CONTENTS

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Tabanid (Diptera) Survey at Five Horse Farms in Maryland, 1984

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Abstract

As part of a Potomac Horse Fever Vector investigation, 1984, the Tabanidae in Montgomery County, Maryland, were surveyed by using modified New Jersey box traps. Seven species of Tabanidae were collected and identified: **Chrysops univittatus, Hymbomitra lasiophthalma, Tabanus lineola, T. quinquevittatus, T. similis, T. stygius,** and **T. trimaculatus.** Almost 90% of the horse flies collected were **T. quinquevittatus.**

A survey was conducted of the Tabanidae (Diptera) associated with the horse farms of northwestern Montgomery County, an area with a recent history of Potomac Horse Fever (PHF). Since 1981 more than 400 horses in Maryland have been diagnosed as having the disease. Although the etiological agent has been established as **Erlichia risticci** Holland (Holland, et. al., 1985), haematophagus arthropods have not been identified as positive vectors (Holland, et. al., 1985; Rohl, 1985). The 1984 tabanid survey was intended to collect live representative species of potential vectors from horse farms within the PHF endemic area, and preserve them by quick-freezing for subsequent PHF pathogen examinations. This report concerns only the species survey.

Materials and Methods

Five horse farms were selected on the basis of having a history of PHF or being adjacent to such a farm. All cooperating farms had horses in stables as well as in corrals and pastures. All of the farms were within 9.5 km of the Potomac River (Fig. 1), in gently rolling terrain, and each had 1 or more intermittent streams. Farms 1, 3, and 4 were equestrian schools and boarded several privately owned horses. Farms 2 and 5 were primarily horse breeding farms. The stables and corrals were very clean, free of litter and each farm had several cats and dogs, secondary hosts for haematophagus Diptera. The modified New Jersey trap (Morgan & Lee, 1977) was the collecting device. Two were placed on each farm. At 4 farms (#1-4) the traps were located 30-50 m apart, outside of, but near corral or pasture fences, and anchored to wooden stakes driven into the ground. At farm 5, for aesthetic purposes the traps were placed within an empty pasture. Unfortunately, midway through the survey season several mares with foals were

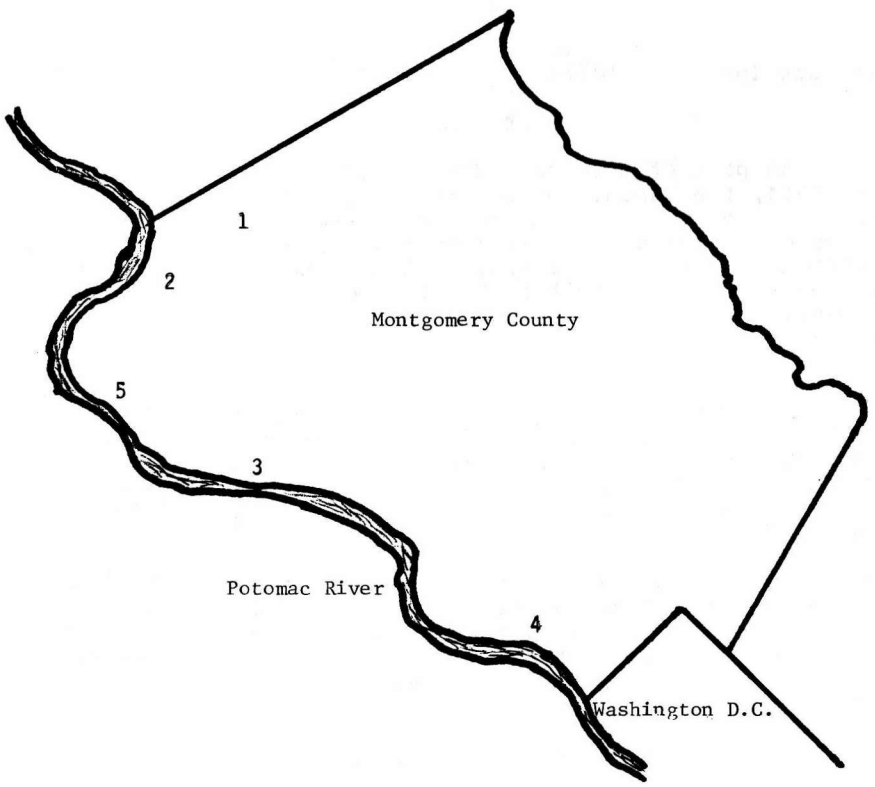

Figure 1. Locations of 5 horse farms surveyed for Tabanidae near the Potomac River, Montgomery County, Maryland, 1984.

placed in that pasture and that part of the survey was rapidly terminated. The mares demolished the traps and the remnants were removed on July 11.

The survey was begun May 29 (first collection date June 5) and ended September 12, 1984. Only live flies were collected weekly from the traps by using the positive phototactic response of the flies to transfer them to small, more transportable cages. One cage measuring 26x26x26 cm, 4 sides of 12 mesh aluminum screen, 1 of solid metal, and 1 containing a sliding metal panel of clean glass, was used to collect the flies from both traps at a farm. A corner of the box trap top screen was secured to the box by 20 cm strips of Velcro ® to create a resealable opening in the screen. The cage was placed over the opening, the glass panel was opened half-way, a sheet of black cloth was draped over the remainder of the box top, and the positive phototactic reaction of the trapped flies caused them to fly into the small cage. The transfer of flies to the small cage was accomplished in <1 minute. By this method only live flies were collected for the subsequent pathogen examinations. Closing the glass panel and the box trap top opening and removal of the cloth readied the trap for more captors. Flies so collected, and transferred to the laboratory, survived >24 hr. when a source of sugar-water was available. The flies were identified using Thompson (1967), which lists 48 species of Tabanidae collected in Montgomery County, and Pechuman (1972).

Results and Discussion

During the May 29-September 12, 1984 period, 7 species of tabanids plus the Muscidae, **Stomoxys calcitrans** (L.) were collected in the modified New Jersey box traps (Table 1). The tabanid species were: **Chrysops univittatus** Macquart, **Hybomitra lasiophthalma** (Macquart), **Tabanus lineola** Fabricius, **T. quinquevittatus** Wiedemann, **T. similis** Macquart, **T. stygius** Say, and **T. trimaculatus** Palisot de Beauvois. All specimens of Tabanidae collected were females, and the **C. univittatus** was the first deer fly collected in my box traps in >10 yrs. of Maryland tabanid surveys.

As shown in Table 1, only 2 species were collected from every farm surveyed, **H. lasiophthalma** and **T. quinquevittatus.** The last **H. lasiophthalma** was collected June 19, and **T. quinquevittatus** was collected every week, June 12 to August 17. From August 17 to September 12, no live Tabanidae or Muscidae were collected from the traps. Inasmuch as only live flies were desired during the survey, no attempt was made to prevent invasions of the box traps by scavenging ants. Since no dead flies were collected, a few other species known to be indigenous to the area may

have died in the traps and been overlooked or were scavenged by other insects or rodents.

The Muscidae, **S. calcitrans**, was included here because it was a major haematophagous pest of horses and it was the second most numerous species collected during the survey.

The modified New Jersey box trap is a successful female horse fly trap, but is totally passive and may capture only a limited sample of the horse flies endemic in the survey area. If the traps had been emptied more than once each week, perhaps more species could have been collected. Thompson (1967) used several methods for collecting Tabanidae in Maryland and was able to present a more complete list of available species. Other than the silhouette type "New Jersey horse fly trap", he used insect nets, CO_2-baited malaise traps, helio-thermal "Manitoba horse fly traps", and specimens obtained from other entomologists' collections.

