

HETEROPTERA IN OCEAN DRIFT.¹

BY J. G. MYERS.

The presence of occasional terrestrial insects or their remains, in beach drift is a phenomenon of little ethological significance; but the occurrence on some rare occasions, under circumstances but little understood, of considerable windrows extending sometimes for miles along the beach and often consisting of little else but insects, is a matter for legitimate speculation.

In 1915 Torre Bueno published extensive records of Heteroptera found in drift on lake and ocean shores, and in 1917 Parshley made further observations on this phenomenon. Mr. P. J. Darlington makes a practice of examining such drift on the Massachusetts coast for Coleoptera, and he has kindly given me four small collections of Heteroptera from this material. Though the species present are not extremely numerous, the circumstances of season and composition render them worthy of record as modifying certain conclusions of previous writers on this obscure subject.

In the lists which follow, the species marked B were present also in Torre Bueno's material, while P indicates those observed by Parshley.

Nahant, Mass., 19th May, 1926.

Pentatomidæ

1 *Podisus maculiventris* (Say) B

1 *Podops cinctipes* (Say) BP

Aradidæ

6 *Aradus robustus* Uhl. (3 males and 3 females).

2 *A. quadrilineatus* Say

1 *A. falleni* Stål

Lygæidæ

1 *Cymus angustatus* Stål P

1 *Drymus crassus* Van D.

¹Contribution from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 268.

6 *Eremocoris ferus* (Say) BP (The most abundant species, Bueno, 19th July)

2 *Cryphula parallelogramma* Stål

Gerridæ

1 *Gerris rufoscutellatus* Latr. B

Miridæ

1 *Lygus pratensis* (L.)

Ipswich, Mass., 22nd May, 1926.

Pentatomidæ

1 *Meadorus lateralis* (Say)

Aradidæ

5 *Aradus robustus* Uhl.

1 *Aneurus inconstans* Uhl.

Lygæidæ

5 *Eremocoris ferus* (Say) BP

Nahant, Mass., 13th June, 1926.

Cydnidæ

2 *Amnestus spinifrons* (Say) B (Most abundant species, Bueno, 3rd Oct.)

3 *Galgupha nitiduloides* (Wolff)

1 *G. atra* (A. and S.)

Pentatomidæ

1 *Podops parvula* Van D.

1 *P. cinctipes* (Say) BP

Aradidæ

1 *Aradus similis* Say

Lygæidæ

1 *Ozophora picturata* Uhl.

1 *Blissus leucopterus* (Say)

3 *Eremocoris ferus* (Say) BP

Tingidæ

1 *Corythucha juglandis* Fitch

Miridæ

1 *Capsus ater* (L.) P

1 *C. ater* var. *semiflavus* (L.) P

2 *C. ater* var. *tyrannus* (Fabr.)

Ipswich, Mass., 20th June, 1926.

Pentatomidæ

- 1 *Menecles insertus* (Say)

Lygæidæ

- 1 *Eremocoris ferus* (Say) BP

Miridæ

- 5 *Capsus ater semiflavus* (L.) P

- 3 *C. ater tyrannus* (Fabr.)

As to the season, it is interesting that Parshley's three records of the phenomenon in question occurred between 21st June and 1st August, while Bueno's observations, extending over a considerable number of years, were made in July, September and October. Mr. Darlington's first two lists are then apparently the first to be compiled in spring.

With regard to supposedly collaborating circumstances, Parshley noticed that "in each case there was a light on-shore breeze with fair weather, and in none was the occurrence preceded by an unusually violent off-shore wind, though on the day before the last a moderate land-breeze was observed." Bueno notes that on at least one of the occasions when he collected ocean drift there was "a heavy sea breeze." In the present cases Mr. Darlington recognizes certain weather conditions as necessary for renumerative drift collecting; but these conditions seem to depend more upon warmth and bright sunshine acting as stimuli to extensive flights, than of direction of wind. The wind on 19th May for instance was quartering, but blowing rather more on- than off-shore; while on the 22nd, the direction of the breeze was practically parallel to the beach. On both these occasions, and in fact on all days when collecting was well rewarded, according to Mr. Darlington, the weather was hot and insects were observed flying in the sunshine.

