frequent in collections from the swamp bed (11 of 16 collections positive) as *T. trimaculatus* (13/16). Larvae were most numerous and most frequent beneath the top leaves of the dense maple leaf litter layer in, or near, flooded areas of the swamp or in the superficial muck soil layer beneath this litter. Larvae were also common and frequent with *T. marginalis* at pond margin habitats very similar to those having that species in New Jersey (Thompson 1970a). In this and the New Jersey studies, the larvae were covered with 0.25–0.50 in. of muck and usually with a mat of *Sphagnum* moss. In early June, mature larvae were found about the bases of maple and oak trees near the larval breeding sites. The crowns of such trees, with the soil, litter, and mosses around them, provided pupation sites above the water line throughout the swamp bed, a habitat which flooded extensively and irregularly. Larvae were found within the top 3 in. of soil; most were immediately beneath mats of mosses or around the large lateral roots of the trees. Pupae were taken with those of *T. lineola* in upright position among the stems of ***Mnium hornum*** Hedw. (7 mats) or in associations of ***M. hornum*** with 1 or 2 species from 6 other genera (***Dicranum, Odontoschisma, Leucobryum, Hypnum, Dicranella,*** or ***Calypogeia*** (3 mats)) (identifications through the kindness of Dr. H. E. Robinson, Smithsonian Institution, Washington, D. C.). In some cases, the pupae of these species were between the tree trunks and the mosses surrounding them.

C. vittatus larvae were abundant beneath the swamp surface litter in sites with *T. melanocerus* and *T. petiolatus*. Usually they were beneath the leaf surfaces of partially submerged maple leaves in flooded areas. Larvae were most concentrated in areas where no *Tabanus* spp. were taken, and here they were aggregated in groups of 2–3. Larvae of *C. vittatus* were also found along margins of the river in situations similar to those having this species in New Jersey (Thompson 1970a). This species was not taken at either of the 2 PWRC ponds sampled.

T. trimaculatus was the most frequent species taken from the swamp bed (13 of 16 collections were positive). Larvae and pupae were found in the same situations as those of *T. melanocerus, T. petiolatus* and *T. lineola.* Larvae were also common at the margins of the gravel pit pond. Two larvae were found near the surface of deep soft mud, covered with green algae, at the edge of the Patuxent River.

Table 1.—Collection data for 269 larvae and pupae of Tabanidae taken April 22, 1968 to June 5, 1970 at Patuxent Wildlife Research Center.

Species	Swamp bed	River margin	Gravel pond	Snowden pond	Total
Tabanus melanocerus Wiedemann and *T. petiolatus* Hine[a]	93	2	16	9	120
Chrysops vittatus Wiedemann[a]	59	10			69
T. trimaculatus Palisot de Beauvois[a]	38	1	11		50
T. lineola F.[a]	8				8
T. sulcifrons Macquart	6	1			7
T. nigripes Wiedemann				6	6
T. marginalis F.	1			3	4
T. similis Macquart	1		1		2
C. carbonarius Walker[a]				2	2
C. dimmocki Hine				1	1
Total					269

[a] Species represented by male specimens reared from the immatures (some specimens were selected for this purpose, but most were identified as larvae by the author).

Five of the 7 *T. sulcifrons* larvae taken were found at one site beneath surface litter in the swamp bed; no other species was found at this site. Two specimens were found at, or near, the river margin in mineral soils and were associated here with *T. trimaculatus* and *C. vittatus.*

T. lineola was taken from the gravel pit pond (2 larvae) and the moss mats (1 larva and 5 pupae) described for *T. melanocerus* and *T. petiolatus.* The *T. similis* specimen collected in the swamp bed was found in a rotted, waterlogged piece of wood. The 3 remaining species *(Chrysops carbonarius, C. dimmocki,* and *Tabanus nigripes)* were found in either the Snowden or gravel pit ponds in the same habitats as the dominant species occurring there.

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Sex Determination in *Propylea 14-punctata* (Coleoptera: Coccinellidae), an Imported Predator of Aphids[1]

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Recognition of sexes of research insects is usually necessary, or at least desirable, for several reasons. Various techniques have been used in sexing adult coccinellids, many of which injure living beetles, utilize dead specimens, or require the use of a microscope and other laboratory equipment. Such techniques leave much to be desired when members of a test population can not be sacrificed or instant field determination is sought.