No arthropods have been implicated as positive vectors even though the etiological agent of PHF has been identified. Other potential entomological vectors in Maryland are blackflies, muscids, biting midges, fleas, and ticks.

Table 1. Summary of flies collected by modified New Jersey box traps at 5 horse farms, Montgomery County, Maryland, May 29 to September 12, 1984.

	Total flies identified per farm				
Farm No.	1	2	3	4	5*
Chrysops univittatus	1	0	0	0	0
Hymbomitra lasiophthalma	1	1	1	3	17
Tabanus lineola	0	0	0	0	1
T. quinquevittata	37	113	46	4	48
T. similis	0	0	0	0	1
T. stygius	0	0	0	0	1
T. trimaculatus	0	1	1	1	0
Stomoxys calcitrans	0	1	6	42	8

* survey terminated July 11

Acknowledgement

The author wishes to recognize Rose M. Noland, formerly of the Livestock Insects Laboratory, Beltsville, Maryland, for her assistance in conducting the tabanid survey.

This paper reports the results of research only. Mention of a proprietary product does not constitute a recommendation for use by the United States Department of Agriculture.

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EDITORAL

This issue of the **Maryland Entomologist** introduces our new format. The journal is now fully referred and will continue to be issued on an irregular basis. Articles on all aspects of entomology are considered for inclusion. The complete editoral policy is found in this issue. Any comments or suggestions are welcomed by the editor.

I would also like to take this opportunity to thank Robert S. Bryant for his service as editor for ten years. His efforts in establishing the **Maryland Entomologist** are gratefully appricated.

C. L. Staines, Jr.
Editor

MARYLAND ENTOMOLOGIST 3(2):30-32 (1988)

The Dryopidae (Coleoptera) of Maryland

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Abstract

A key to the three species of Dryopidae found in Maryland is presented. Also included is biological information and distirbutional records.

Dryopidae are small (less than 8 mm.), brown or black beetles found crawling about on the bottom of streams. The body is elongate, oval, and convex. Head: deflexed, inserted into the pronotum; antennae 11-segmented, clavate, inserted under prominent frontal ridge; eyes lateral, small, rounded. Pronotum: larger than head, ovate; borders lateraly arcuate, margined; anteriorly very broadly emarginate; posteriorly sinuate. Elytra: entire; striae punctate. Venter: five visible abdominal sternites, sutures may be interrupted in middle; surface finely rugose. Legs: anterior coxae well developed, trochanters exposed. There are three genera and 12 species of Dryopidae in North America (Brown, 1983). Three species in the genus **Helichus** are found in Maryland.

Adult **Helichus** are aquatic, being found clinging to rocks in streams. Adults do not remain in the water once they enter it, on occasion they emerge and fly at night (Brown, 1972). Females have sharp-tipped ovipositors to insert eggs into appropriate materials. The elateroid larvae are terrestrial, inhabiting soil or decaying wood. The last generic revision was by Musgrave (1935).

Key to the Maryland species of **Helichus**
(adapted from Brown, 1972)

1. Uniformly covered with fine pubescence.....**lithophilus**
   Not uniformly covered with fine pubescence.....2
2. Glabrous space on pronotum shining; first elytral stria almost impunctate, or at most with small punctures not reaching the base. .....**basalis**
   Glabrous space on pronotum alutaceous; punctures of first elytral stria larger and often reaching the base.....**fastigiatus**

Helichus litophilus (Germar)

Body color brown to black, uniformly covered with fine pubescence, with bronze cast to pubescence. Pronotum: narrowed anteriorly; anterior and posterior angles acute; basal margin bisinuate; disk convex; densely and finely punctate. Elytra: striae slightly impressed, first four more distinct; lateral margins convergent behind middle; apices acute. Venter: last abdominal sternite nearly glabrous, reddish in color. Legs glabrous. Length 4.4 to 5.8 mm.

Ecology: Under stones or submerged wood in streams. Occasionally found in plant roots. Mingo (1979) and Seagle & Hendricks (1982) found this species in medium sized streams (less than 7 m. wide). Finni & Skinner (1975) found this species in sluggish rivers, small stony streams, stony rivers, and constant rivers. Often taken at lights.

Range: Canada to Florida west to Wisconsin, Iowa, Oklahoma and Texas (Brown, 1983).

Specimens examined: Anne Arundel Co.- Friendship, 30/VII/1967, light trap. Baltimore City- 9/VII/1965, light trap. Baltimore Co.- Butler, 21/VIII/1975, light trap; Hebbville, 1/VIII/1961, 2/VIII/1962, 16/VIII/1965, 15/VII/1961, light trap. Charles Co.- no locality, 22/V/1978. Montgomery Co.- Cabin John, 31/VIII/1929; Plummers Island, 14/VII/1918; Priest Bridge, 21/V/1939; no locality, 22/IX/1915, 5/VIII/1931. Prince George`s Co.- Bladensburg, 21/IX—, 7/XI--; Laurel, 24/VIII/1977. Queen Anne`s Co.- Queen Anne, 28/IV/1983. St. Mary`s Co.- Leonardtown, 7/IV/1983; St. Marys City, 29/IV/1978, 14/IV/1978. Washington Co.- Hagerstown, 21/VII/1916.

Helichus basalis LeConte

Body color brown to black. Pronotum: suddenly depressed just behind middle; base with shining glabrous area just before scutellum. Elytra: parallel for basal two-thirds, then convergent to a point at apices, lateral margins tomentose; elytral stria impressed except base which is impunctate, small shallow punctures begin at basal fourth and continue until the striae disappear into the pubescence of the apex; first striae almost impunctate or at most with small punctures not reaching the base. Venter: abdomen entirely covered with pubescence. Length 4.3 to 5.5 mm.

Ecology: Beneath rocks and wood near shores of streams. Mingo (1979) found this species in medium sized streams.

Range: Massachusetts to Georgia west to Texas, Kansas, and Ohio (Brown, 1983).

Specimens examined: Allegany Co.- Oldtown, 3/X/1980. Montgomery Co.- Cabin John, 6/IX—, 31/VIII/1929; Plummers Island, 24/VII/1902; no locality, 22/IX/1915. Prince George`s Co.- Beltsville, 19/IX/1922; Bladensburg, 7/XI—.

Helichus fastigiatus (Say)

Body color brown to black, with bronzed cast to pubescence. Pronotum: suddenly depressed just behind middle; shallow median depression in front of scutellum; lateral margins with recumbent pubescence; uniformly punctate, punctures separated by one or two times their diameters; glabrous area alutaceous. Elytra: more or less parallel for basal half, widest beyond middle, narrowing to a point at apex; lateral margins tomentose; punctures of elytral stria one often reaching the base. Venter: last abdominal sterna less densely pubescent than preceding ones. Length 4.5 to 5.5 mm.

Ecology: Under wood in slower areas of streams. Mingo (1979) found this species in medium sized streams.

Range: Canada to Florida west to Illinois, Kansas, and Oklahoma (Brown, 1983).

Specimens examined: Baltimore Co.- Arbutus, 13/VIII/1976, at sugar lure. Harford Co.- Fallston, 6/IX/1983; Pylesville, 6/IX/1983. Montgomery Co.- Ashton, 8/X/1975, 31/VII—; no locality, 22/IX/1915. Prince George's Co.- Beltsville, 19/VII/1922. Queen Anne's Co.- Sudlersville, 17/VIII/1983.

Acknowledgements

I thank E. J. Ford; C. Mitter, University of Maryland; R. Paul and S. Stockwell, St. Mary's College; and P. J. Spangler, Smithsonian Institution, for allowing me to examine the collections under their care.

