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ADDITIONS TO THE LIST OF CARABIDAE
(COLEOPTERA) IN THE FAUNA OF
PLUMMERS ISLAND, MARYLAND

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ABSTRACT

Over four hundred specimens of Carabidae (Coleoptera) representing 78 species, were collected on 29.viii.1976 and between 24.iv. and 3.v.1981 on Plummerville Island, Maryland, a site of some importance in studies of the North American fauna. These species are listed with their habitats, and include eleven new to the site and six not collected there since 1965. This study confirms the fact that the carabid fauna of Plummerville Island is constantly changing with time.

Plummerville Island is situated close to the Maryland shore in the Potomac River about 14.5 km north-west of the Mall, Washington, D.C. This area lies to the east of the Appalachian Mountains just on the edge of the piedmont, next to the east coastal plain. Plummerville Island is one of the few sites in North America with a well-documented natural history and is therefore an important locality in studies of faunal and floral change.

Erwin (1981*a*) analysed various aspects of the carabid fauna of the island using specimens collected at the site from the beginning of this century up to 1978. His findings on the island's carabid fauna form part of the basis for his proposed future comparisons of other temperate and zoogeographic localities in relation to the 'Taxon Pulse' hypothesis (Erwin 1979, 1981*b*; Erwin & Adis 1982). He found that 214 species of carabids have been collected on Plummerville Island, with 160 species in the first decade (1901-1910) dropping to 101 species during the last decade (1965-1975).

Whilst on a recent visit to the Smithsonian Institution, I made four collecting trips to Plummerville Island, on 24 and 25 April, and 2 and 3 May 1981, accompanied by T. L. Erwin and Moira Sucharov. I was surprised therefore, when I found that after sorting my collection of some 400 Carabidae from this locality that I had 78 taxa represented, with 11 species new to the site and 6 not found since 1965.¹ Because of the importance of this locality and its fauna I prepared this paper with the list of species shown in Table 1 representing the results of our collections. All collecting was done by hand.

Erwin (1981*a*) did not give figures for the numbers of specimens for each species collected from the study site, so in the table I included figures to give the reader some idea of relative abundance. It is apparent that a higher proportion of the species were collected from the floodplain sites (primary and secondary) than the 'terra firme' sites in my results than in those analysed by

¹ In this figure I have included data from 22 specimens collected by my colleague P. M. Hammond (26.viii.1976) by sieving leaf litter, primarily at a small pond on the Maryland shore. These include one species new to Plummerville Island and two not found since 1965.

Table 1. Species of Carabidae collected from 24.iv.-3.v.1981 (N. E. Stork, T. L. Erwin, M. Sucharov) and on 29.viii.1976 (P. M. Hammond).

	Floodplain		Terra firme		
	Prim.	Sec.	P & S	Gen.	Slope
<i>Omophron americanum</i> Dejean	7	1	—	—	—
<i>Nebria lacustris</i> Casey	8	—	—	—	—
<i>Notiophilus aeneus</i> Herbst	1	—	—	—	—
<i>Elaphrus californicus</i> Mannerheim	12	1	—	—	—
<i>E. ruscarius</i> Say	3	—	—	—	—
<i>Cicindela repanda</i> Dejean	9	—	—	—	—
<i>C. sexguttata</i> Fabricius	1	1	—	6	—
<i>Scarites subterraneus</i> Fabricius	1	3	—	—	—
<i>Dyschirius sphaericollis</i> Say	1	—	—	—	—
<i>D. pilosus</i> LeConte	4	—	—	—	—
<i>Ardistomis viridis</i> Say	2	—	—	—	—
<i>Clivina bipustulata</i> Fabricius	6	—	—	—	—
<i>C. americana</i> Dejean	4	—	—	—	—
<i>C. dentipes</i> Dejean	5	—	—	—	—
<i>Bembidion inaequale</i> Say	4	—	—	—	—
<i>B. honestum</i> Say	4	—	—	—	—
<i>B. levigatum</i> Say	3	—	—	—	—
<i>B. fugax</i> LeConte	19	—	—	—	—
* <i>B. nigrum</i> Say	2	—	—	—	—
* <i>B. semistriatum</i> Haldeman	1	—	—	—	—
<i>B. variegatum</i> Say	9	14	—	—	—
<i>B. castor</i> Lindroth	7	3	—	—	—
<i>B. affine</i> Say	16	12	8	—	—
<i>B. quadrimaculatum</i> Linné	1	1	—	—	—
† <i>B. chalconeum</i> Dejean	2	1	—	—	—
† <i>B. patruelle</i> Dejean	1	1	—	—	—
<i>Elaphropus incurvus</i> Say	13	8	—	—	—
<i>E. vivax</i> LeConte	14	1	—	—	—
<i>Paratachys proximus</i> Say	2	—	1	—	—
<i>P. scitulus</i> LeConte	16	1	—	—	—
<i>P. potomaca</i> Erwin	1	—	—	—	—
* <i>P. obliquus</i> Casey	—	—	5	—	—
<i>Patrobus longicornis</i> Say	1	—	2	—	—
<i>Agonum tenue</i> LeConte	6	—	4	—	—
<i>A. rigidulum</i> Casey	1	—	—	—	—
† <i>A. melanarium</i> Dejean	1	—	—	—	—
<i>A. extensicolle</i> Say	29	—	—	—	—
<i>Platynus decentis</i> Say	—	—	6	—	—
<i>P. cincticollis</i> Say	8	—	3	—	—
* <i>P. parmarginatum</i> Hamilton	—	—	—	1	—
<i>Calathus gregarius</i> Say	—	1	—	—	—
<i>Olisthopus micans</i> LeConte	—	—	3	4	—
† <i>Loxandrus velocipes</i> Casey	—	—	1	—	—
* <i>Pterostichus honestus</i> Say	—	1	—	2	—
<i>P. lucublandus</i> Say	1	—	—	—	—
<i>P. ohionis</i> Csiki	—	1	—	1	—
<i>P. corvinus</i> Dejean	—	—	1	—	—
<i>P. caudicollis</i> Say	—	—	3	—	—
† <i>Morion monilicornis</i> Latreille	—	—	—	—	1
<i>Amara impuncticollis</i> Say	2	—	—	—	—
<i>A. anthobia</i> Villa	5	—	—	—	—

