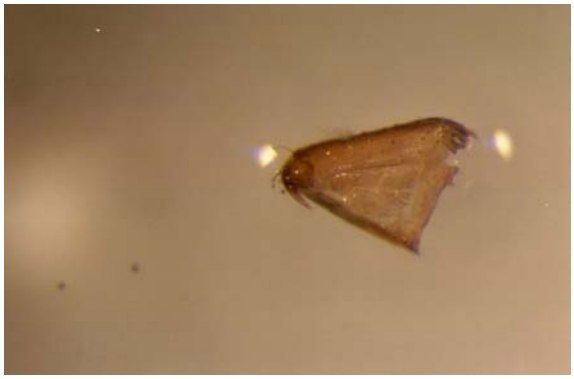


**Photo 01-20**

**Photo 01-21**

**Slide 0006**

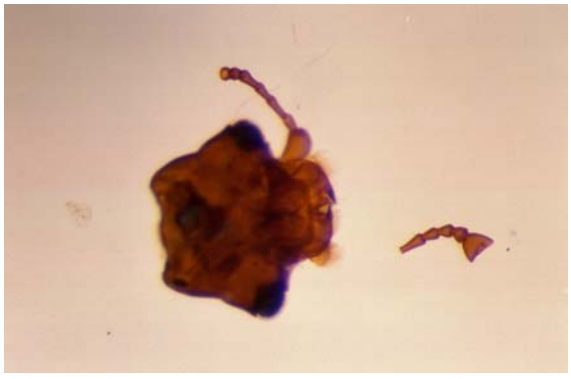


**Photo 05-12**

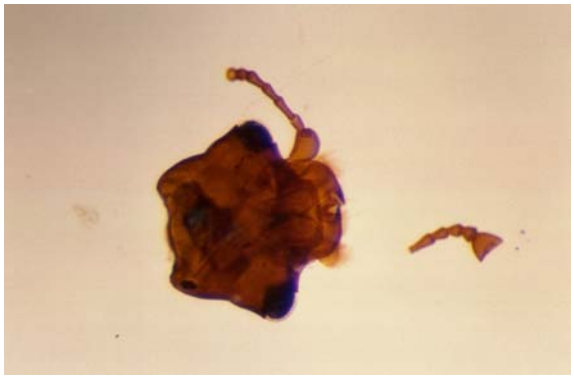


**Photo 05-13**

**Slide 0007**

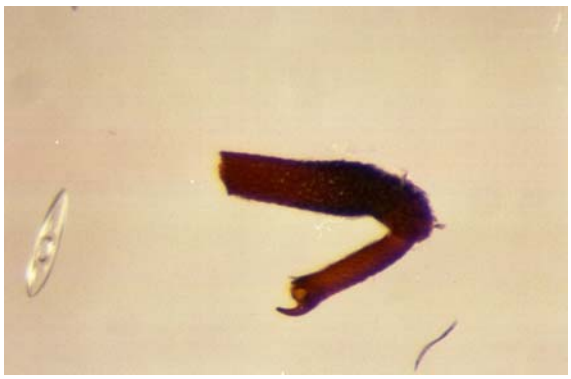


**Photo 01-24**

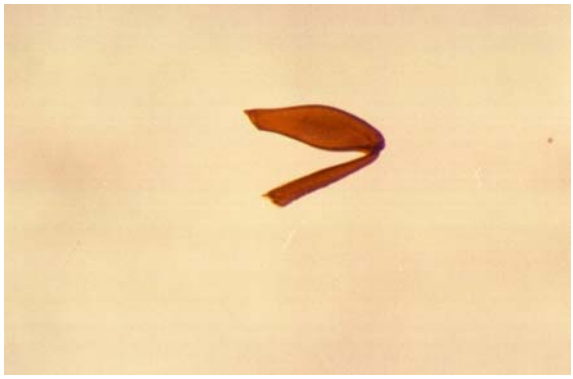


**Photo 01-25**

**Photo 05-14**

**Photo 05-15**

**Slide 0008**

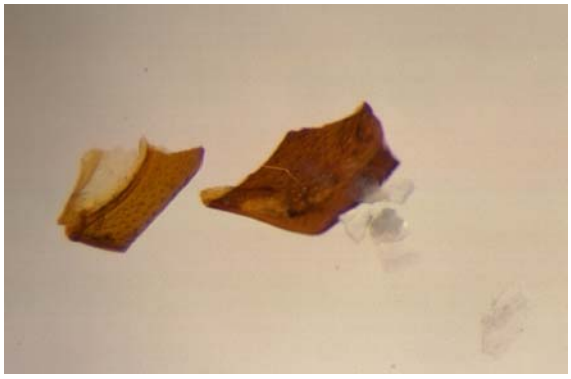


**Photo 05-16**

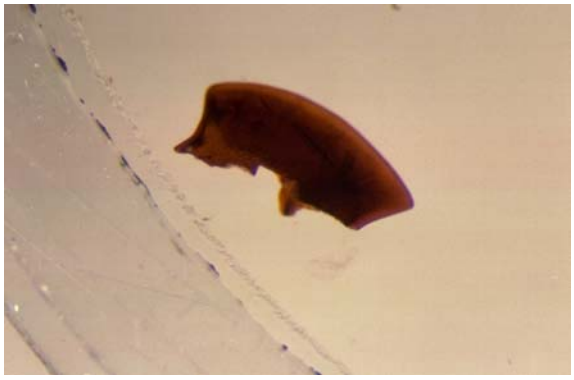


**Photo 05-17**

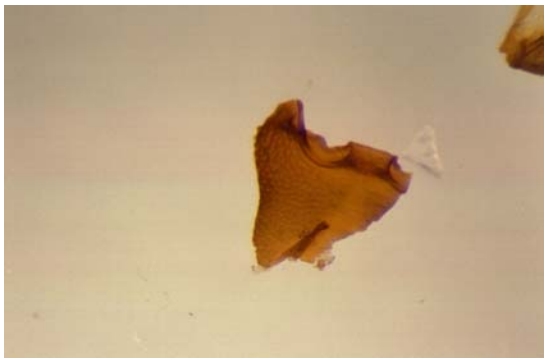


**Photo 05-18**

**Slide 0009**

**Photo 05-19**

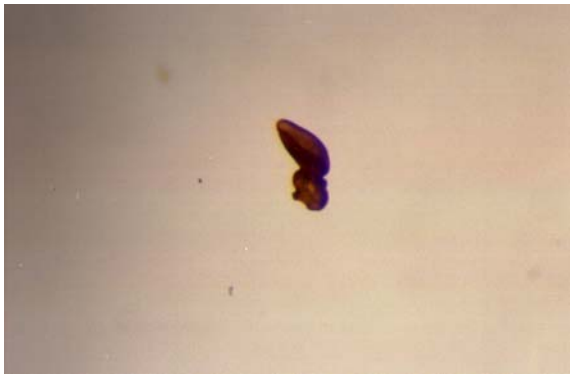


**Photo 05-20**

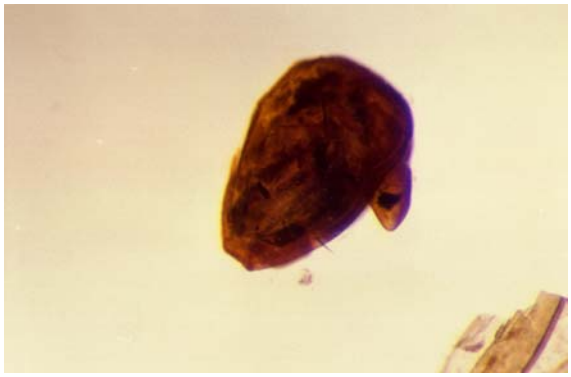


**Photo 05-21**

**Slide 0010**

**Photo 05-22**

**Photo 05-23**

**Photo 05-24**

**Photo 05-25**

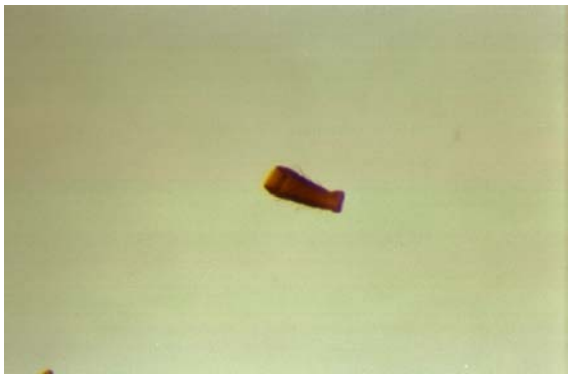


**Photo 06-04**

## SAMPLE 3

**Label Data**

5/12/03 WF1 F2
brcr 231071224 (BW)

**Slides and Photos**

| | |
|---|---|
| 0001 | 01-15, 01-16, 01-17, 01-18, 05-11 |
| 0002 | 01-10, 01-11, 01-13, 01-14 |
| 0003 | 01-12 |

**Sample Contents**

Sample 3 consisted of spider femur, and beetle femur, coxae, integument fragments, tarsal claws, elytra fragments, mandibles, and a Dipteran egg. It is estimated that Sample 1 contained fragments from at least 1 spider and 1 beetle. No specimens were found in the arthropod collection that matched the fragments of this beetle.

**Slide 0001**

**Photo 01-15**

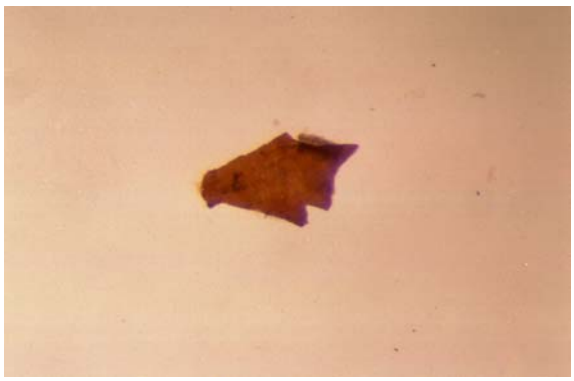


**Photo 01-16**

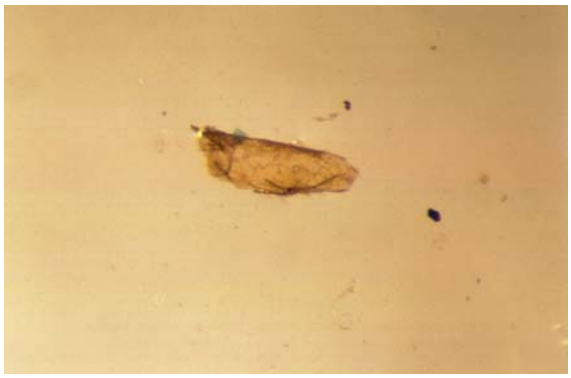


**Photo 01-17**

**Photo 01-18**

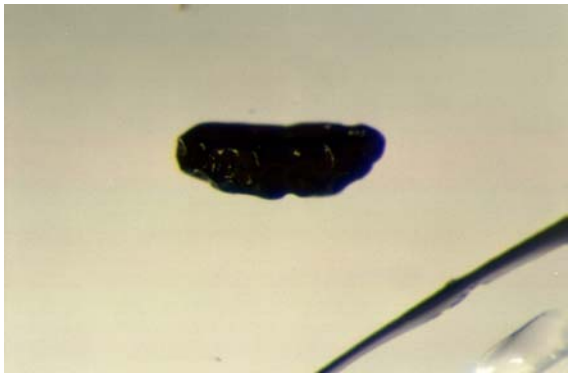


**Photo 05-11**

**Slide 0002**

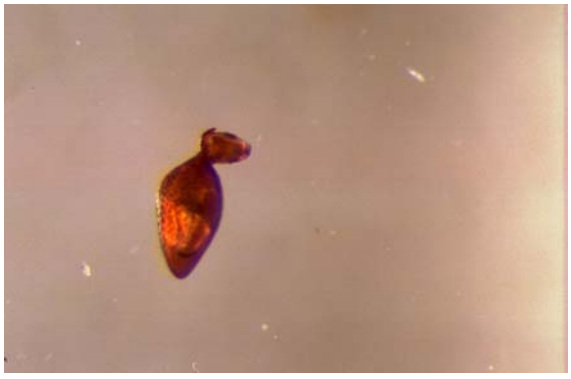


**Photo 01-10**

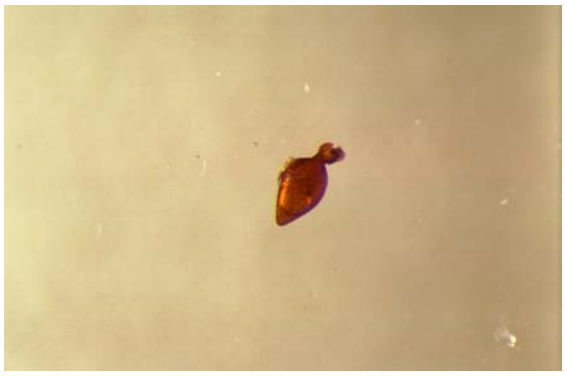


**Photo 01-11**

**Photo 01-13**

**Photo 01-14**

**Slide 0003**

**Photo 01-12**

## SAMPLE 4

Sample 4 consisted of two sample vials, labeled 1 of 2 and 2 of 2. The results reported here are a composite of the two sample vials.