Dobzhansky (1931) used head markings to identify species, and genitalia to differentiate sex among *Coccinella* species. Smith (1966) reported that females, on the average, are larger and heavier than males in some species of *Adalia, Anatis, Coccinella, Coleomegilla,* and *Hippodamia. Aphidecta obliterata* (L.) females and males were differentiated on the basis of body length and head coloration and markings (Witter and Amman 1969). Presented here is a method whereby quick and accurate

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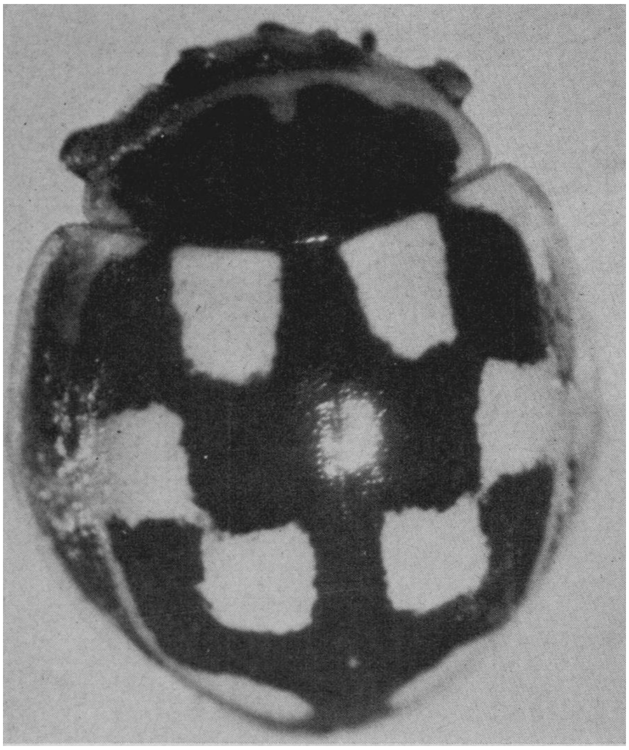


FIG. 1.—Dorsal view of *P. 14-punctata*.

sex determination of adult *Propylea 14-punctata* (L.) may be made without the assistance of optical aids.

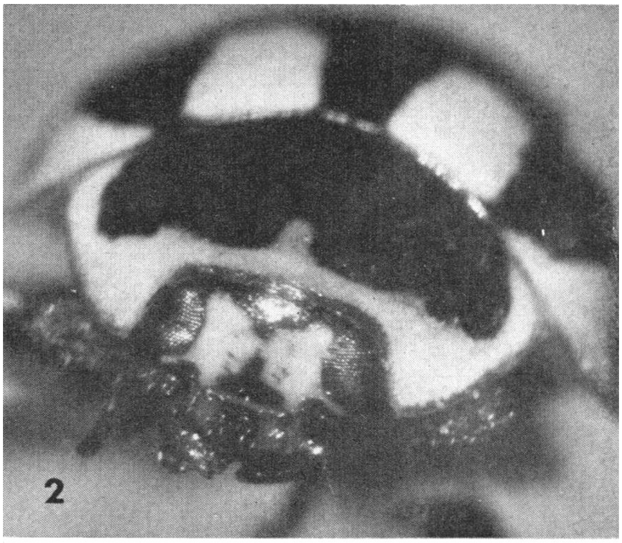
P. 14-punctata is a European coccinellid that was imported into the United States primarily to see if it would be effective against the greenbug, *Schizaphis graminum* (Rondani). The imported stock was originally collected at Crest (Drome), France, and bred in the USDA Insect Identification and Parasite Introduction Research Branch, Moorestown, N. J., laboratory to insure against introduction into and distribution of *Propylea* parasites within the United States (Personal communication, G. W. Angalet).

In general, the elytra of *P. 14-punctata* have a checkerboard appearance of black on a base color of light yellow to deep orange (Fig. 1). An uncommon variant of this pattern is a base color of yellowish orange with small, circular black spots. The pronotum of both sexes has a light yellow to deep orange base color with a posteromedian black area. The dorsum of the head in each sex is essentially a white to yellow base color, bordered by black along the posterior and lateral margins. Differentiation of the sexes is based primarily on the presence or absence of anteromedian head pigmentation, and secondarily, by the pattern of pronotal pigmentation.

The female (Fig. 2) has a distinct black area along the anteromedian margin of the head. Sometimes the pigmented area is triangular and extends posteriorly the length of the head. However, there is commonly only a distinct black spot on the head just posterior to the clypeus. The male (Fig. 3) lacks the anteromedian head pigmentation entirely, or in some instances, there is a mottled area of indistinct pigmentation.

The pattern of black on the pronotum may also be used to determine the sex, but with less assurance than with the head pigmentation. Fig. 2 shows the anteromedian border of the pigmented area on the female pronotum to be vaguely emarginated. The corresponding character on the male pronotum displays a sharply delineated [pronounced] emargination (Fig. 3). The area of black tends to be more extensive on the female pronotum than on that of the male.

All specimens that were classified as females on head pigmentation also exhibited the expected female pronotal pigmentation. On the other hand, ca. 15% of the specimens classified as males on head pigmentation displayed pronotal pigmentation approaching that expected on females. About 100 beetles have been paired in our laboratory by using the head pigmentation as a means of determining sex. Fertile ova have resulted from these pairings, except when other phases of our program may have influenced fertility of the ova.