As an example of the form in which the material is found, the drift on 19th May was said to consist of a broken windrow extending for about half a mile. The most common constituent insect was a Bibionid, which made up more than all other species combined. Next most abundant were Coleoptera and thirdly Heteroptera.

Finally, as to the Heteroptera represented in beach-drift, Bueno records 66 species, of which 22 were in Lake Michigan drift and 49 in ocean debris (with 5 common to both situations). Parshley adds over 30 more species, while the present lists include 17 forms not previously recorded. It is therefore obvious that we are still far from knowing how many eastern North American Heteroptera may occur in this plight, but the extreme variety of the records so far published renders it likely that any species may be so found. In Bueno's material the Pentatomids (*sens. lat.*) were far the most plentiful, with Lygæidæ next in abundance. After considering the representation of other groups Bueno concludes that "the relative abundance of the families is what should be expected, in view of the fact that the Cimicidæ [Pentatomoidea] are abundant in numbers and strong fliers and that the Myodochidæ [Lygæidæ], next to the Miridæ, are the largest of the Heteropterous families and most abundant as to individuals." In Mr. Darlington's lists, however, while the Lygæidæ are strongly represented by 6 species with 21 examples, a preponderance brought about by the frequency of the littoral *Eremocoris fesus*, the Aradidæ, insects by no means frequent in the field, have 5 species with 16 specimens—an unexpectedly high representation, and one out of all proportion to their relative abundance as gauged by ordinary methods of collecting. Mr. Darlington states that on 19th May, Aradids were at least as numerous in the drift as all other Heteroptera put together. On later occasions their relative numbers decreased. Since the collections made are likely to represent more truly the number of species present than the proportion of individuals I list the families in order according to the former criterion,—Lygæidæ, 6 spp., Pentatomidæ and Aradidæ 5 spp. each, Miridæ 4 forms, Cydnidæ 3 spp., Gerridæ and Tingidæ, 1 each. Judged on both criteria the Aradidæ come second on the list.

From the fresh and indeed frequently living condition of the stranded insects, the presence of Heteroptera in beach drift is a sure indication that each species concerned has indulged, perforce or *sua sponte*, in flights over the water. Parshley remarks that the "phenomenon is not to be explained in connection with the spring and fall flights when the air seems alive wi

insects on the wing, as it has been observed at various other seasons, and for the same and other reasons such flights do not seem to be nuptial in character." He offers the suggestion that "on a clear day with a slight, on-shore breeze the surface of the ocean reflects sunlight with a peculiar sparkling brilliancy which might conceivably attract insects already flying above the land in unusual numbers because of some favouring combination of atmospheric conditions."

The outstanding feature of the present case is the unexpectedly strong representation of such cryptozoic woodland insects as the Aradids. That these bugs, in common with many social, semi-social or gregarious insects living in the same cryptozoic habitat, exhibit the phenomenon of a definite autumnal flight seems well ascertained in some species. Thus, with *Aradus australis* Erichs. in New Zealand, February appears to be a flying period during which these insects may be found in the most unlikely places, in houses, on windows in cities and often in large numbers in spiders' webs. Indications of a similar habit occur in *Ctenoneurus hochstetteri* (Mayr), a New Zealand Mezirine which has been observed flying at midday in brilliant sunshine. Bueno found two species of *Aradus* and one of *Neuroctenus* in ocean drift on 19th July.

That there is a definite spring flight of North American Aradids has been shown by Parshley (1921, p. 4). I have taken at Blue Hills, Mass., *Aradus quadrilineatus* in the open on 13th. of May. This species is included in our present ocean-drift list, as is also *Lygus pratensis* (L.), of which Mr. George Salt saw extensive flights in the vicinity of Boston during the earlier part of May. The preponderance of Bibionid flies in the first drift recorded in the present paper is obviously associated with the spring-flights so characteristic of these flies and so familiar to all who collect at that season. It seems therefore altogether probable that the occurrence in large numbers, of insects in general and of Heteroptera in particular in ocean-drift is related more often and more exclusively than Parshley believes, with definite spring and autumn flights. It is at least likely that Aradids form a considerable portion of such débris only during the spring and fall flights.

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