### Label Data

BJC 5/05/03 WF3-BR
FECAL SAMPLE 1 of 2 and 2 of 2

### Slides and Photos

| | |
|---|---|
| 0015 | 06-13 |
| 0016 | 06-14 |
| 0017 | 06-15 |
| 0018 | 06-16, 06-17, 06-18, 06-19, 06-20, 06-21 |
| 0019 | 06-22 |
| 0020 | 06-23, 06-25, 07-1A, 07-2A, 07-3A, 07-5A |
| 0021 | 07-6A, 07-7A, 07-8A |

### Sample Contents

Sample 4 consisted of spider femur and tibia, and beetle tarsi, tibia, femur, coxae, elytra fragments, head and pronota. It is estimated that the composite Sample 4 contained fragments from at least 1 spider and 3 beetles. One of the beetles was a Curculionidae. No specimens were found in the arthropod collection that matched the fragments of this beetle. The beetles are generally small in size, most likely less than 1 cm in length.

**Slide 0015**

**Photo 06-13**

**Slide 0016**

**Photo 06-14**

**Slide 0017**

**Photo 06-15**

**Slide 0018**

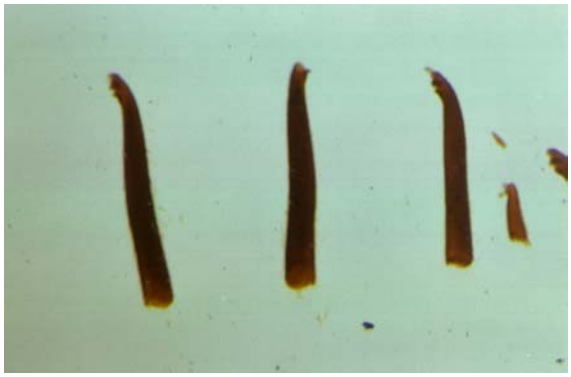


**Photo 06-16**

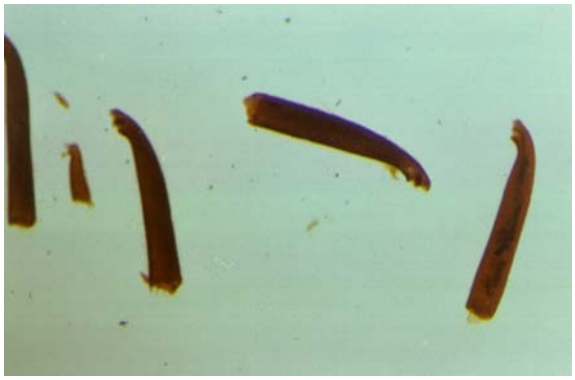


**Photo 06-17**

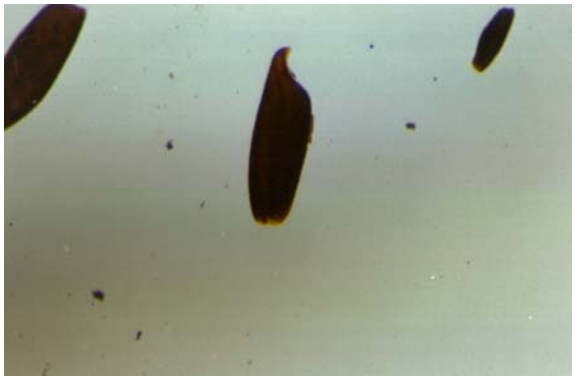


**Photo 06-18**

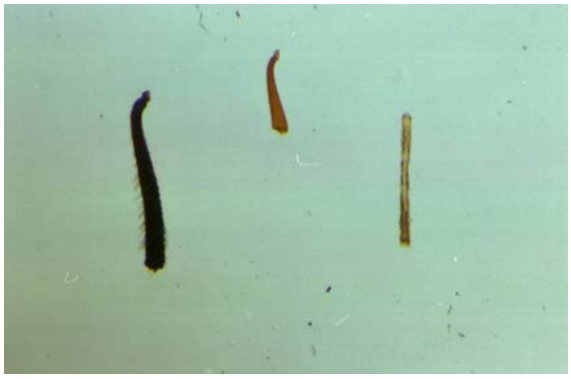


**Photo 06-19**

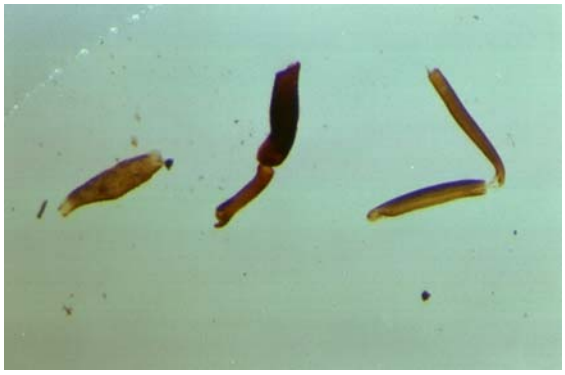


**Photo 06-20**

**Photo 06-21**

**Slide 0019**

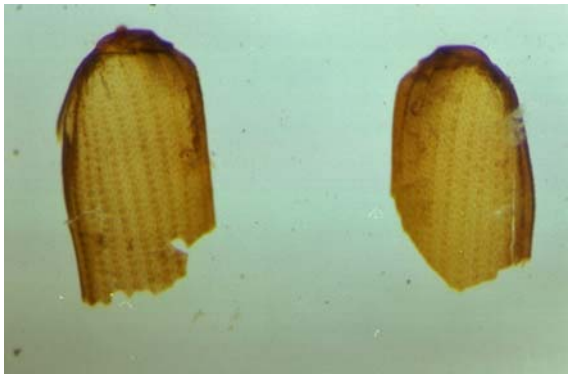


**Photo 06-22**

**Slide 0020**

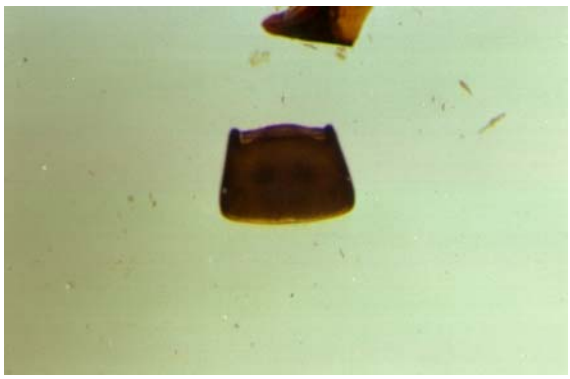


**Photo 06-23**

**Photo 06-25**

**Photo 07-1A**

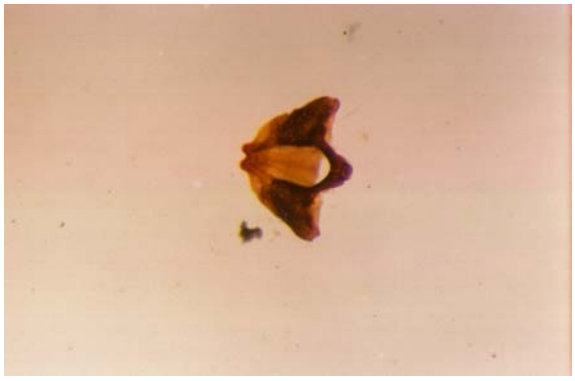


**Photo 07-2A**

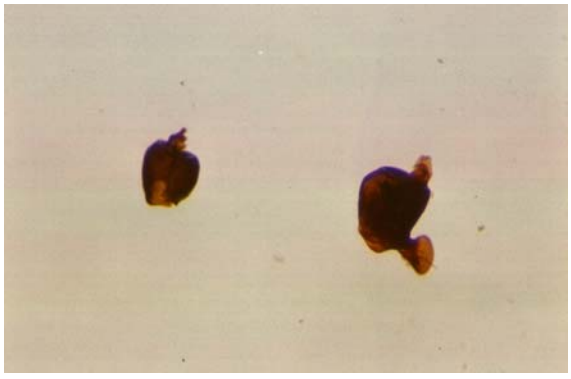


**Photo 07-3A**

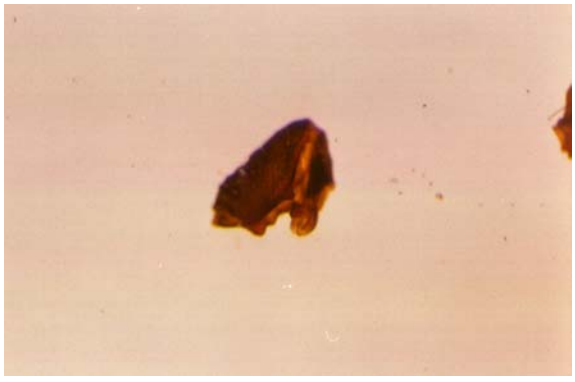


**Photo 07-5A**

**Slide 0021**

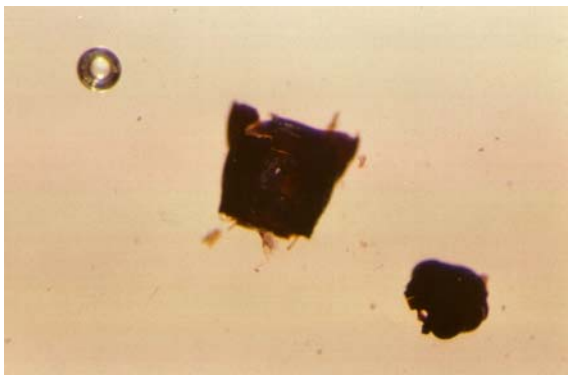


**Photo 07-6A**

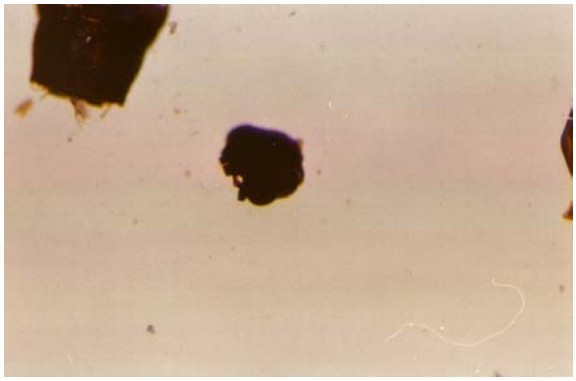


**Photo 07-7A**

**Photo 07-8A**

## SAMPLE 5

**Label Data**

brcr 05/13/03 WF3 65/H55
YW # 231071225

**Slides and Photos**

| | |
|---|---|
| 0032 | 04-07, 04-08, 04-09, 04-10, 04-11, 04-12, 04-13, 04-14, 04-15, 08-19A, 08-20A, 08-21A, 08-22A |
| 0033 | 04-16, 04-17, 04-18 |
| 0034 | 04-19, 04-20, 04-21, 04-22, 04-23, 04-24 |
| 0035 | 09-01, 09-02, 09-03, 09-04, 09-05, 08-23A, 08-24A |

**Sample Contents**

Sample 5 consisted of beetle legs, tarsal claws, tibia, femur, coxae, antennal segments, elytra fragments, pronota, scutella, and sternum. It is estimated that Sample 5 contained fragments from at least 5 beetles. One of the beetles were Elateridae 01 (see mounted specimens), and another was a Curculionidae. The beetles are generally small in size, most likely less than 1 cm in length.