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MARYLAND ENTOMOLOGIST 3(2):33-39 (1988)

Observations on, and new adult host plants for, **Callirhopalus (Pseudocneorhinus) bifasciatus** (Roelofs) (Coleoptera: Curculionidae), with a review of host plants

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Abstract

Field observations were made on populations of **Callirhipalus bifasciatus** in a landscape planting from 1984-1987. A list of host plants is summarized from the literature and 36 new adult host plants are recorded. Insecticide tests showed that three of the five materials tested did not give adequate control. **Callirhopalus bifasciatus** is a woods' edge inhabiting species which does not survive well in areas of bright sunlight and high temperatures.

Callirhopalus bifasciatus (Roelofs), the twobanded Japanese weevil, is a native of Japan which was first found in the United States in Philadelphia, Pennsylvania (Allen, 1949). The early literature referred to this species as **Pseudocneorrhinus setosus** Roelofs. Buchanan (1946) corrected the identification to **C. bifasciatus.** The current distribution is from Connecticut to South Carolina and west to Indiana (O'Brien & Wibmer, 1982).

Britton (1932) reported the first instance of injury to ornamental plants and reported the species to be flightless. Efforts to locate the immature stages were unsuccessful (Britton, 1934). Buchanan (1946) found that all specimens that he examined were female and suggested that the beetle was parthenogenetic. The first published research on the biology of **C. bifasciatus** was Smith (1955). Smith found that the beetle is a diurnal feeder. It is easily overlooked on its host plant. It is a defoliating species. It oviposits on partially eaten curled leaves. Allen (1957) continued research on the biology of **C. bifasciatus** and concluded that the species preferred shaded locations and greatly expanded the list of host plants. Unfortunately, almost all of the plants were listed by common name rather than scientific name. Allen (1957) also described the egg, egg laying habit, and noted the larvae but did not describe them. Allen (1959) found that **C. bifasciatus** overwintered as eggs, larvae or adults and associated the larvae as root feeders. Zepp (1978) described the egg laying behavior. Marrone & Zepp (1979) described the mature larva and the pupa. Maier (1983b) studied the effect of host plant on the fecundity of **C. bifasciatus** adults and found that fecundity was directly related to leaf toughness, water content of leaves, and the

nitrogen content. He also determined the preoviposition period on five hosts.

Materials and Methods

Populations of adult **C. bifasciatus** were sampled and observed in a landscaped garden in Edgewater, Maryland and various commercial nurseries in Maryland from 1984 to 1987. Plants were examined visually for typical weevil feeding damage and weevils at various times during daylight. Plants were then sampled by the use of a beating sheet. Data was recorded on date, host plant, and position on host. Trap boards (Maier, 1983) were placed at the Edgewater site to measure their effectiveness in detecting **C. bifasciatus** populations. Hand picking and beating were used as a mechanical control measure. Additional host plant records were obtained from the nursery inspection records of the Maryland Department of Agriculture.

No-choice feeding tests, using **Buxus sempervirens** L., **Pachysandra terminalis** Siebold & Zucc. (Buxaceae), and **Picea abies** (L.) Karst. (Pinaceae), were conducted in 100x15 mm disposable petri dishes. Five field-collected adult weevils were confined with the plant material. Evaluations were made after 48 hours. Plants were evaluated by the number of notches in each leaf. Each plant was repeated five times.

Choice feeding tests, using **B. sempervirens** or **P. abies** with **Monarda didyma** L. (Lamiaceae) as the preferred host. Five field-collected adults were confined in a 145x25 mm disposable petri dish. A leaf of **M. didyma** and one of the other plants was placed in the dish. The plants were evaluated for feeding signs after 48 hours. Each test had five replications.

Several insecticides were tested against adults, using the recommended dosage. Five field-collected adults were placed in a 100x15 mm disposable petri dish with three treated leaves of **Lonicera japonica** Thunb. (Caprifoliaceae). Leaves were treated by dipping them in mixed insecticide solution and allowed to dry before placement in the dish. The dishes were evaluated at 24 and 48 hours. Each test consisted of five petri dishes and each was repeated twice.

Results

Adults were collected as early as 23 May and as late as 12 November during the study. Most weevils were collected near the ground. Some specimens were as high as 1.3 meters on a host.

Callirhopalpus bifasciatus adults were observed to be more common in shady areas than in sunny locations. This occurred in both garden and nursery situations. No adults were found under trap boards.

Table 1. **Callirhopalus bifasciatus** host plants recorded in the literature.

Family	Host plant	Reference
Acanthaceae	**Thunbergia** sp.	Marrone & Zepp, 1979
Aceraceae	**Acer** sp.	Marrone & Zepp, 1979
Aquifoliaceae	**Ilex aquifolium** L.	McComb, 1986
	I. crenata Thunb.	McComb, 1986
Araliaceae	**Hedera helix** L.	Allen, 1957
Asteraceae	**Ageratum houstonianum** Mill.	Schuder, 1968
	Aster sp.	Allen, 1957
	Bidens sp.	Britton, 1924
	Chrysanthemum marifolium Ramat.	Smith, 1955
	Erigeron sp.	Britton, 1933
Berberidaceae	**Berberis thunbergii** DC	Britton, 1932
	Mahonia sp.	Schuder, 1968
Betulaceae	**Corylus americana** Walt.	Allen, 1957
Bignoniaceae	**Campsis** sp.	Marrone & Zepp, 1979
Bromeliaceae	**Aechmea fulgens** Brongn.	Allen, 1957
Caprifoliaceae	**Abelia** sp.	Allen, 1957
	Lonicera sp.	Allen, 1957
	Weigelia x **vanicekii**	Britton, 1934
Celastraceae	**Celastrus scandens** L.	Maier, 1986
Chenopodiaceae	**Chenopodium album** L.	Allen, 1957
Cornaceae	**Cornus florida** L.	Allen, 1957
	C. racemosa Lam.	Maier, 1986
Crassulaceae	**Sedum** sp.	Marrone & Zepp, 1979
Ericaceae	**Kalmia latifolia** L.	Britton, 1934
	Rhododendron sp.	Buchanan, 1946
	R. maximum L.	Maier, 1983b
Fabaceae	**Albizia julibrissin** Durazz.	Smith, 1955
	Cercis canadensis L.	Allen, 1957
	Phaseolus lunatus L.	Buchanan, 1946
Fagaceae	**Quercus** sp.	Allen, 1957
Geraniaceae	unable to determine	Allen, 1949
Juglandaceae	**Juglans** sp.	Allen, 1957
Labiatae	**Ajuga** sp.	Allen, 1957
	Teucrium sp.	Allen, 1957
Lamiaceae	**Coleus blumei** Benth.	Marrone & Zepp, 1979
Liliaceae	**Convallaria majalis** L.	Allen, 1949
Lythraceae	**Lythrum** sp.	Marrone & Zepp, 1979
Malvaceae	**Hibiscus** sp.	Allen, 1957
	H. syriacus L.	Smith, 1955
Moraceae	**Morus** sp.	Marrone & Zepp, 1979
Oleaceae	**Forsythia** x **intermedia**	Britton, 1934
	Franxinus americana L.	Schuder, 1968
	Ligustrum ovalifolium Hassk.	Britton, 1933
	L. vulgare L.	Maier, 1983b
	Syringa vulgaris L.	Britton, 1933
Pinaceae	**Tsuga canadensis** (L.) Carr.	Britton, 1933
Platanaceae	**Platanus occidentalis** L.	Allen, 1957
Polemoniaceae	**Phlox divaricata** L.	Allen, 1957
	P. paniculata	Allen, 1957
Polygonaceae	**Persicarea** sp. L.	Allen, 1957
Ranunculaceae	**Clematis** sp.	Smith, 1955
Rosaceae	**Cydonia oblonga** Mill.	Allen, 1957
	Fragaria sp.	Smith, 1955
	Malus sp.	Allen, 1957
	Pyracantha coccinea M. J. Roem.	Allen, 1957
	Rosa sp.	Allen, 1949
	R. multiflora Thunb.	Maier, 1983b
	Rubus occidentalis L.	Maier, 1986
	Spiraea x **vanhouttei**	Smith, 1955
Rutaceae	**Citrus** sp.	Schuder, 1968
Salicaceae	**Populus** sp.	Marrone & Zepp, 1979
Saxifragaceae	**Deutzia** sp.	Schuder, 1968
	Heuchera sanguinea Engelm.	Allen, 1957
	Philadelphus sp.	Schuder, 1968
Scrophulariaceae	**Veronica** sp.	Allen, 1949
Solanaceae	**Solanum dulcamara** L.	Maier, 1986
Theaceae	**Camellia** sp.	Schuder, 1968
Ulmaceae	**Celtis occidentalis** L.	Schuder, 1968
	Ulmus sp.	Smith, 1955