Table 1. Continued.

	Floodplain		Terra firme		
	Prim.	Sec.	P & S	Gen.	Slope
<i>A. familiaris</i> Duftschmidt	1	—	—	—	—
<i>Chlaenius aestivus</i> Say	—	2	—	—	—
<i>C. impunctifrons</i> Say	—	4	—	—	—
<i>C. tricolor</i> Dejean	3	4	—	—	—
† <i>C. lithophilus</i> Say	1	—	—	—	1
† <i>C. pusillus</i> Say	—	1	—	—	—
<i>Oodes amaroides</i> Dejean	—	—	4	—	—
† <i>O. brevis</i> Lindroth	—	—	1	—	—
* <i>Badister reflexus</i> LeConte	—	—	1	—	—
<i>Harpalus faunus</i> Say	—	3	—	—	—
<i>H. fulgens</i> Csiki	—	1	1	—	—
<i>Episcopellus autumnalis</i> Say	2	—	—	—	—
<i>Anisodactylus agricola</i> Say	2	1	—	2	7
* <i>A. rusticus</i> Say	—	1	—	—	—
† <i>Xestonotus lugubris</i> Dejean	—	2	1	—	1
<i>Amphasia interstitialis</i> Say	1	1	—	1	1
<i>Bradycellus rupestris</i> Say	—	—	3	—	—
<i>B. badipennis</i> Haldeman	1	—	—	—	—
<i>B. atrimedeus</i> Say	4	1	—	—	—
<i>Stenolophus ochropezus</i> Say	16	—	—	—	—
<i>S. comma</i> Fabricius	8	—	—	—	—
<i>S. lecontei</i> Chaudoir	6	—	—	—	—
<i>S. conjunctus</i> Say	1	—	—	—	—
† <i>S. fuliginosus</i> Say	1	—	—	—	—
† <i>Acupalpus rectangulus</i> Chaudoir	—	—	3	—	—
<i>Lebia viridis</i> Say	—	—	—	—	1
<i>Galerita bicolor</i> Drury	—	2	—	2	—
Totals	280	74	51	19	12
Species	53 (30)	28 (6)	18 (10)	7 (1)	6 (2)
*	2 (2)	2 (1)	2 (2)	2 (1)	—
†	5 (2)	4 (1)	4 (3)	—	3 (1)

Figures in parentheses for species found only at that habitat zone.

* Denotes species not found on Plummers Island in recent years.

† Denotes species not previously recorded from Plummers Island according to Erwin.

Prim.—Primary floodplain.

Sec.—Secondary floodplain.

P & S—Pond and stream sites.

Gen.—General collecting.

Slope—Litter covered slope on island.

Erwin (1981a). Since we collected equally on the floodplain and terra firme sites, this perhaps indicates that the floodplain sites warm up earlier in the year than the more shaded terra firme, and their carabid fauna is more active and collectable. This view is supported by the lack of Licinini, Lebiini and Harpalini that one might expect to find in the terra firme sites. Seasonality therefore may have biased the collections towards the floodplain faunas.