**Slide 0032**

**Photo 04-07**

**Photo 04-08**

Photo 04-09

04-10

Photo 04-11

04-12

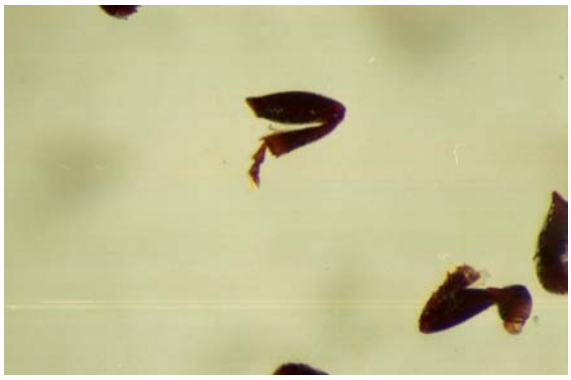


Photo 04-13

04-14

Photo 04-15

08-19A

Photo 08-20A

08-21A

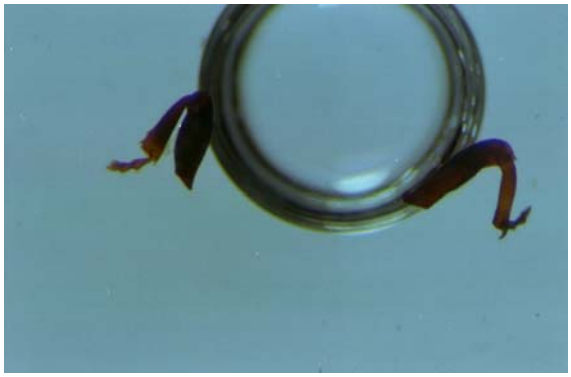


Photo 08-22A

**Slide 0033**

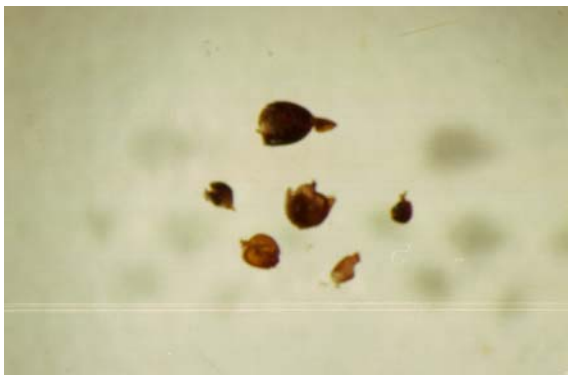


**Photo 04-16**

**Photo 04-17**

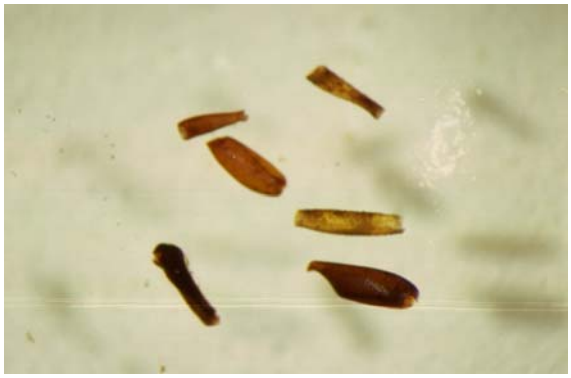


**Photo 04-18**

**Slide 0034**

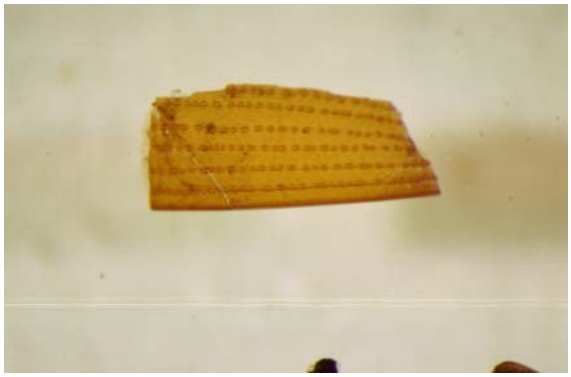


**Photo 04-19**

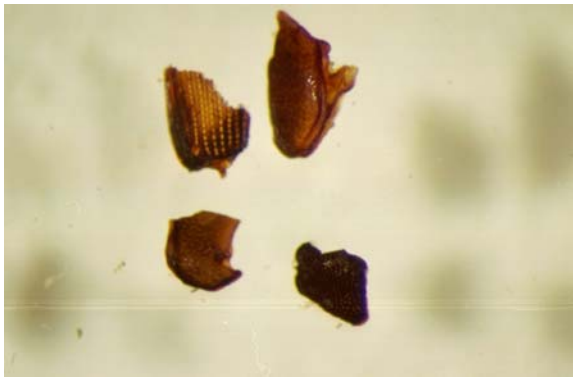


**Photo 04-20**

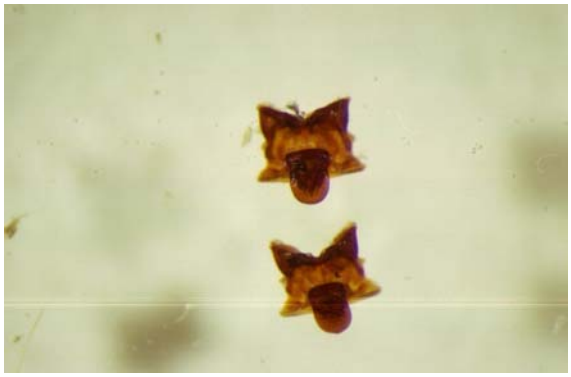


**Photo 04-21**

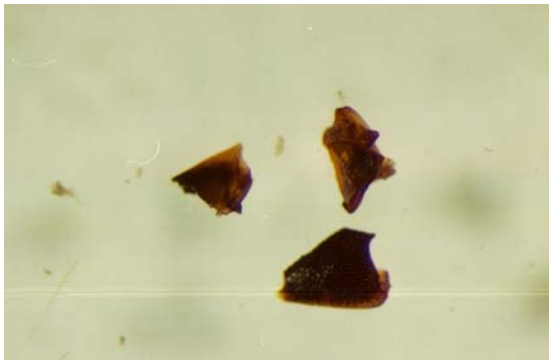


**Photo 04-22**

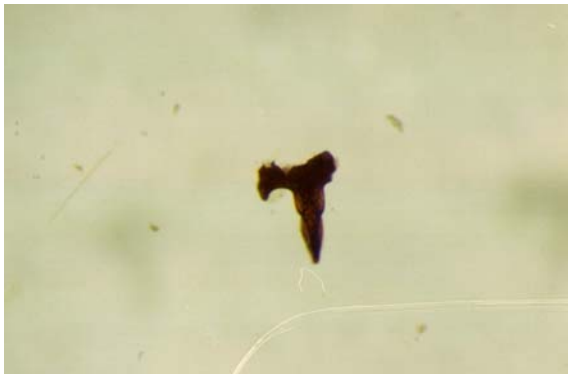


**Photo 04-23**

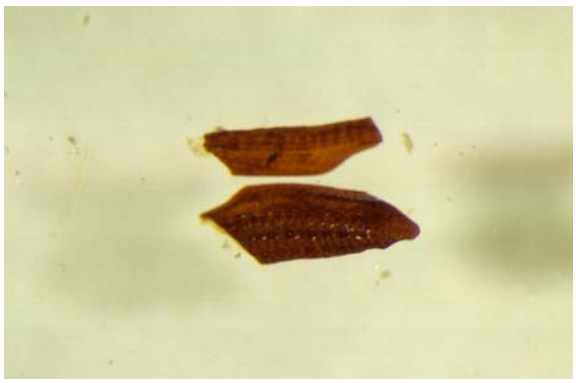


**Photo 04-24**

**Slide 0035**

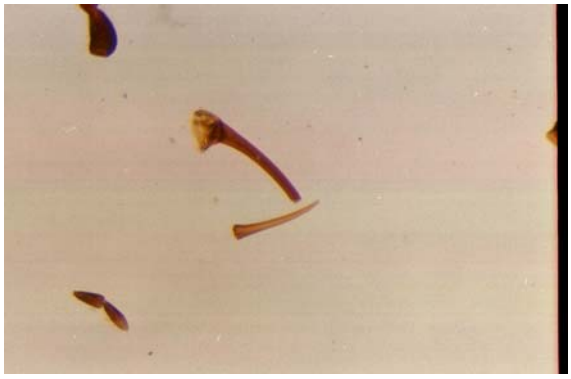


**Photo 09-01**

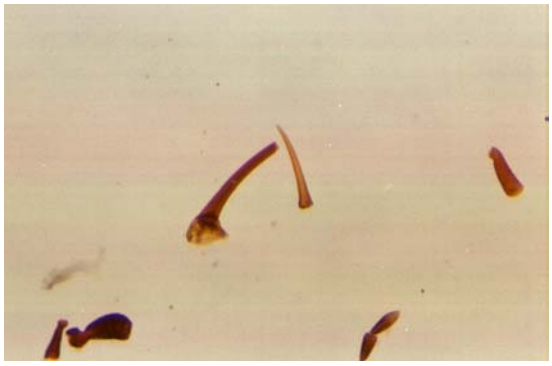


**Photo 09-02**

**Photo 09-03**

**Photo 09-04**

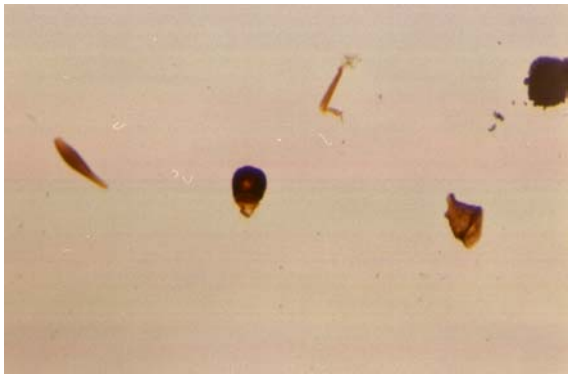


**Photo 09-05**

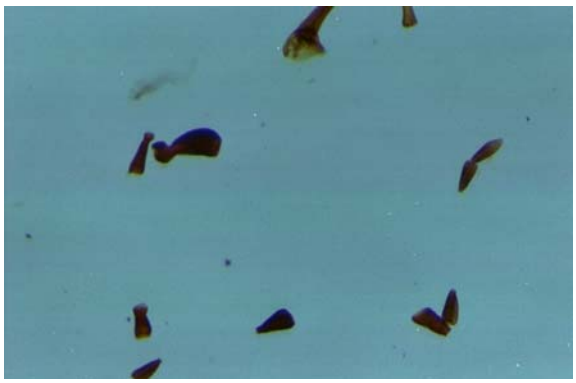


**Photo 08-23A**

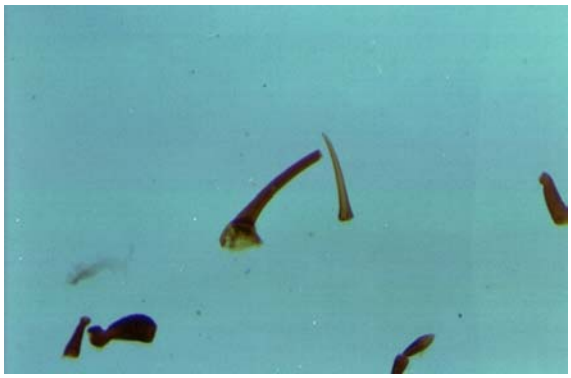


**Photo 08-24A**

## SAMPLE 6

**Label Data**

5/22/03 WF6 Color WY male
Bd # 231071204

**Slides and Photos**

| | |
|---|---|
| 0029 | 04-01, 04-02, 04-03, 04-04, 04-05, 04-06, 08-16A |
| 0030 | 08-17A, 08-18A |

**Sample Contents**

Sample 6 consisted of spider tibia and beetle tarsi, tibia, and mandibles. It is estimated that Sample 1 contained fragments from at least 1 spider and 2 beetles. The beetles are generally small in size, most likely less than 1 cm in length.