Plants recorded in the literature as adult host plants are summarized in Table 1. Hosts were generally listed in the literature by common name; the scientific names have been assigned when possible. The only citation unplaceable to at least family was Smith's (1955) record of fern.

The following plants are to be added to the list of adult food plants for **C. bifasciatus:** Apocynaceae- **Vinca minor** L.; Asteraceae-**Ambrosia artemisiifolia** L., **Aster novibelgii** L., **Dahlia pinnata** Cav., **Parthenium integrifolium** L., **Zinnia elegans** Jacq.; Bignoniaceae-**Campsis radicans** (L.) Seeman; Caprifoliaceae- **Lonicera japonica, Viburnum burkwoodii** Hort. Burkw. & Skipw., **V. recognitum** Fern.; Caryophyllaceae- **Dianthus barbatus** L., **D. plumarius** L., **Lychnis coronaria** (L.) Desr.; Celastraceae- **Euonymus japonica** Thunb.; Elaeagnaceae- **Elaeagnus angustifolia** L.; Geraniaceae- **Geranium maculatum** L., **G. carolinianum** L.; Iridaceae- **Iris cristata** Ait.; Lamiaceae- **Monarda didyma, Perilla frutescens** L., **Physostegia virginiana** L., **Salvia spendens** Sello, **Scutellaria serrata** Andrews; Oleaceae- **Jasminum nudiflorum** Lindl.; Paeoniaceae- **Paeonia** sp.; Polemoniaceae- **Polemonium caeruleum** L.; Polypodiaceae- **Dryopteris** sp.; Rosaceae- **Amelanchier sanguinea** (Pursh) DC, **Cotoneaster** sp., **Prunus laurocerasus** L., **P. serrulata** Lindl., **Rubus flagellaris** Willd.; Rutaceae- **Skimmia japonica** Thunb.; Taxaceae-**Taxus cuspidata** Siebold & Zucc.; Violaceae- **Viola** sp; and Vitaceae-**Parthenocissus quinquefolia** (L.) Planch..

The most commonly infested host plant in Maryland is **Lonicera japonica,** which may have been the host species referred to by Allen (1957) as climbing honeysuckle. **Lonicera japonica** appears to be a preferred host since it supports high populations while other nearby plants remain uninfested.

The following plants exhibited no feeding damage in the field even when the surrounding plants were infested: Buxaceae- **Buxus sempervirens;** Pinaceae- **Picea abies,** and **P. pungens** Engelm..

In the no-choice feeding tests adult **C. bifasciatus** fed on all three plants. **Picea abies** was more heavily fed on than either **B. sempervirens** or **Pachysandra terminalis.** The two choice feeding tests showed **C. bifasciatus** adults always on **M. didyma.** No feeding was observed on **Buxus** or **Picea.**

The results of the insecticide tests are summarized in Table 2. Acephate was the most effective material followed by Diazinon.

Discussion

The highest populations were found on **Rosa** sp., **Heuchera sanguinea, Scutellaria serrata,** and **Jasminum nudiflorum.** These plants became more than 50%, defoliated by

adult feeding despite hand picking and beating as control methods. Manual control efforts were employed after leaf notching and minor defoliation were observed. A beating sheet was employed occasionally to check the effectiveness of hand picking. It was found that these preferred host plants were reinfested within six hours. This may be from a staggered emergence or reinfestation from the periphery.

Maier (1983b) found **R. multiflora** as the plant on which **C. bifasciatus** was most fecund and postulated that this was because both were from Japan. This correlation does not hold for **Heuchera** and **Scutellaria,** natives of North America, or **Jasminum,** a native of China.

Adult beetles are active longer than the earliest and latest collection dates recorded here. Due to the difficulty in sighting them, damage is usually observed before the first adult is discovered. Maier (1986) also found trap-boards to be a poor sampling tool for **C. bifasciatus** as compared to pit-fall traps and beating.

Maier (1983b) suggested the lack of insecticide resistance as a reason why **C. bifasciatus** was not a pest in commerical nurseries. Allen (1957) found that chlordane did not control larvae. Insecticides used against adults have been shown to have variable effects (Smith, 1955; Allen, 1949). Our results show three out of five materials tested not to be effective against **C. bifasciatus.** From our observations **C. bifasciatus** is a woods' edge inhabiting species which does not survive well in areas of bright sunlight and high temperatures. This may explain why it is not a pest in commerical nurseries.

Acknowledgements

We would like to thank W. F. Gimpel, Maryland Department of Agriculture, and J. W. Neal, U. S. Department of Agriculture, Florist and Nursery Crops Lab, for commenting on earlier drafts of this paper.

Table 2. Effectiveness of some insecticides against adult **Callirhopalus bifasciatus.**

Material	Avg. No. dead 24 hrs.	Avg. No. dead 48 hrs.
acephate	3.1±0.7	4.2±0.4
chlorpyrifos	0.2±0.4	0.5±0.7
diazinon	1.0±1.0	3.0±2.0
dimethoate	0.7±0.9	1.8±1.8
malathion	0.3±0.5	1.8±1.9
control	0.1±0.3	0.2±0.4

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All five species of **Metaxaglaea** (Lepidoptera: Noctuidae, Cuculliinae) at a single site in Tidewater Maryland

In "A revision of the genus **Metaxaglaea**" (Postilla #178, 1979), Dale F. Schweitzer (DFS) described two new species- **M. australis** and **M. violaea.** At that time he commented "Every species of the genus occurs in partial sympatry with at least three congeners, but no single locality is known to have all five species." His surmise apparently stemmed from his inability to locate **australis** specimens from north of the type locality (McClellanville, S. C.), although he did speculate that "this species will ultimately be found in the Atlantic and Gulf coastal plains from eastern Texas to eastern North Carolina and perhaps southeastern Virginia".

Dr. Schweitzer recently identified the following **Metaxaglaea** collected at Southhaven, Anne Arundel County (UTM UU 61):

M. inulta (Grote): Hodges Number 9943; 23 Sept.- 31 Oct.; 14 specimens.
M. viatica (Grote): Hodges Number 9944; 6 Oct.; 1 specimen.
M. semitaria Franclemont: Hodges Number 9945; 23 Oct- 6 Nov.; 5 specimens.
M. australis: Hodges Number 9945.1; 23 Oct.- 6 Nov.; 18 specimens.
M. violacea: Hodges Number 9945.2; 24 Oct.- 14 Jan.; 23 specimens.