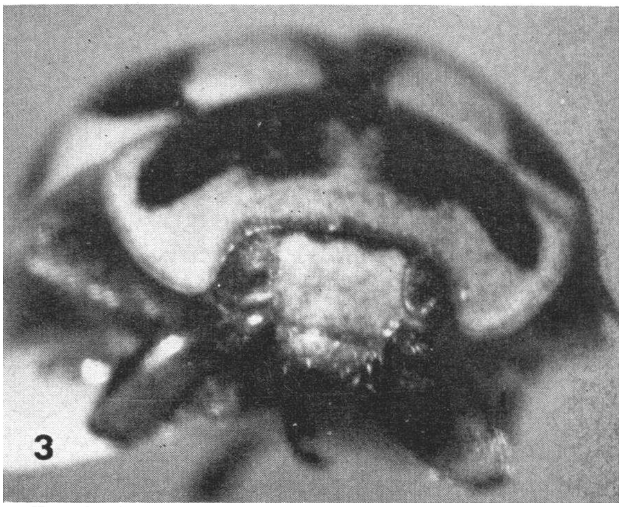


FIG. 2.—Frontal view of a female *P. 14-punctata* illustrating distinct head pigmentation and the vaguely marked emargination of anterior border of pronotal pigmentation.

FIG. 3.—Frontal view of a male *P. 14-punctata* illustrating the absence of distinct head pigmentation and the sharply delineated emargination of anterior border of pronotal pigmentation.

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A New Species of Fossil Diptera (Diopsidae) from the Ruby River Basin (Oligocene) of Montana[1]

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One fossil impression of an adult diopsid fly was discovered from shale deposits of the Ruby River Basin of southwestern Montana. The specimen (RR 6-390) was discovered in the well-known fossil basin area between Peterson and Mormon Creeks (site no. 6, T. 7 S, R.5 W, Sec. 23 Madison County, Mont.), 13 miles south of the town of Alder, Mont. This preservation, as far as known, is the 1st fossil diopsid to be recorded from the North American continent.

The paper shale deposits, from which this fossil was taken, appear to have been laid down during the late Oligocene (Becker 1961). The sediments making up these thin-laminated shales resulted from a combination of volcanic dusts from neighboring sources and mud and silt from surrounding mountains. These constituents formed the lake deposits that trapped the insects for later fossilization. The fine-grain matrix of volcanic dust and silt formed a suitable medium for preservation of minute and delicate insect parts, as well as plant structures. The paleoclimate, as suggested by plant fossils, was probably much warmer and not as extreme in temperature variations as the present climate. The amount of moisture was also much greater than at present. I can not now make any definite conclusions concerning paleoclimate from paleoentomological evidence.

The fossil found in this study was structurally similar to a fossil diopsid, *Prosphyracephala succini* (Loew) described by Hennig (1965) from the Baltic Amber (Oligocene). Although that specimen was somewhat larger than the fossil from Montana, they do compare quite closely. These similarities (1) overall body form, (2) wing venation (that which is visible), (3) front legs with enlarged femur, and (4) thoracic shape. It is not possible to compare the exact size of body structures because the specimen described by Hennig is not readily available. However, it appears that the Montana specimen has a longer eye stalk than that of the Baltic Amber specimen.

FIG. 1.—Impression of fossil diopsid fly, *P. rubiensis* (adult). Photograph shows dorsal view of fly from Ruby River Basin near Alder, Mont. (7.7×)

I believe that this fossil specimen belongs to the same genus as the fossil from the Baltic Amber deposits. Because of the structural similarity to *P. succini,* plus having the same relative geologic age, it is placed in the genus *Prosphyracephala* with the new specific name of *rubiensis.* The geographical separation of these specimens during the Oligocene warrants a new specific category.

The following systematic description gives morphologic features of the preservation mentioned in this scientific note.

Prosphyracephala rubiensis, n. sp.

(Fig. 1)

Description from dorsal view of insect, complete except for most appendages. Total length 4.53 mm; width of thorax at widest part, 1.46 mm; width of abdomen at widest part, 0.98 mm. Body light tan, with darker areas occurring as a result of heavy sclerotization. Head, minus stalk and eyes 0.74 mm long, 0.98 mm wide; distance between outside edge of eyes, 2.68 mm. Length of thorax, 1.60 mm; scutellar spines not visible; femur of 1st leg robust; only a portion of anterior part of wing venation visible; wing light tan with darker veins. Length of abdomen 2.19 mm.

Holotype.—No. RR 6-390. Found near Alder, Mont., by John Alley. 196?. Oligocene sediments of Ruby River Basin. No reverse. The type specimen is in the John Alley collection, Butte, Mont.

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[1] Received for publication Dec. 24, 1970.