Of the 11 species new to Plummers Island, *Bembidion chalceum*, *Bembidion patruelle*, *Agonum melanarium*, and *Stenolophus fuliginosus* are all northern

species associated with floodplains. *Bembidion chalconeum*, collected under stones on the primary floodplain and on the mud flats next to a pond on the secondary floodplain, is normally found on barren shores consisting of gravel or coarse sand, usually by large rivers, and takes flight quite readily (Lindroth 1963). It is probable that larger populations of this species occur along the Potomac River and these specimens represent a small and possibly poorly established colony. *Bembidion patrule* (often confused with *B. castor*), collected from secondary floodplain leaf litter and under cakes of drying mud on the river bank, is found by standing or slowly running water, on areas of sparse vegetation. This species is often in areas affected by human habitation. *Agonum melanarium* is found on soft wet soil by water, usually clay mixed with organic matter (Lindroth 1966). The southern limit of this species is uncertain (Lindroth 1968). *Stenolophus fuliginosus*, collected on the primary floodplain, is found by permanent or temporary pools on clay soils with surface detritus.

Both *L. velocipes* and *M. monilicornis* are species with a southern distribution; but both might be expected to occur in this area as they have been collected further north. The *L. velocipes* specimen was found amongst leaf litter at the edge of a small pond. This habitat agrees with that suggested by Allen (1972) for this species (like many of the genus). The specimen of *M. monilicornis* was found in deep leaf litter on a steep slope on the island. This species normally occurs in rotting wood or in ant nests (Erwin, pers. comm.).

The remaining five species have a 'mid-North American' distribution. Both *Chlaenius lithophilus*, collected amongst leaf litter on the secondary floodplain, and *Chlaenius pusillus*, collected under stones on the primary floodplain and in deep leaf litter on a steep slope on the island, are associated with damp habitats, the former being found at the border of standing or running water where the vegetation is rich (Lindroth 1969). *Oodes brevis* is associated with vegetation close to or in water and was collected by treading leaf litter at the edge of a pond. The natural history of *Xestonotus lugubris* is not known, but, as with *Acupalpus rectangulus*, it appears to be well established at the site. Single individuals of *X. lugubris* were collected in several habitats; in deep leaf litter on a steep slope on the island, under bark of a fallen tree, on the secondary floodplain, and under stones on the primary floodplain. *Acupalpus rectangulus* was collected by P. M. Hammond in its usual habitat close to shaded standing water, among layers of leaves and grass (Lindroth 1968).

The species new to the list for Plummers Island were found in various habitats examined and it is interesting to note that most of these species seem to be clearly well established, since they were found in more than one zone. However, the species *Agonum melanarium*, *Morion monilicornis*, *Loxandrus velocipes*, *Oodes brevis*, *Anisodactylus rusticus* and *Stenolophus fuliginosus* were represented by only single specimens and these may not necessarily be firmly established at this site.

Six species have not been collected recently on Plummers Island. Of these, *Bembidion nigrum* and *Bembidion semistriatum*, both found on the river bank (the latter normally associated with woodland streams (Erwin, pers. comm.)), have similar habitats to that for *B. chalconeum* and also probably have better established colonies elsewhere on the Potomac River. Similarly the species *Paratachys obliquus* and *Badister reflexus*, both collected by P. M. Hammond in wet leaf litter by a terra firme pond; *Anisodactylus rusticus*, collected on the secondary floodplain; and *Platynus parmarginatum* (collecting habitat uncertain), are all fully winged, vagile dispersants and probably have larger colonies

near to the site. However, *Pterostichus honestus* is short-winged and presumably has a more permanent population on Plummers Island or on the mainland shore. Single individuals of this species were found under bark of a fallen tree, in leaf litter on a terra firme site, and on the secondary floodplain.

The main conclusion from these new data is that the carabid fauna of Plummers Island has a basic core of common species but that its overall composition is constantly changing with occasional species turning up as their geographical frontiers fluctuate.

Erwin (1981a) mentioned that two species of Rhysodini had been collected near to the Plummers Island site. Both of these species, *Clinidium sculptile* Newman and *Omoglymmius americanum* Laporte, were collected from the same rotting log, 3.5 miles n.e. of Great Falls, Fairfax County, Virginia, on the 26.iv.1981 (collectors: N. E. Stork, T. L. Erwin and M. Sucharov). Grand Falls is about 8 miles (15 km) up river from Plummers Island.

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