Southaven is a peninsula of approximately 2,000 acres extending into the headwaters of the South River, a tidal estuary of the Chesapeake Bay. It is four to five miles west-south-west of Annapolis, Maryland. Geographically it is within UTM UU 61 at 38° 58' north latitude and 76 55' west longitude. Physiogeographically it is on the Upper Coastal Plain. The maximum elevation is 100 feet, with numerous ravines but no permanent streams or ponds. Hardwood trees to 100 feet high, in decreasing frequency, are various oaks, sweetgum, tulip poplar, black locust, dogwood, maple, etc. The predominant softwood is scrub pine. Waterplants have disappeared completely in the past 20 years. Minute areas of wetland plants are limited due to extensive bulkheading, steep slopes, and cliffs that drop to the water's edge. Rock formations are occasional stratas of ferritite. The water in the South River varies from brackish to nearly fresh after heavy rains. Housing development has eliminated farmlands. Lush undergrowth is rapidly being replaced by lawns.

This report extends the range of **M. australis** even further than originally suspected and is the first report of the occurrence of **violacea** and **australis** in Maryland. It is of further interest that it also represents another instance of a southern species not previously reported from Maryland. Tidewater appears to be a fertile area for discovery of extended ranges of southern species.

All five species of **Metaxaglaea** have now been reported from Maryland.

Specimens of **M. australis** and **violacea** have been deposited with DFS and the National Museum of Natural History.

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The Noteridae (Coleoptera) of Maryland

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Abstract

A key is presented to the six species of Noteridae that may be found in Maryland. Each species has a short description, a summary of the ecology, and a list of Maryland records.

The Noteridae is a family of small beetles (less than 6 mm.) which closely resemble the Dytiscidae. All species have the scutellum hidden by the bases of the elytra and the protibiae modified and often bearing a strong hook or curved spine at the apex. The common name of the group, burrowing water beetles, is suggested by the habits of the larvae, which have fossorial legs and dig into mud around the roots of aquatic plants. The adults also burrow into aquatic debris. Most adults are strong swimmers and are predaceous. The food of the larvae is unknown.

The body of the adult is broadly oval, subdepressed, smooth; color piceous to dark reddish-brown, sometimes with pale head and pronotum; pubescence absent except on appendages; legs with swimming hairs. Head: small; surface smooth; antennae 11- or 12-segmented, filiform, inserted on the under surface of head between eyes and base of mandibles; eyes distant, oval. Pronotum: widest posteriorly, narrowed anteriorly until nearly width of head; surface smooth; margins simple. Elytra: streamlined; as wide at base as pronotum, narrowed behind; surface smooth or with vague striae. Venter: prosternal process broader apically, projecting over mesonotum; abdomen with five visible sternites, the first mostly covered by coxal plates; surface smooth. Legs: trochanters somewhat ovate; femora thick; tibiae short, thick; tarsi 5-5-5, first segments thick, remainder narrower, subequal in length; two equal tarsal claws on each tarsus.

The family is worldwide in distribution and is best represented in the tropics. There are 15 species in six genera in the United States (Young, 1979a). There are two genera and four species recorded from Maryland. Two additional genera may occur in Maryland and are included in the following discussion.

Key to the Maryland species

1. Apex of protibiae bearing more or less conspicuous curved hooks or spines; length usually more than 2.0 mm.....2
   Apex of protibiae without curved hooks or spines; length rarely exceeding 1.5 mm.....**Notomicrus nanulus**
2. Protibial spurs strong, curved and conspicuous; hind femora with angular cilia; prosternal process truncate behind.....3
   Protibial spurs weak and unconspicuous; hind femora usually without angular cilia; prosternal process rounded behind.....
   .....**Pronoterus semipunctatus**

3. Apex of prosternal process at least twice its breadth between metacoxae, not broader than long; last segment of maxillary palps emarginate at apex.....**Suphisellus**.....4
   Apex of prosternal process very broad, at least 2.5 to 3 times its breadth between metacoxae, broader than long; last segment of maxillary palps truncate at apex.....**Hydrocanthus**....5
4. Elytra dark brown to black with lighter strips, bars, spots or irregular markings.....**S. punticollis**
   Elytra uniformly light to dark brown without lighter markings...
   .....**S. bicolor punctipennis**
5. Elytra with three irregular dorsal row of fine punctures.....
   .....**H. iricolor**
   Elytra with punctures very fine, almost obliterated.....
   .....**H. oblongus**

Notomicrus nanulus (LeConte)

Body form narrowly ovate; surface highly polished. Pronotum: light brownish-yellow. Elytra: reddish-brown; minutely punctate; long hairs present near the lateral margins. Legs: hind tarsi elongate; anterior tibiae without curved hooks or spines; poorly adapted for swimming; internal and external laminae of hind coxae not differentiated. Length 1.2 to 1.3 mm.

Ecology: Found in permanent bodies of water with roots and submerged debris along the edge. Sometimes found associated with sphagnum. Also found among submerged sticks and logs.

Range: Virginia to Florida.

Specimens examined: None. Cross (1972) collected this species at Chincoteague National Wildlife Refuge, Virginia. This species should be found on the lower eastern shore.

Pronoterus semipunctatus (LeConte)

Body regularly oval in form, scarcely narrower behind, not convex above, reddish-brown in color. Head: ultimate segment of maxillary palps nearly acute at tip, does not appear emarginate in any view; intermediate antennal segments enlarged in male. Pronotum: lateral margins entire. Elytra: with several rows of coarse punctures. Venter: apex of prosternal process rounded. Legs: protibial spurs weakly developed. Length 2.6 mm.

Ecology: Lentic situations.

Range: Michigan to Florida.

Specimens examined: None. This species may occur in Maryland.

Suphisellus Crotch

Body shape broadly oval. Head: ultimate segment of maxillary palps emarginate at apex. Pronotum: lateral marginal lines originating at hind angle on either side, diverging toward middle of margin, and disappearing at about the middle; slightly rounded. Venter: prosternal process broad, truncate behind; apex of prosternal process at least twice its breadth between anterior coxae, but not broader than long; laminate inner plates of hind coxae with a broad and deep angular excision at the posterior end, leaving on either side

a diverging triangular process; hind coxal cavities contiguous. Legs: protibial spurs present, strong, curved, conspicuous; hind femura with angular cilia (setae or spurs).

Suphisellus puncticollis Crotch

Pronotum: fuscus macula present; punctures coarse, close; strong reticulate microsculpture between punctures. Elytra: dark brown to black, with the margin lighter and a short bar or broken fascia extending inward from the margin to near the middle, there is considerable variation in the color pattern; punctation as on pronotum. Venter: last visible abdominal sternite feebly impressed medially. Length 2.7 to 3.0 mm.

Ecology: Woodland pools, ponds, marshes, swamps.

Range: Massachusetts to Michigan south to Florida (Young, 1979b).

Specimens examined: Kent Co.- Galena, 24/IX/1982, from swamp. Prince George's Co.- Greenbelt, 30/VIII/1980, from margin of pond with heavy cattails; Riverdale, 22/VIII/1929. Talbot Co.- Seth State Forest, reported by Spangler (1973).

Suphisellus bicolor punctipennis (Sharp)

Body widest at base of elytra, more or less tapered behind. Dorsal surface not bicolorous, or if bicolorous, elytra dark brown not black, no lighter markings on elytra. Elytra and base of pronotum not closely punctate, impressed reticulate microsculpture present. Venter: last visible abdominal sternite impressed on either side; prosternum, metasternum, and coxal laminae forming a nearly flat ventral platform. Length 2.4 to 2.8 mm.

Ecology: Ponds.

Range: New Jersey west to Indiana, south to Georgia and Alabama (Young, 1979b).

Specimens examined: Harford Co.- Havre de Grace, 18/VII/1983, pond with water lilies. Queen Anne's Co.- Wye Mills, 23/X/1982, 28/IV/1983, community pond. District of Columbia- 10/XI—.