**Slide 0029**

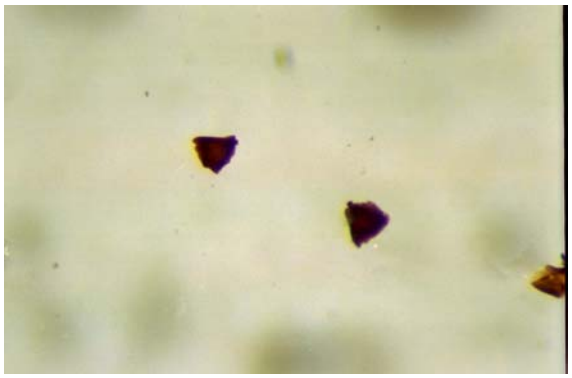


**Photo 04-01**

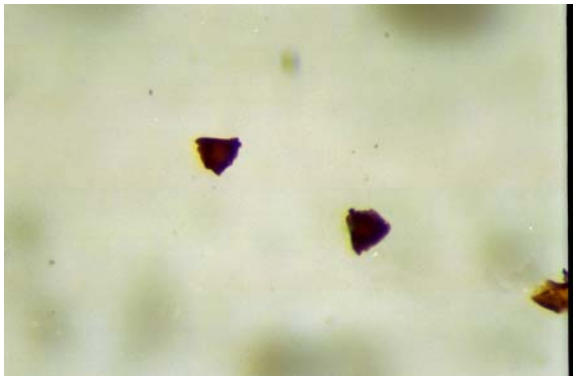


**Photo 04-02**

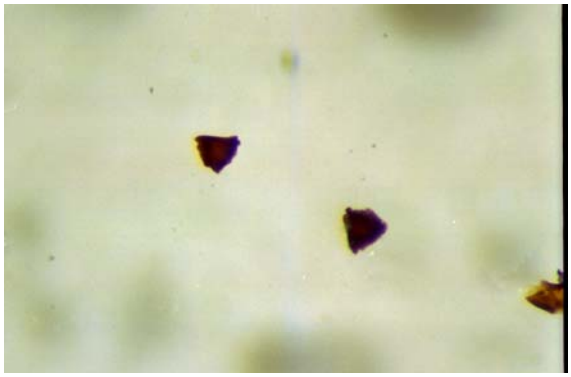


**Photo 04-03**

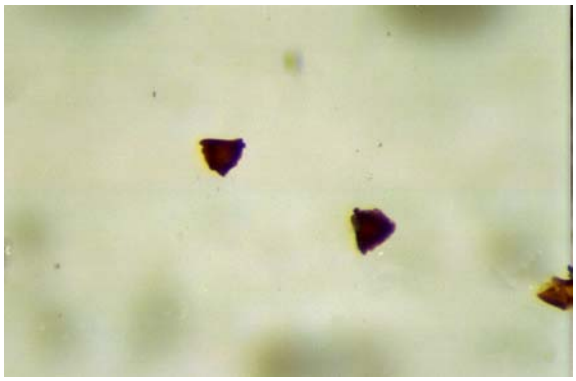


**Photo 04-04**

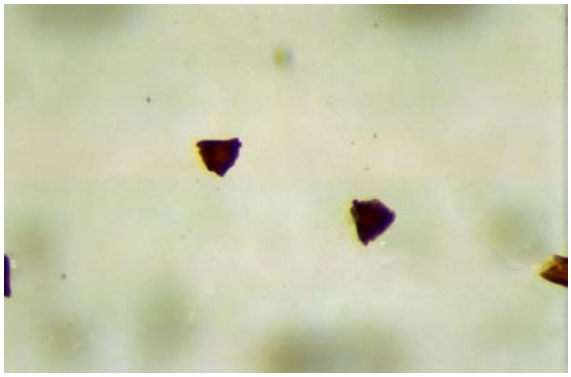


**Photo 04-05**

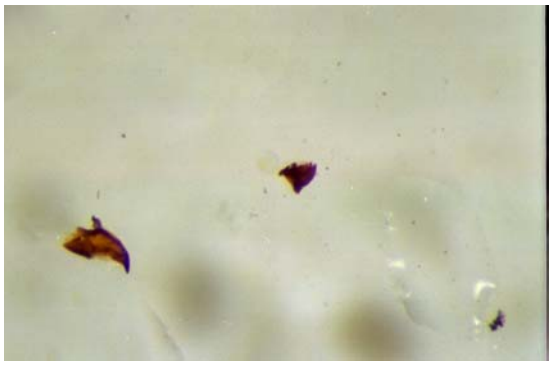


**Photo 04-06**

**Photo 08-16A**

**Slide 0030**

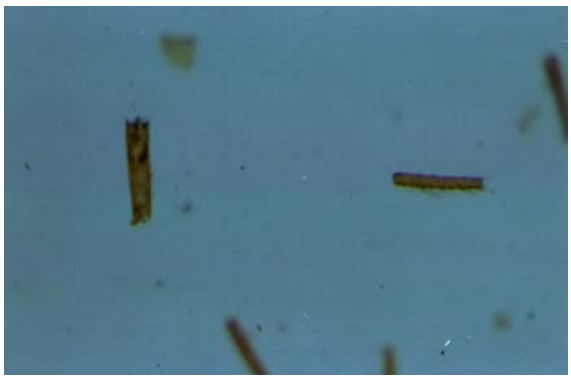


**Photo 08-17A**

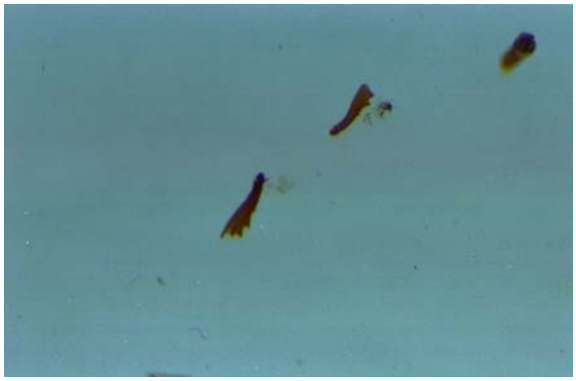


**Photo 08-18A**

## SAMPLE 7

**Label Data**

5/23/03 WF3/6
Bd # 231071205
Color YO (k)

**Slides and Photos**

| | |
|---|---|
| 0022 | 07-9A, 07-10A |
| 0023 | 07-11A, 07-12A, 07-13A |

**Sample Contents**

Sample 7 consisted of spider tibia and beetle tarsi, tibia, femur, coxae, and elytra fragments. It is estimated that Sample 7 contained fragments from at least 1 spider (?) and 2 beetles. The beetles are generally small in size, most likely less than 1 cm in length.

**Slide 0022**

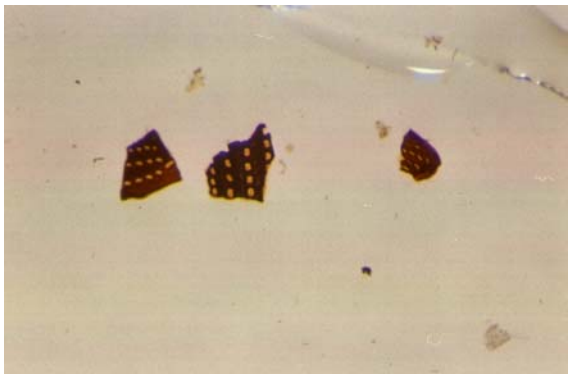


**Photo 07-9A**

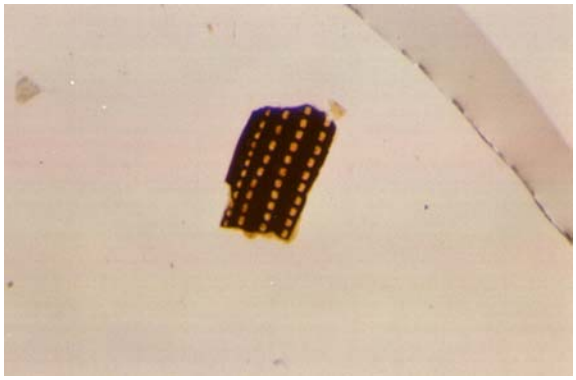


**Photo 07-10A**

**Slide 0023**

**Photo 07-11A**

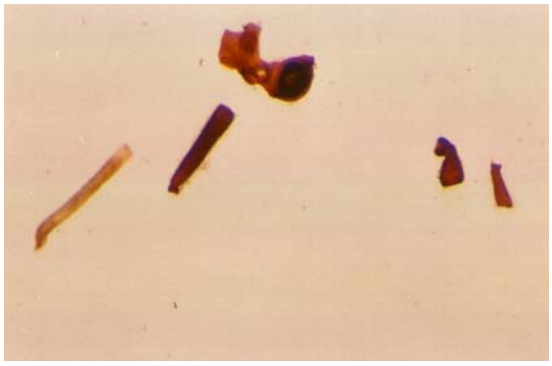


**Photo 07-12A**

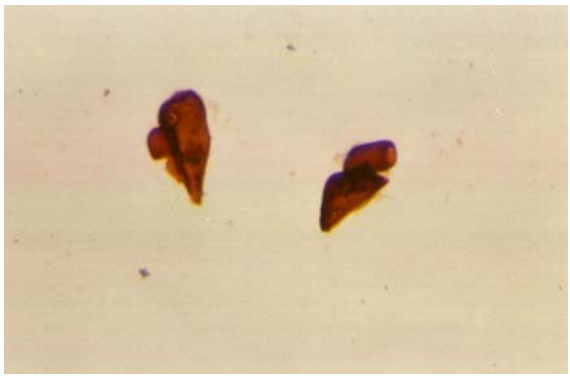


**Photo 07-13A**

## SAMPLE 8

**Label Data**

6/12/03 BrCr DP52
FP (S) ?

**Slides and Photos**

| | |
|---|---|
| 0027 | 08-6A, 08-7A, 08-8A, 08-9A, 08-10A |
| 0028 | 08-11A, 08-12A, 08-13A, 08-14A, 08-15A |

**Sample Contents**

Sample 1 consisted of beetle tarsi, tibia, femur, coxae, antennal segments, head, mandibles, scutella, and pronota. It is estimated that Sample 8 contained fragments from at least 4 beetles. The beetles are generally small in size, most likely less than 1 cm in length.

**Slide 0027**

**Photo 08-6A**

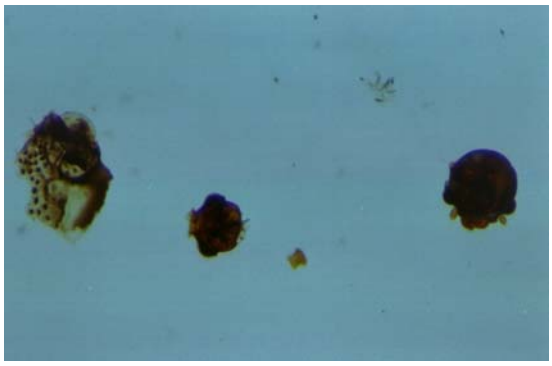


**Photo 08-7A**

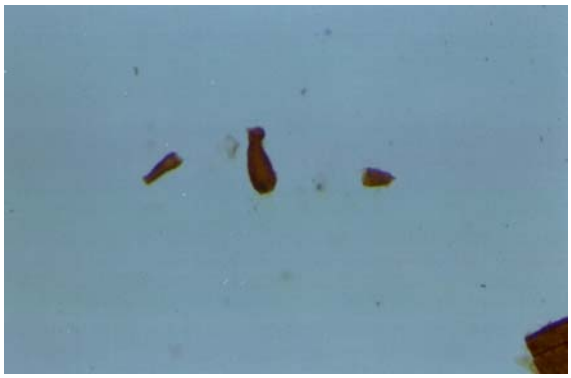


**Photo 08-8A**

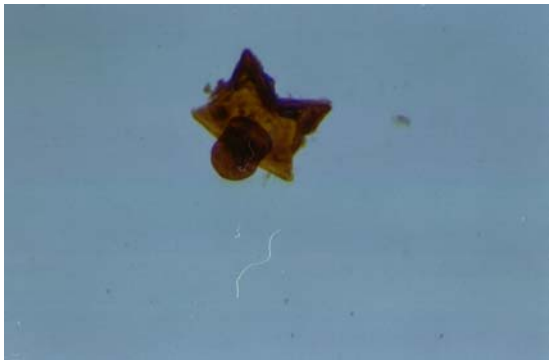


**Photo 08-9A**

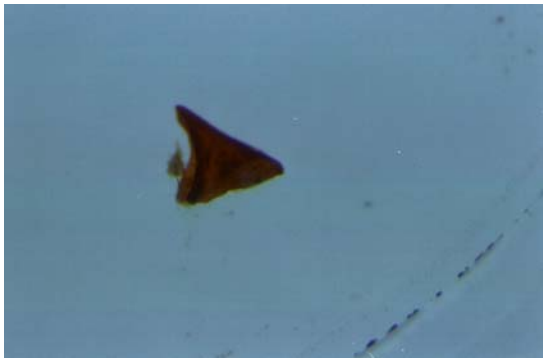


**Photo 08-10A**

**Slide 0028**

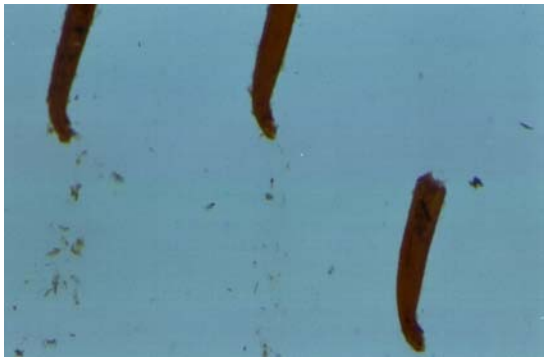


**Photo 08-11A**

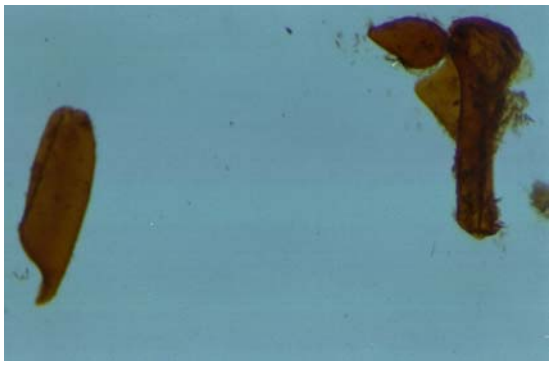


**Photo 08-12A**

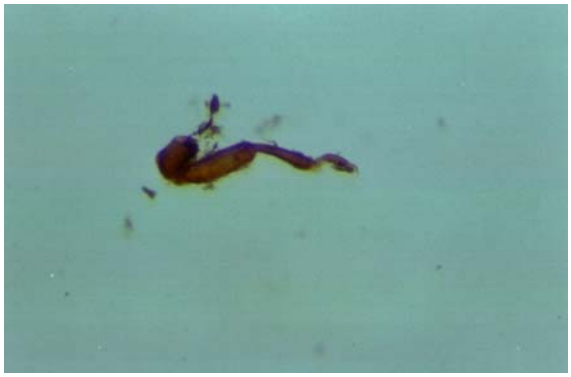


**Photo 08-13A**

**Photo 08-14A**

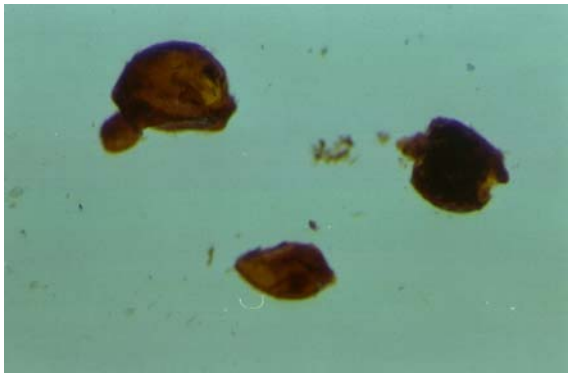


**Photo 08-15A**

## SAMPLE 9

**Label Data**

06/03/03 BRCR DP5
Bd # 231071207 BO (S)

**Slides and Photos**

| | |
|---|---|
| 0024 | 07-14A, 07-15A, 07-16A, 07-17A, 07-18A, 07-19A |
| 0025 | 07-20A, 07-21A, 07-22A, 07-23A |
| 0026 | 07-24A, 08-0A, 08-1A, 08-2A, 08-3A, 08-4A, 08-5A |

**Sample Contents**

Sample 1 consisted of beetle tarsal claws, tibia, femur, coxae, antennal segments, elytra fragments, sternum fragments, mandibles, and scutella, and mandibles from a Lepidoptera larva. It is estimated that Sample 9 contained fragments from at least 2 beetles and one caterpillar. The prey items are generally small in size, most likely less than 1 cm in length.

**Slide 0024**

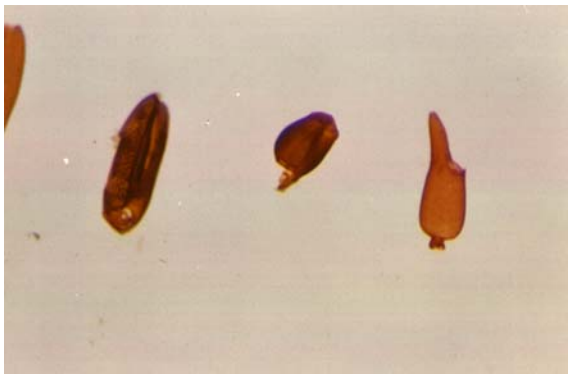


**Photo 07-14A**

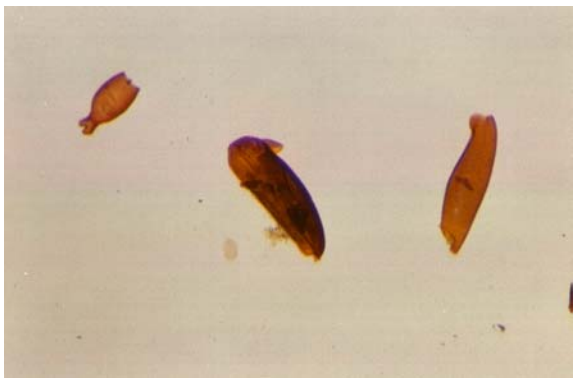


**Photo 07-15A**

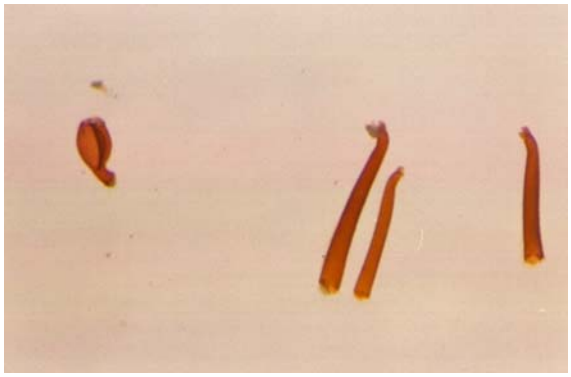


**Photo 07-16A**

**Photo 07-17A**

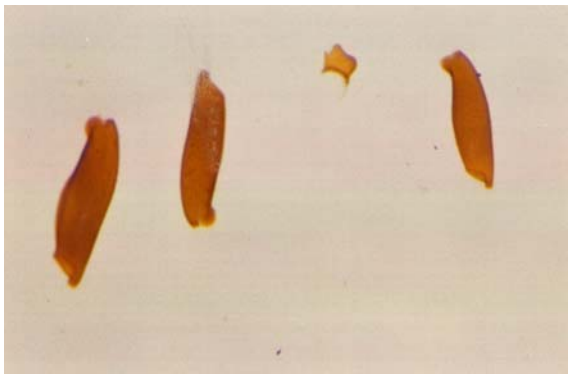


**Photo 07-18A**

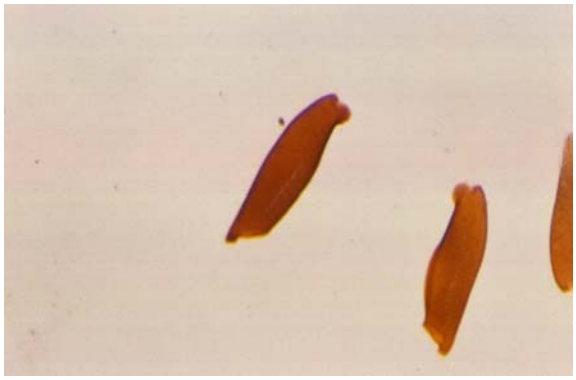


**Photo 07-19A**

**Slide 0025**

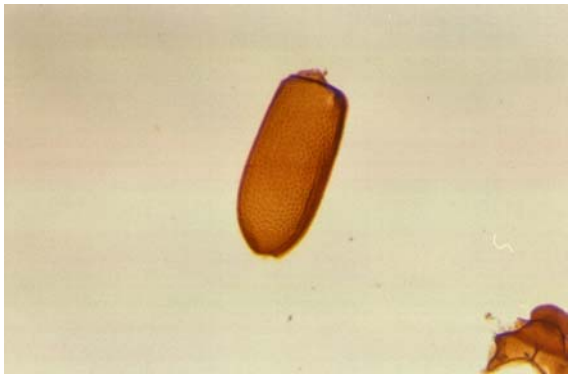


**Photo 07-20A**

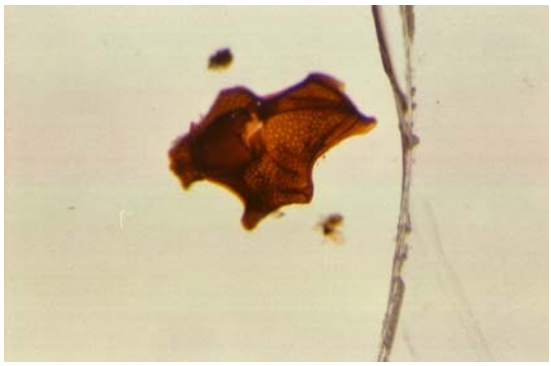


**Photo 07-21A**

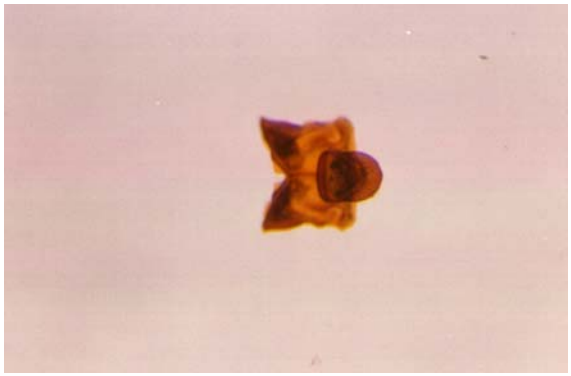


**Photo 07-22A**

**Photo 07-23A**

**Slide 0026**

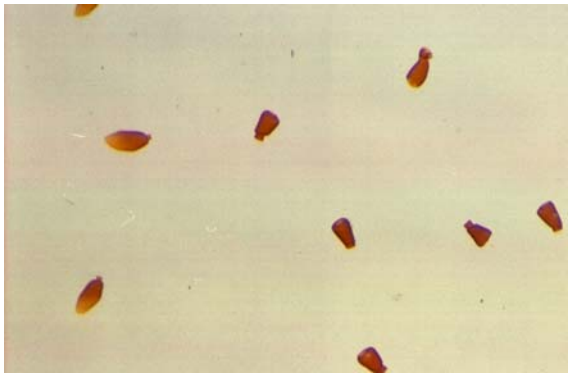


**Photo 07-24A**

**Photo 08-0A**

**Photo 08-1A**

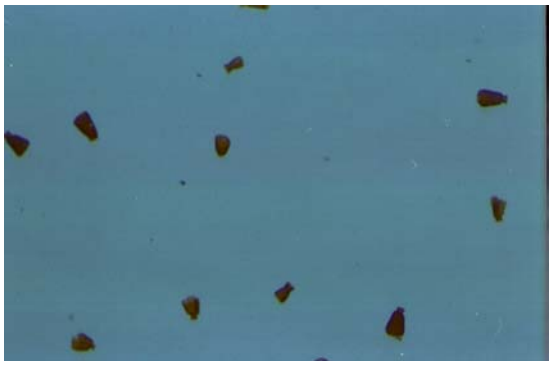


**Photo 08-2A**

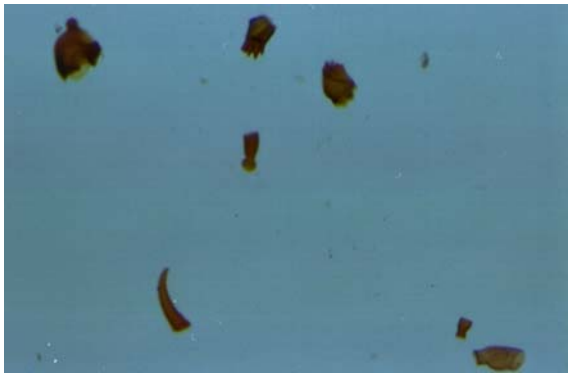


**Photo 08-3A**

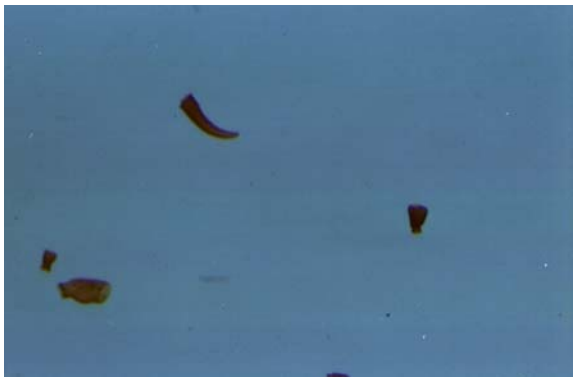


**Photo 08-4A**

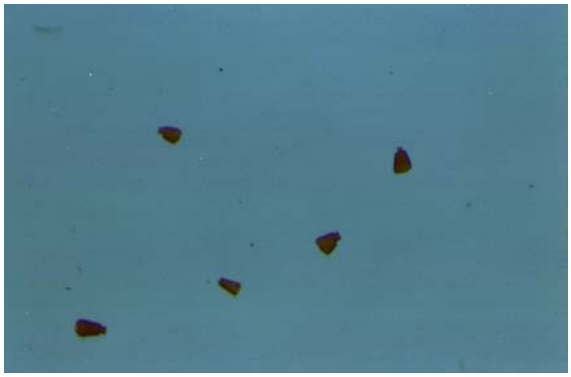


**Photo 08-5A**

## SAMPLE 2004/01

**Label Data**

WF3 05/13/04
Bd # 231071112

**Slides and Photos**

| | |
|---|---|
| 0036 | 09-06, 09-07, 09-08, 09-09, 09-10, 09-11, 11-3A, 11-5A, 11-6A, 11-7A, 11-8A, 11-9A, 11-10A, 11-11A, 11-12A, 11-13A |
| 0037 | 09-12, 11-14A |

**Sample Contents**

Sample 1 consisted of spider patella and beetle tarsi, tarsal claws, femur, coxae, antennal segments, and elytra and sternum fragments. It is estimated that Sample 2004/01 contained fragments from at least 1 spider and 1 beetle. The beetle was generally small in size, most likely less than 1 cm in length.