Hydrocanthus Say

Body elongate oval, strongly attenuate behind, strongly convex above. Head: ultimate segment of labial palps enlarged, usually with a seam along the inner margin with small tubercles at either end; ultimate segment of maxillary palps with two small tubercles. Pronotum: lateral marginal bead complete from base to anterior margin; transverse row of setose punctures behind head. Venter: front coxae separated by base of prosternal process; prosternal process truncate or obstusely angulate medially, apex two or three times as broad as base, overlaps part of the metasternum, forms ventral platform by fusing with metasternum and inner laminae of the hind coxae. Legs: middle and hind legs modified for swimming; femora of hind legs expanded and flattened, rows of strong setae present on lower surface, distinct tuft of setae at the hind angle.

Hydrocanthus iricolor Say

Head, pronotum, and venter dark brown; elytra darker. Elytra: dark reddish brown, polished, iridescent; with three irregular rows of fine punctures visible. Venter: prosternal process smooth, nearly impunctate in females, punctate in males. Length 4 to 5 mm.

Ecology: Weedy margins of ponds.

Range: Massachusetts to South Carolina.

Specimens examined: Charles Co.- Hilltop, 1/IV/1982; Nanjemoy, 15/IX/1983; Pomfert, 31/X/1983. Dorchester Co.- Vienna, 31/XI/1980. Harford Co.- Fallston, 23/VIII/1983; Havre de Grace, 18/VII/1983. Prince George's Co.- Beltsville, 6/X/1965, 18/IX/1969, 10/VI/1971, 20/X/71, 10/X/1976; College Park, 17/IV/1948; Greenbelt, 1/XI/1976; Largo, 11/III/1983. Queen Anne's Co.- Wye Mills, 27/IX/1975, 28/IV/1983. Talbot Co.- Seth State Forest, 30/VI/1983. Worcester Co.- Shad Landing, 3/X/1970.

Hydrocanthus oblongus Sharp

Color uniformly reddish brown. Elytra: with subserial punctation very fine, almost obliterated. Venter: prosternal process punctate in both sexes. Length 3.7 to 4.6 mm.

Ecology: Lentic situations.

Range: New Jersey to Florida and Louisiana.

Specimens examined: None.

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I thank E. J. Ford; C. Mitter, University of Maryland; M. J. Rothschild; P. J. Spangler, Smithsonian Institution; and W. E. Steiner for allowing me to examine the collections under their care.

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Dasychira atrivenosa (Palm) (Lepidoptera: Lymantriidae) in Tidewater Maryland

Dasychira atrivenosa (Palm) (Hodges Number 8299) is not listed in Covell (Field Guide to the Moths, 1984) nor in Holland (The Moth Book, 1903). Forbes (Lepidoptera of New York, Part II:243) gives a very brief description and notes adults are active in July and known from southwest Arkansas (Type locality: Red River region).

D. C. Ferguson (DCF) (The Moths of America north of Mexico Fasc. 22.2:43-44, 1978) said that **atrivenosa** is extremely rare in collections, with only four specimens taken prior to 1964, including the two type specimens. Since that time about 50 specimens were examined by DCF, who also reared a brood at McClellanville, SC. He notes that reared specimens tend to be larger and darker than field collected ones. It was then regarded as a southeastern species and had not been collected further north than Carteret Co., NC. Two additional comments of interest are the flight periods of two broods (17-25 May and 10 August-6 September) and the preferred host plant of sweetgum (**Liquidamber styraciflua** L., Hamamelidaceae).

The following specimens have been taken by the author at blacklight in Southaven, Anne Arundel Co., Maryland (UTM UU61):
17 August 1985 ,determined DCF; 1 August 1986, determined DCF; 4 June 1987; 10 June 1987; 1 August 1987; 15 August 1987; 16 August 1987, a female; 22 August 1987; 29 August 1987; 5 September 1987; 7 September 1987; 8 September 1987, a female.

Twelve specimens of **D. atrivenosa** have been collected at a single site in Southaven. Collections have been made twice daily, before sunrise and circa 10 pm, for three years. Ten of the twelve specimens have been taken during the morning collection. No more than one specimen has been taken on the same day.

This report is the first for **D. atrivenosa** in Maryland and extends the range northward considerably. It also suggests that breeding populations exist, but are undiscovered, because of its' rarity and inconsistent collecting efforts. Daily morning collection between 1 August and 15 September in sites where **L. styracuflua** is common may further extend the range of this easily recognized Lymantriid.

All specimens are presently in the private collection of the author. Comment is invited to the address below.

I thank J. Cheevers, D. Chiles, and J. Wheeler for their assistance in collecting.

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Northern Records of **Papilio (Heraclides) cresphontes** (Cramer) (Lepidoptera: Papilionidae) in the Midwestern U. S.

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Abstract

The recent capture of a specimen of the giant swallowtail from southeastern Minnesota is documented and records of the northern distribution of this species in the midwestern United States are breifly reviewed.

Papilio (Heraclides) cresphontes (Cramer) (Lepidoptera: Papilionidae), the giant swallowtail, is a ubiquitous species in the southern portions of its range, where its larvae often feed on various members of the citrus family (Rutaceae). In the south, the larvae, known colloquially as "orange dogs", sometimes are injurious to young trees and shrubs (Weed, 1923; Klots, 1951). The giant swallowtail belongs to a neotropical group, and is much less common northward. It is quite rare above 42° north latitude, although it has been taken occasionally along the coast of Maine, and in Quebec and Ontario, where its appearance is considered "exceptional". Scott (1986) reports that its habitats include tropical regions, transitional woodlands, and citrus groves. This note will document the recent capture of a fresh male **P. cresphontes** from southeastern Minnesota. A brief review of some northern records of this species from the midwestern U. S. also is included. I have previously reported the occurrence of this species in Maryland and Wyoming (Platt, 1980).

On 24 July 1987 about 1200 hr., I was driving west on Interstate 90 with my father, when we stopped for gas at an AMOCO station at Dresbach (Winona Co.), Minnesota, having just crossed the Mississippi River at La Crosse, Wisconsin. The gas station (at approximately 43° 53' N lat, 91° 41' W long.) is located west of the interstate, and about 1.5 to 2 mi. west of the river. The weather was warm, clear, and breezy, following heavy thunderstorms, which occurred during the previous night.

As I was pumping gasoline, I noticed a large dark swallowtail butterfly patrolling and "mud puddling" around a sandy brown, cleared dirt area at the north end of the gas station. After pumping the gasoline, I approached the insect closely, and determined that it was a fresh male **P. cresphontes.** The lower half of both of the insect's tails had been clipped off horizontally (possibly by a bird), but, as it hovered above the ground, the proximal portions of the small yellow triangular patches still were visible on the

remaining tail bases. The dorsal lemon yellow "X" striping also was quite evident as the insect hovered. Although I had no insect net with me, I was able to capture the specimen by dropping my father's baseball cap over it, as it hovered a few inches above the ground. The specimen was pinched, and placed in a labeled glassine envelope. The papered specimen, unfortunately, has since been lost, during my subsequent trip to Wyoming and return to Maryland. However, an insect pin with complete data labels has been placed in the UMBC collection, to represent the missing specimen.

The butterfly was large, and could not be told apart (by visual comparison) from another male collected at Key Largo, Florida in June 1987. Thus the Minnesota specimen most likely represented typical **cresphontes** rather than the northern form **P. c. pennsylvanicus** Chermock & Chermock (1945), which (at most) is poorly differentiated from **cresphontes** proper (see Klots, 1951; Platt, 1980 for further discussion of the purported differences between these forms).

Other Midwestern Northern Records

Macy & Shepard (1941) list four locality records for **P. cresphontes** in Minnesota, as follows: Mendota (Dakota Co.), Eitzen and La Crescent (Houston Co.), and Lake Harriet, Minneapolis (Hennepin Co.). The La Crescent locality is only a mile or two south of Dresbach, where the recent specimen was taken. Inclusive dates for the Minnesota records are 16 July to 25 August. In addition, Opler (1983, map p.33) indicates records from Wabash and Winona Counties, and the distribution map (p. 47, Fig. 6) in Opler & Krizek (1984) suggests that **P. cresphontes** is limited geographically mainly to very southeastern Minnesota, in regions immediately adjacent to the Mississippi River. (The seeming extension of the northern edge of the range of **P. cresphontes** into southwestern Minnesota on their map evidently results from close northern Iowa records, and one record in very southeastern North Dakota-- see below).

Opler (1983) also has published county occurrence records for the surrounding states. These records show the species to be prevalent throughout Missouri. The noteworthy records in surrounding states are briefly reviewed below, with counties being arranged from west to east, by state.

1. northern Iowa - Dickinson, Hancock, Worth, Blackhawk, Winneshiek, Allamakee, Clayton, and Dubuque Counties, plus 21 other counties in the southern half of the state.

2. Wisconsin - Washburn, Eau Claire, La Crosse, Marathon, Wood, Adams, and Winnebago Counties, plus ten other counties in the southern third of the state. Johnson & Malick (1972) record **P. cresphontes** from Wood Co., west of Port Edwards, as well. Evidently, the species is limited to the prairie-deciduous forest (oak-savanna) ecotones of southern Wisconsin, and is absent from the more northern mesic broadleaf forests, dominated by conifers (pines, hemlocks, spruces, and firs).

3. Michigan - Ottawa, Kent, Montcalm, Isabella, Gratiot, Clinton, Huron, and St. Clair Counties, plus 14 other counties farther south. **Papilio cresphontes** is limited to the southern half of the lower peninsula in Michigan. Inclusive collection dates are from 14 May to 6 September in Michigan (Moore, 1939, 1960).

Finally, Scott (1986) lists a North Dakota record, presumably in the vicinity of Richland Co., in the extreme southeastern corner of the state, judging from the accompanying map in his book (p. 177). This small map also shows the species as possibly occurring throughout South Dakota, as well, but I doubt that there are many (if any) records of **P. cresphontes** from the latter state. Rather, I believe that Scott simply has connected up the known Minnesota, North Dakota, and Wyoming records to obtain his approximate distribution map, which also shows the species as occurring too far north in Minnesota. Gall (1987) comments on the "inferior quality" of Scott's maps for the eastern U. S. species, as compared to those of Opler & Krizek (1984).

Discussion

The giant swallowtail evidently is double brooded, even in the northern parts of its distribution (Opler & Krizek, 1984; Scott, 1986). Three broods may occur in Florida. Like most papilios, it overwinters in the pupal stage, which is mottled with various greyish-brown hues, is of irregular outline, and is very cryptic against tree bark.

Larvae feed on rutaceous plants, including **Citrus** (4 spp.), **Zanthoxylum** (4 spp., including prickly ash), and **Ptelea trifoliata** L. (common hop tree). In recent years, P. J. Kean and E. Cohen have obtained females from the McKee-Besher Wildlife Area near Seneca (Montgomery Co.) Maryland on several occasions. These have readily oviposited on **Ptelea**, and their larvae have been reared to adults on this foodplant at UMBC. Sedman & Hess (1985) mention that **P. cresphontes** larvae feed on hop tree and prickly ash in west central Illinois, and Macy & Shepard (1941) noted a male hovering above a prickly ash thicket, in a dense oak forest near Mendota, Minnesota. Scott (1986) lists five other rutaceous genera, and two additional plant families known to be used as foodplants by **P. cresphontes**, mainly in the Gulf and Caribbean regions.

The northern distribution of **P. cresphontes**, closely correlates geographically with the known

distribution of **Ptelea trifoliata**, but not with that of **Z. americanum** Miller, common prickly ash (Jaques, 1946 fig. 218, p. 109 and fig. 225, p. 113). Thus, the former species, rather than the latter, probably determines the distribution of **cresphontes** in regions north of where citrus groves occur in the U. S. However, where prickly ash is found in the north, as, for example, on limestone slopes in Allegany Co. in western Maryland, vicinity of Fort Hill, and near Brighton, New Jersey (see the 1985 Season Summary of the Lepidopterists' Society), **cresphontes** also occurs. Southern and northern populations of the giant swallowtail apparently exhibit intra-familial generic preferred host plant shifts in various geographic regions (e.g.) **Piper** sp. in Cuba, **Citrus** sp. in Florida and the Gulf Coast regions, and **Ptelea** spp. and **Zanthoxylum** spp. northward (Scott, 1986).

Extreme northern records of the insect may result from dispersal (or migration) of individuals from local central or northern populations. However, males, especially, seem to be quite territorial and are known for their "patrolling" behavior in restricted fly ways. Severe summer storms on occasion may transport and/or displace this strong flying butterfly great distances.

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Book Review

Handbook of Insect Rearing Vols. I & II. P. Singh and R. F. Moore (eds.). Elsevier Sci. Publ., Amsterdam, 1985. 488 pp., and 514 pp., $96.00.

This two volume set is intended as a standard book to provide guidelines for rearing insects. The information is generally provided in 8 sections- introduction, facilities and equipment, diet or food, rearing or colony maintenance, insect holding, life cycle, supply procedure, and references. The authors have succeeded admirably in obtaining a somewhat uniform format. However, the rearing techniques are the individual cooperator's methods, not necessarily standard methods.

Volume I consists of a series of general articles on rearing. There are sections on diets, both natural and artifical; diseases; quality assessment; design of rearing facilities and insect rearing management. These are followed by species-specific rearing procedures for Coleoptera, Collembola, Dictyoptera, Hemiptera, Hymenoptera, Neuroptera, and Orthoptera.

Volume II follows the same pattern, covering the orders Diptera and Lepidoptera. Most of the rearing techniques are for agriculturally important moths. Both volumes contain an index to common and scientific names.

Agricultural insect rearing techniques far outnumber those of medical/veterinary importance. For example, no mention is made of rearing techniques for **Anopheles** mosquitoes, a vector of a major disease. No mention is made of rearing Anoplura (i.e. **Pediculus humanus**), or Siphonaptera (i.e. **Ctenocephalides felis**) or bedbugs (**Cimex** sp.) or any tick species (granted they are not insects). Another rearing technique omitted is the rather commonly reared milkweed bug (**Lygaeus kalmii**). Surprising, mealworm (**Tenebrio** sp.) rearing is omitted from the order Coleoptera.

The two volumes will be a handy adjunct to any facility that rears or intends to rear insects. The "cookbook style" of rearing instructions is excellent. The listing of the sources of supplies with addresses is extremely helpful. The list of references at the end of each rearing technique could have been expanded. It is hoped that a much more complete volume will be produced that will fill the gaps in the present volumes.

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Xestia bollii (Grote) (Lepidoptera: Noctuidae, Noctuinae) in Tidewater Maryland

Xestia bollii (Grote) (Lepidoptera: Noctuidae), Hodges Number 10956, is recorded in Forbes (Lepidoptera of New York Part III:62, 1954) as **Noctua bollii**. This is all of the literature available on this species and it is merely stated "approaches the southwest corner of our area". Bryant Mather (Per. Comm.) advised me that he has records of 12 specimens for interior Mississippi, no coastal records.