**Slide 0036**

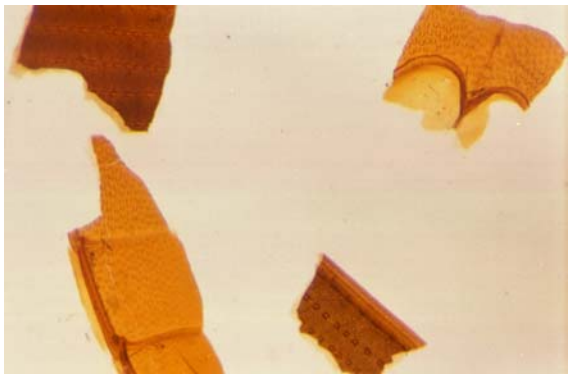


**Photo 09-06**

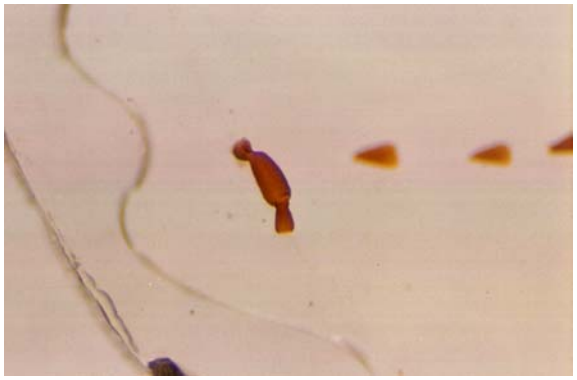


**Photo 09-07**

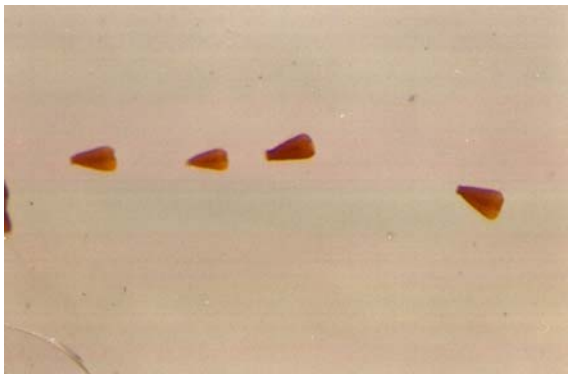


**Photo 09-08**

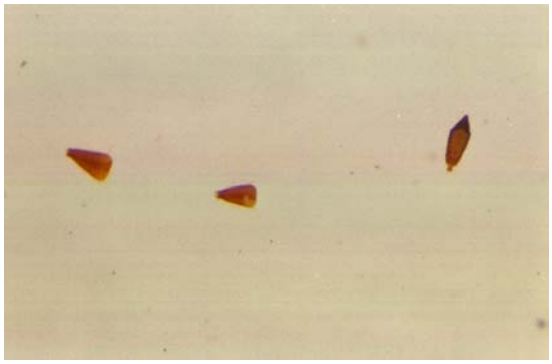


**Photo 09-09**

**Photo 11-3A**

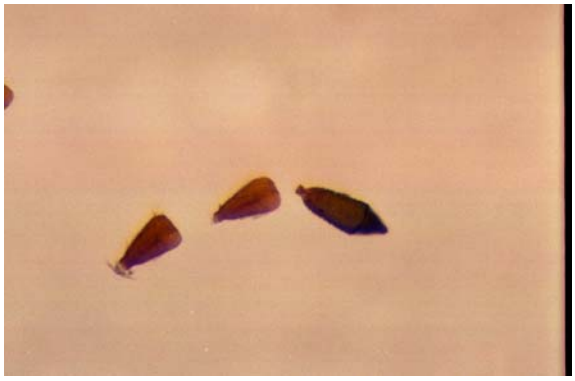


**Photo 11-5A**

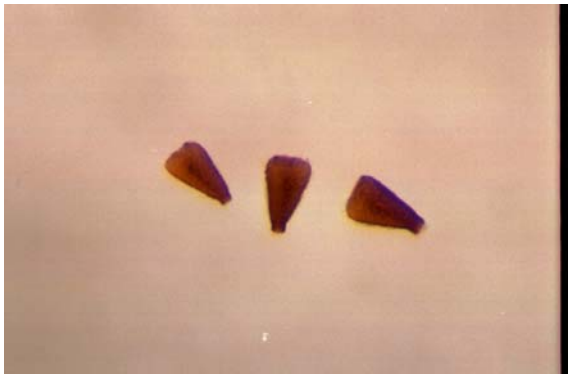


**Photo 11-6A**

**Photo 11-7A**

**Photo 11-8A**

**Photo 11-9A**

**Photo 11-10A**

**Photo 11-11A**

**Photo 11-12A**

**Photo 11-13A**

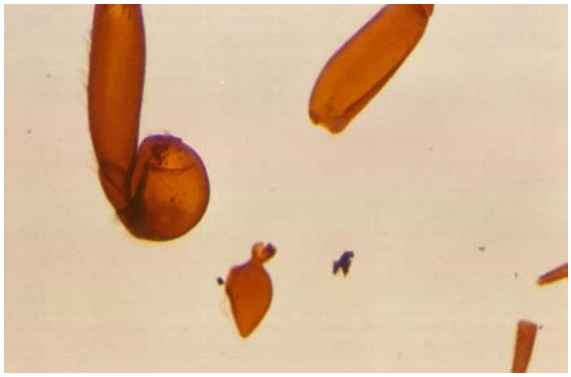


**Photo 09-10**

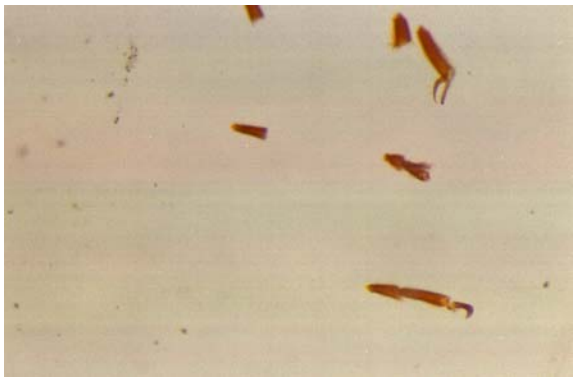


**Photo 09-11**

**Slide 0037**

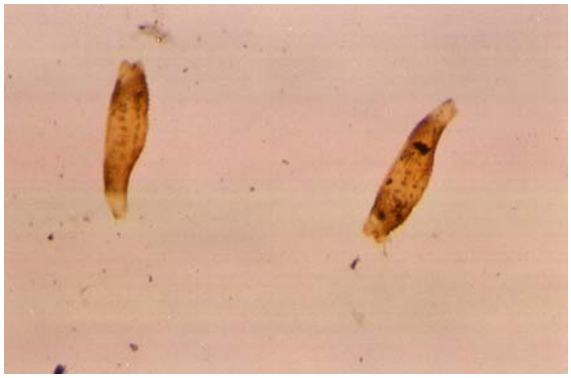


**Photo 09-12**

**Photo 11-14A**

## SAMPLE 2004/02

**Label Data**

WF4 05/17/04 RD
Female # 231071210

**Slides and Photos**

| | |
|---|---|
| 0038 | 09-13, 09-14, 09-15, 09-16, 09-17, 11-15A, 11-16A, 11-17A, 11-18A, 11-19A, 11-20A |
| 0039 | 09-18, 09-19, 09-20, 09-21, 11-21A, 11-22A |
| 0040 | 05-04, 05-05, 05-06, 09-22, 09-23, 09-24, 09-25, 10-01, 11-23A, 11-24A, 11-25 |
| 0041 | 05-07, 05-08, 05-09, 05-10, 10-02, 10-03, 10-04, 10-05, 10-06, 10-07, 10-08 |

**Sample Contents**

Sample 2004/02 consisted of beetle tarsi, tarsal claws, tibia, femur, coxae, antennal segments, legs, mandibles, and elytra and sternum fragments, and mandibles from a Lepidoptera larva. It is estimated that Sample 2004/02 contained fragments from at least 4 beetles and one caterpillar. The prey are generally small in size, most likely less than 1 cm in length.

**Slide 0038**

**Photo 09-13**

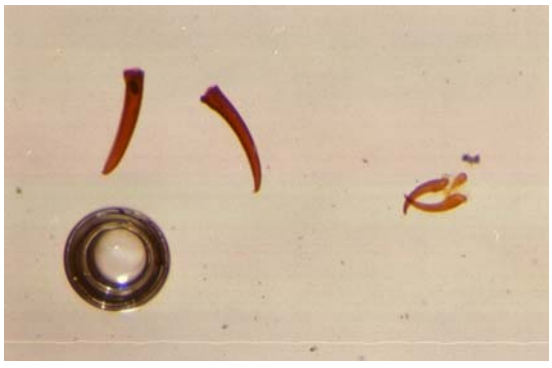


**Photo 09-14**

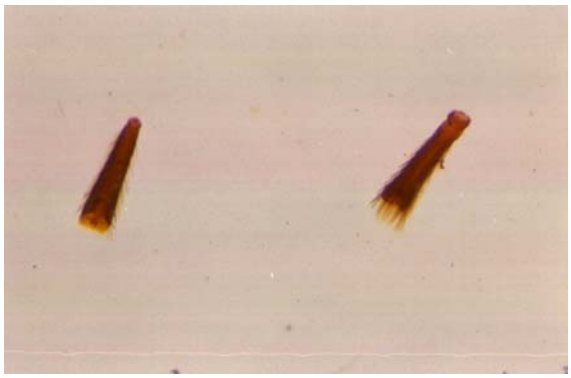


**Photo 09-15**

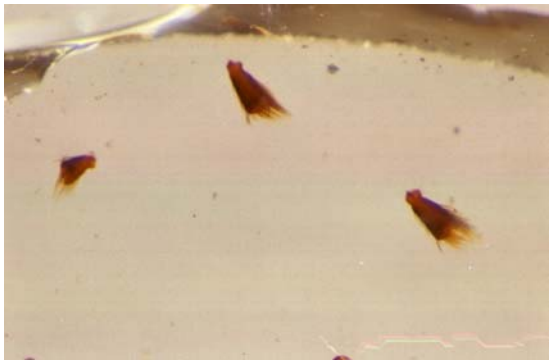


**Photo 09-16**

**Photo 09-17**

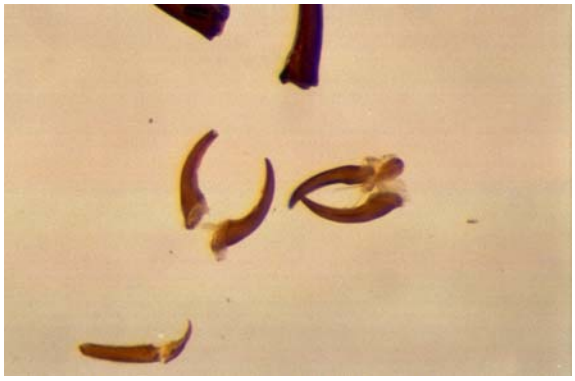


**Photo 11-15A**

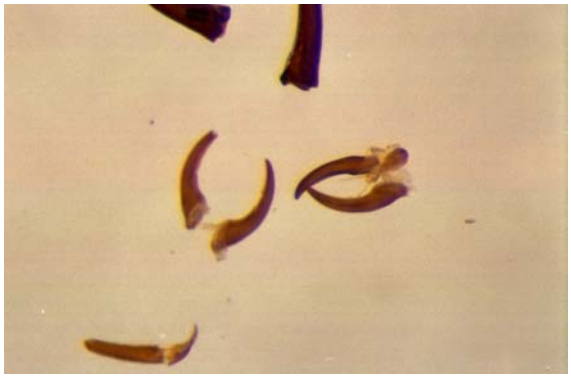


**Photo 11-16A**

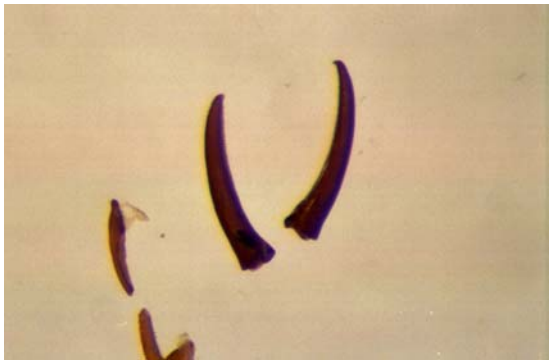


**Photo 11-17A**

**Photo 11-18A**

**Photo 11-19A**

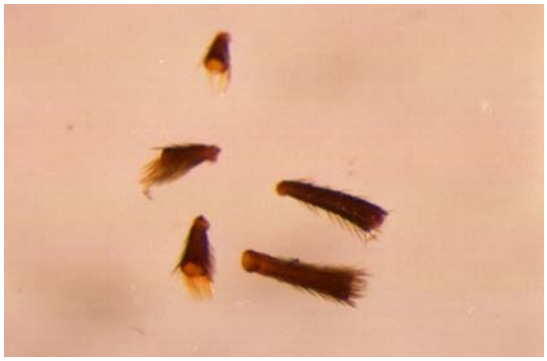


**Photo 11-20A**

**Slide 0039**

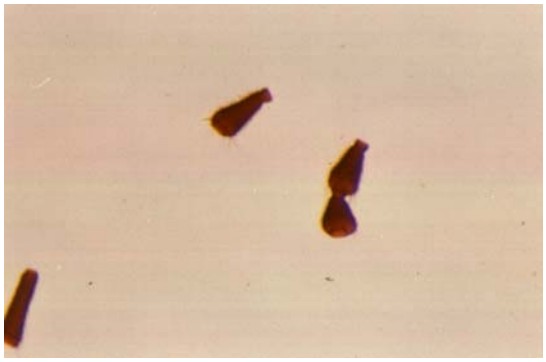


**Photo 09-18**

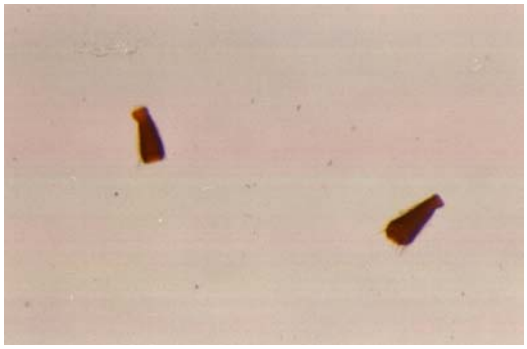


**Photo 09-19**

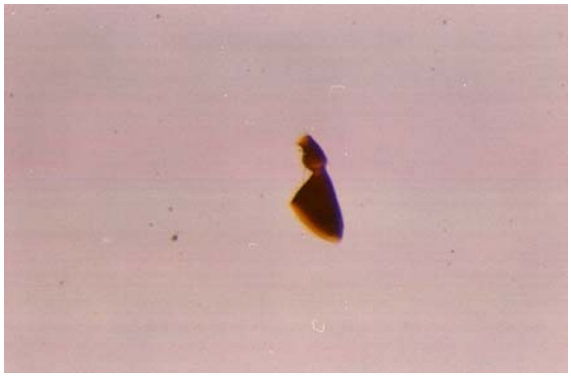


**Photo 09-20**

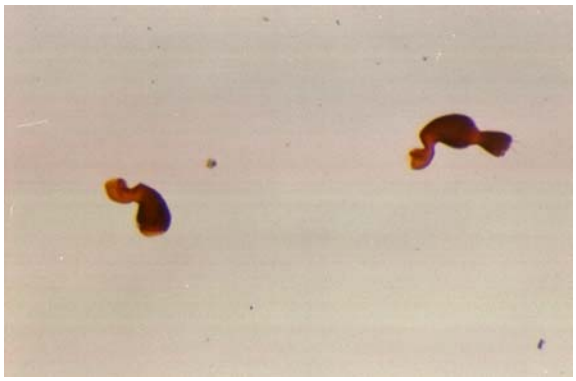


**Photo 09-21**

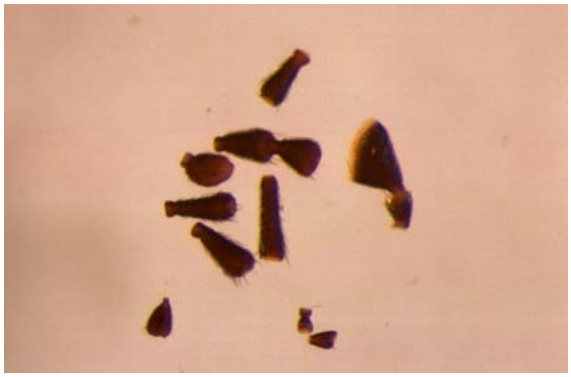


**Photo 11-21A**

**Photo 11-22A**

**Slide 0040**

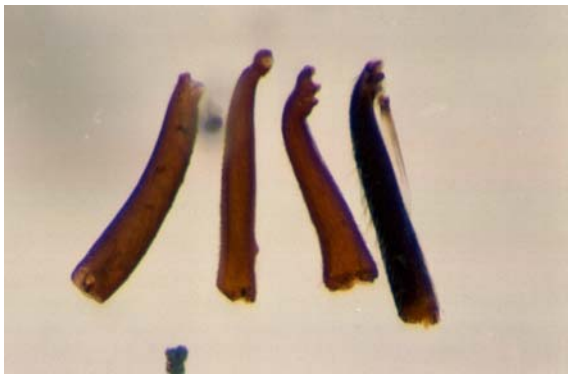


**Photo 05-05**

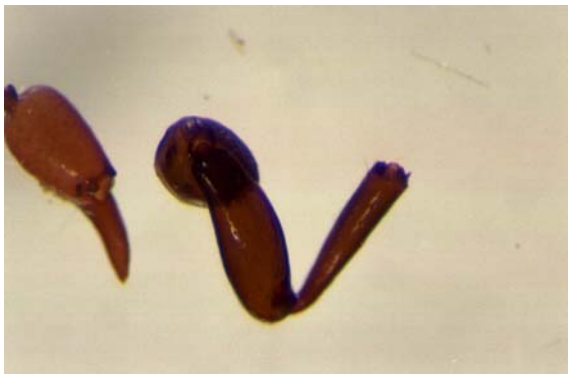


**Photo 05-05**

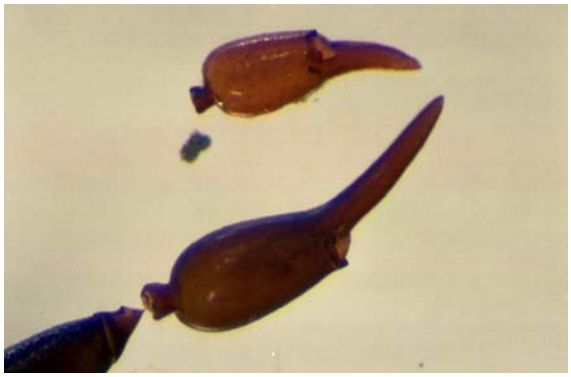


**Photo 05-06**

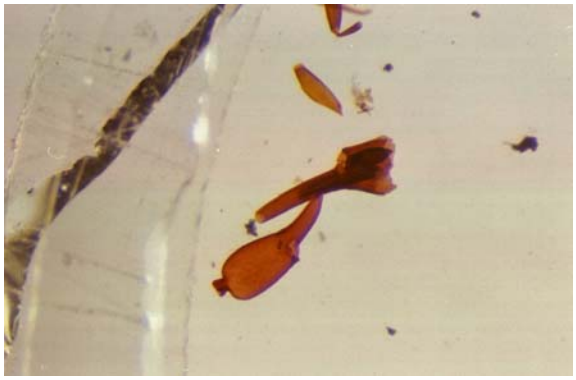


**Photo 09-22**

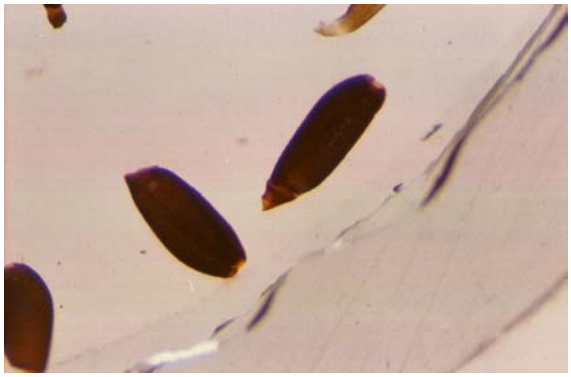


**Photo 09-23**

**Photo 09-24**

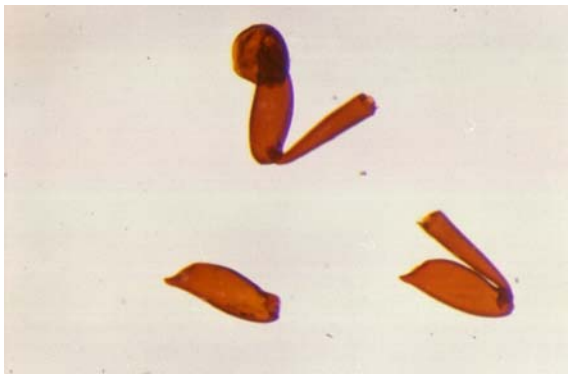


**Photo 09-25**

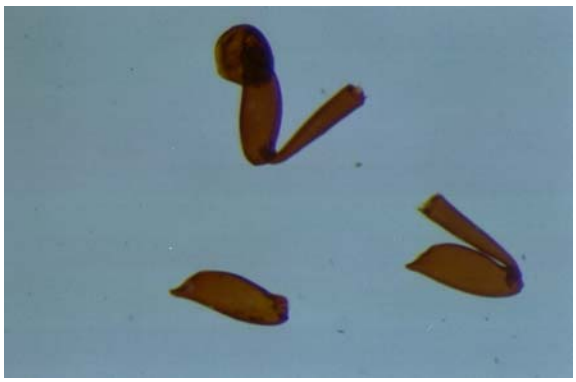


**Photo 10-01**

**Photo 11-23A**

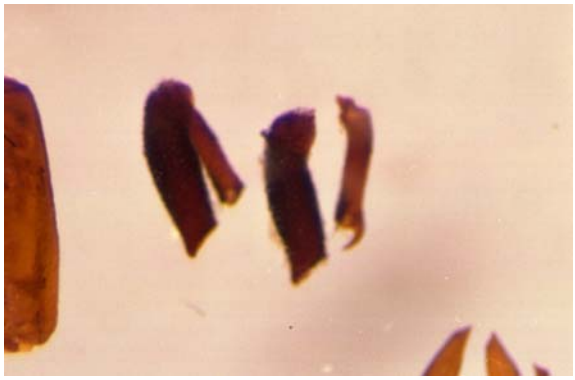


**Photo 11-24A**

**Photo 11-25**

**Slide 0041**

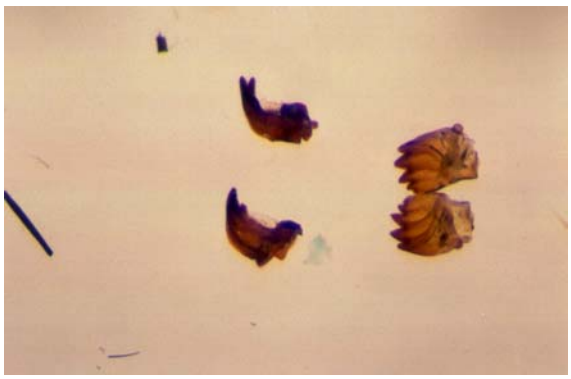


**Photo 05-07**

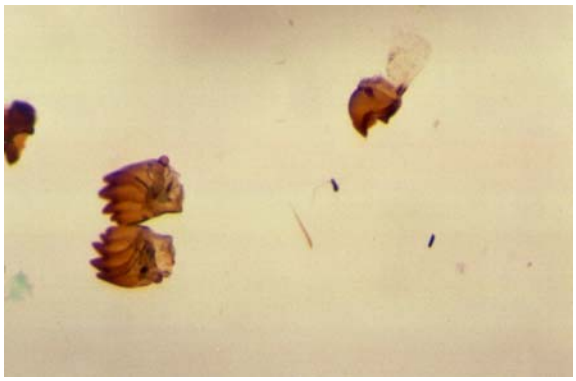


**Photo 05-08**

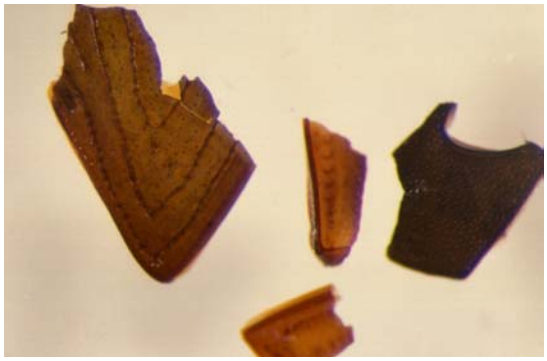


**Photo 05-09**

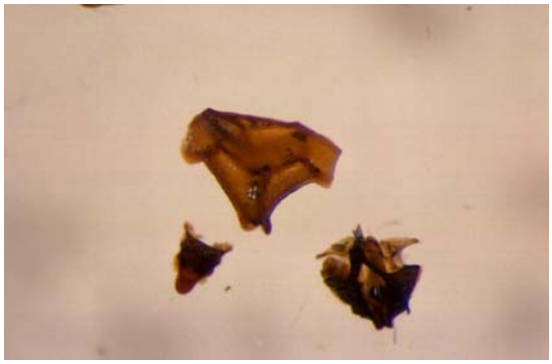


**Photo 05-10**

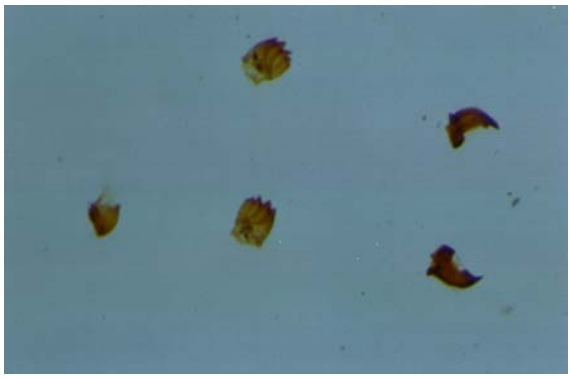


**Photo 10-02**

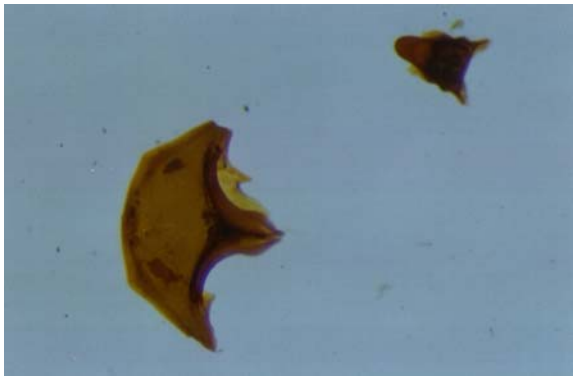


**Photo 10-03**

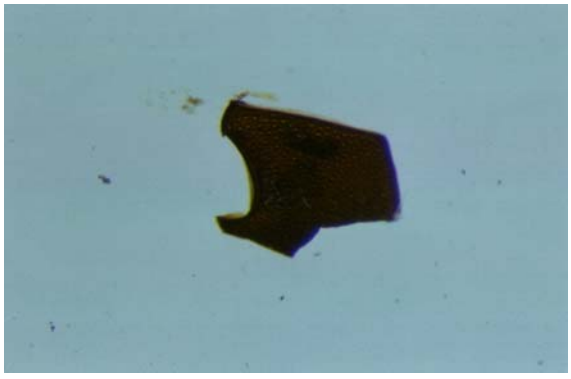


**Photo 10-04**

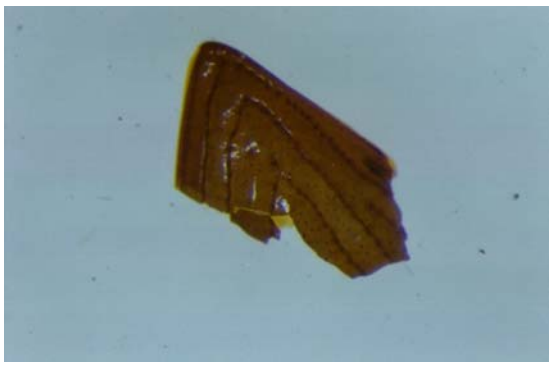


**Photo 10-05**

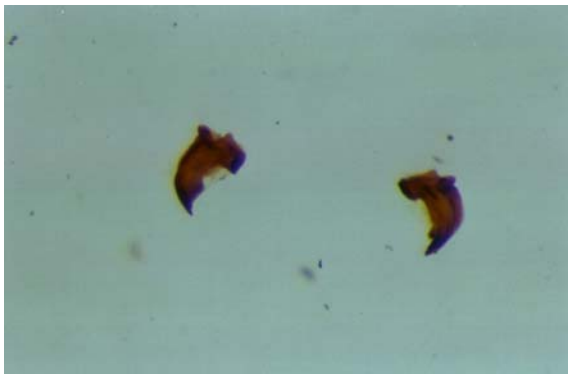


**Photo 10-06**

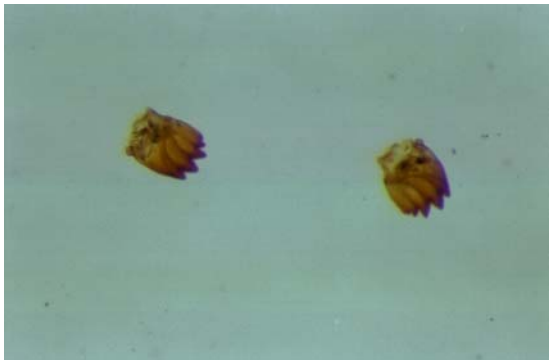


**Photo 10-07**

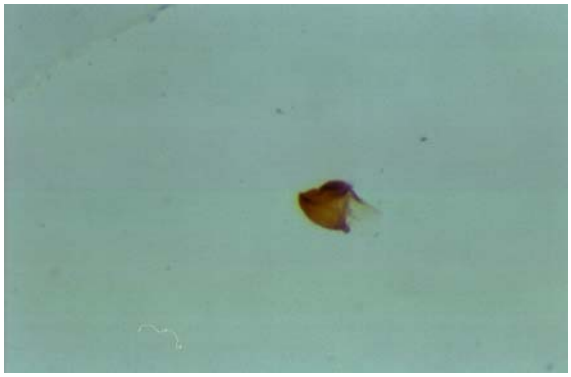


**Photo 10-08**

## SAMPLE 2004/03

**Label Data**

WF3 5/19/04
Bd # 231071232

**Slides and Photos**

0042 10-09

**Sample Contents**

Sample 2004/03 consisted of beetle elytra fragments. It is estimated that Sample 2004/03 contained fragments from at least 1 beetle. The beetle was generally small in size, most likely less than 1 cm in length.