On 5 October 1986 a specimen of **Xestia** was collected at black light at Quaker Neck Landing, Kent Co., Maryland. This location is six miles south of Chestertown on the banks of the Chester River. The specimen differed from all in my collection and was set aside.

On 10 March 1987, D. Schweitzer recognized the specimen as X. bollii, but suggested confirmation at the National Museum of Natural History. On 11 March we visited D. C. Ferguson who compared it with specimens at that collection and verified the identification.

This is a puzzling record as there was no extreme weather, i. e. no hurricane, except for a cold front which passed through the night of 3 October (barometric pressure at 0700, 30.20 in., which bottomed out at 29.65 at 1700 on 4 October). Further it is suscepted that this storm was of northern origin as there was no precipitation associated with it. Nor is the specimen "worn", but is in excellent condition.

While visiting the Maryland Department of Agriculture insect collection, its curator, G. L. Williams, showed me two pinned specimens of **Xestia**. After relaxing and spreading them it was obvious that they were **X. bollii**, a male and a female. Identification was subsequently confirmed by D. C. Ferguson.

Both specimens were taken a black light #12 of the Maryland Agricultural Pest Survey on 12 October 1987. The trap is located at the University of Maryland Wye Institute Research Center near Carmichel, Queen Anne's Co. (UTM VU00). The specimens were not worn.

The occurrence of a single specimen seems to be all-to-frequently referred to as a "stray". However, in the first case there seemed to be no weather-related vector that could have resulted in the displacement of X. bollii this far from its presumed normal range. The two additional specimens taken within a week of the previous year and within 20 km raises several questions- is this an indication of a breeding population in tidewater Maryland? If so, is it a recent range extension or has it been present for some time?

A single "stray" seems to warrant a high degree of suspicion that there may exist undetected populations as noted elswhere in this Journal (see pp. 40 & 43). It strongly suggests that intensified collecting DURING THE SAME TIME PERIOD of a single or unusual occurrence confirm this supposition.

The first record of Xestia bollii in Maryland and perhaps east of the Mississippi is reported. Additional records would be welcomed by the author.

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MARYLAND ENTOMOLOGIST 3(2):54 (1988)

Book Review

Insects, their biology and cultural history. B. Klausnitzer. Universe Books, New York, 1988. 238 pp. $40.00.

This "coffee-table" book is beautifully illustrated with photos by Manfred Forster and is replete with interesting facts and figures. The text starts out with Insect Diversity and includes many historical items of interest, from Aldrovandi's System (1602) of insect classification to classification today. The author then discusses various orders of insects, always including some historical notes and illustrations. These tidbits of information are quite fascinating. For example, in the chapter on Mantids, the author presents information from the Pen ts'ao, a classical Chinese pharmacological writing from about 1108. It describes how to collect and prepare mantis egg cases, how to remove warts on the skin or arrows from wounds, by means of mantids and croton beans.

In his chapter on Grasshoppers, the author discusses locusts in art, in the Bible, in ancient writings, as food and medicine, and in history.

Each chapter covers a different order, and as the title indicates, includes information on the biology and particularly the cultural history.

It is an interesting book to read and contains many references to obscure literature that notes the relevance of insects to the culture of mankind.

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Maryland Entomologist Editorial Policy

The **Maryland Entomologist** is devoted to the advancement and dissemination of knowledge of insects. The journal will consider for publication manuscripts of any length dealing with original research in entomology. Book reviews and other items of interest are solicited.

All manuscripts are edited for grammar and conciseness. Changes may be required to achieve uniformity of style, clarity of presentation, and economy of words.

TITLE: The title should be an unique and concise description of the contents of the article. Classification as to order and family should be included in the title, except where not pertinent or appropriate to the content of the paper, or when the paper does not deal with specific taxonomic groups.

An ABSTRACT is required for all manuscripts over 3 typewritten pages. It should be a condensation of the text and must be carefully worded.

SCIENTIFIC NAMES should be written in full (genus, species, author) the first time used and must be underlined or in bold face. Subsequent use should include first letter(s) of generic name. Do not begin a sentence with an abbreviation.

TEXT: Follow a general format of introduction (no heading), methods, results, and discussion. Taxonomic keys must be dichotomous. Formal descriptions of taxa may be telegraphic; use of ♂ and ♀ symbols is acceptable except for headings. Abbreviate collection dates with Roman numerals for months and Arabic numerals for days and years: 17-VII-1986. Metric measurements are highly preferred (units of U. S. weights and measures may be used in parentheses for comparative purposes); express quantities as Arabic numerals except as the first word of a sentence to avoid ambiguity.

CITATIONS: Use the name-date format; Smith (1986); (Smith, 1986); Smith & Jones (1986); (Smith & Jones, 1986); Smith (in press); Smith (personal communication); use et. al. for 3 or more authors. Provide evidence of acceptance for works "in press", otherwise cite them as "unpublished" or "personal communication". Provide written permission from personal communications.

ACKNOWLEDGEMENTS: Place disclaimers, journal series numbers, funding sources, address changes other than correspondent, etc. here.

REFERENCES CITED: List alphabetically at end of text. Manuscripts with missing or incomplete references will be returned. Abbreviations of periodicals should be as in the World List of Periodicals.

Article in periodical:

Essig, E. O. 1926. A butterfly migration. Pan-Pac. Entomol. 2:211-212.

Serial:

Weldon, L. W., et. al. 1969. Common aquatic weeds. U. S. Dept. Agric., Agric. Handb. 352. 43 pp.

Book:

Leng, C. W. 1920. Catalogue of the Coleoptera of America north of Mexico. John D. Sherman, Mt. Vernon, NY. 470 pp.

Contribution to a book:

Leech, H. B. and H. P. Chandler. 1956. Aquatic Coleoptera. **in** Usinger, R. L. Aquatic insects of California with keys to North American genera and California species. Univ. California Press, Berkely and Los Angeles, pp. 293-371.

TABLES: Captions should be concise and self-explanatory. All tables must be referenced in the text. Tables should be submitted as a separate page with the caption at the top and each numbered with an Arabic numeral.

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ARTICLES SUBMITTED to the **Maryland Entomologist** will be reviewed by at least 2 individuals selected by the Editor. Depending on the reviewers' comments and the judgement of the Editor, a manuscript will be accepted, rejected or returned for revision. Submit an original and 2 complete copies to the Editor: C. L. Staines, Jr., 3302 Decker Place, Edgewater, MD 21037. An acknowledgement will be sent when the Editor receives a manuscript for review.

Manuscripts submitted for review must be typewritten or computer printed, double-spaced (no extra space between paragraphs) with ample margins (each line 60 spaces wide, 24 lines on each page), and be on a bond paper or equivalent weight not larger than 8 1/2 x 11 inches. Number all manuscript pages consecutively, in pencil, at top right margin, starting with page 1 (including title page).

After acceptance the manuscript will be formated to make a photoready copy. Detailed instructions will be sent to the author when the manuscript is accepted. Limited reformating may be done by the Editor if requested. At least one author of each manucript must be a member, in good standing, of our Society.

Cover Illustration: The logo of the Maryland Entomological Society features the Maryland Shield and a specimen of **Euphydras phaeton** (Drury), the Baltimore checkerspot, which is the official insect of the state of Maryland.

The **Maryland Entomologist** is published irregularly by the Maryland Entomological Society. There are four numbers in each volume. Original articles on geographic and temporal distribution, particularly pertaining to Maryland and adjacent states, ecology, biology, morphology, genetics, systematics, behavior, etc. are welcome. Book notices and reviews, distributional notes, migration, life history, and others will be published. All articles are subject to editorial review and acceptance. They should be send to C. L. Staines, Jr., 3302 Decker Place, Edgewater, MD 21037. Instructions to authors are contained in Volume 3(2).