**Slide 0042**

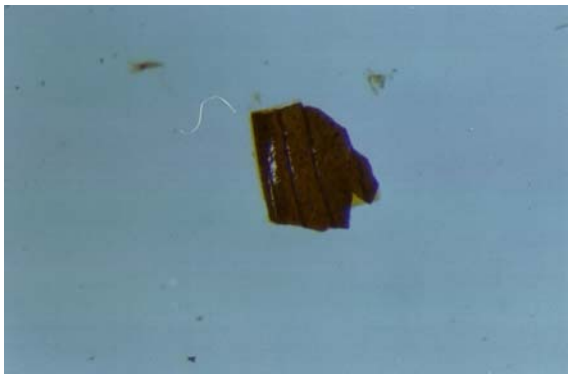


**Photo 10-09**

## SAMPLE 2004/04

**Label Data**

DP6 male WB
band # 231671236

**Slides and Photos**

0043 10-10, 10-11, 10-12, 10-13

**Sample Contents**

Sample 1 consisted of spider patella and tibia, and Diptera wing fragments. It is estimated that Sample 2004/04 contained fragments from at least 1 spider and 1 fly.

**Slide 0043**

**Photo 10-10**

**Photo 10-11**

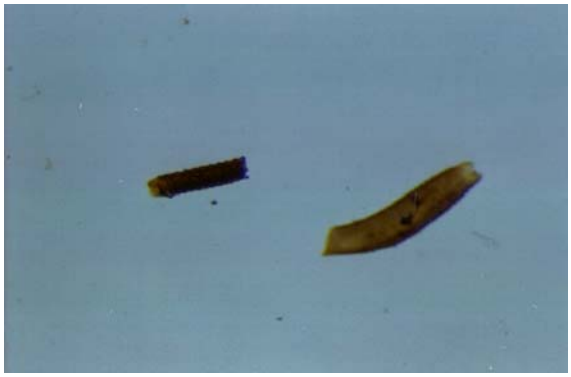


**Photo 10-12**

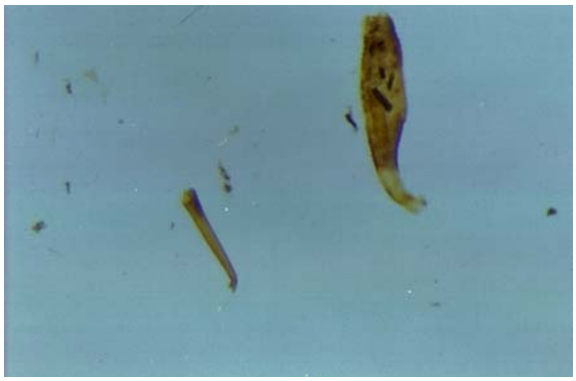


**Photo 10-13**

# VI. DISCUSSION

Brown creeper fecal samples contained fragments of prey items consisting of spiders, small beetles, and Lepidoptera larvae. The beetles are generally small in size, most likely less than 1 cm in length. The beetle prey items are most likely Elateridae, Staphylinidae, and Curculionidae. One of the Lepidoptera larvae was a Tortricidae.

Three hundred and sixty arthropod collection samples taken from the same locality as the brown creeper fecal samples were searched for specimens that matched fragments. Only two specimens were positively matched to fragments. One specimen of each was mounted. Mounted specimen Coleoptera 01 is tentatively identified as a Staphylinidae. The other mounted specimen, Elateridae 01, is an Elateridae. No other specimens were matched to fecal sample fragments and therefore it was not possible to identify the fragments beyond the level of Order.

# VII. BIBLIOGRAPHY

Barnes, R. D. 1968. Invertebrate Zoology Second Edition. W. B. Saunders Company, Philadelphia. 743 pages.

Cornell. 2005. Website: http://birds.cornell.edu/BOW/BROCRE/. Copyright© 2000 Cornell Laboratory of Ornithology.

Dillon, E. S. and L. S. Dillon. 1972. A Manual of Common Beetles of Eastern North America. Dover Publications, Inc., New York. 894 pages.

Kaufman, Kenn. 2005. Kenn Kaufman's Nature Website http://www.kknature.com/.

Ralph, C., P., S. E. Nagata, and C. J. Ralph. 1985. Analysis of droppings to describe diets of small birds. Journal of Field Ornithology 56:165-174.

Seattle Audubon. 2002. BirdWeb Seattle Audubon's Online Guide to the Birds of Washington State. http://www.birdweb.org/birdweb/.

White, R. E. 1983. Peterson Field Guides. Beetles. Houghton Mifflin Company, New York. 368 pages.