Reprinted from *The Florida Entomologist,* Volume 63, Number 4, December 1980.

# THE MIRID RECTAL ORGAN: PURGING THE LITERATURE

A. G. WHEELER, JR.
Bureau of Plant Industry,
Pennsylvania Department of Agriculture,
Harrisburg, PA 17110

ABSTRACT

The rectal or perianal organ of mirid (plant bug) nymphs was explored in a recent paper and assumed to have been overlooked by hemipterists. To rebut this notion, references ascribing the presence of an eversible rectal organ in nymphs of Old and New World mirids are cited, and their function of assisting nymphs to maintain contact with their hosts under adverse conditions is discussed. It is concluded that the rectal organ, although inadequately studied and mentioned only sporadically in the literature, occurs in mirid nymphs of all stages and probably in all subfamilies. A similar organ occurs in adult mirids; a similar-appearing, eversible structure is present in nymphs of the Anthocoridae.

---

A rectal or perianal organ recently was discovered in nymphs of *Dagbertus olivaceus* (Reuter) and a homologous structure was noted in nymphs of the Palearctic mirid *Pantilius tunicatus* (F.) (Leston 1979). The organ was illustrated and its function was proposed as helping nymphs of arboreal species maintain contact with their host plants under windy conditions, assuredly a reasonable suggestion. I offer the following comments not to asperse but to rectify the assumption that the rectal organ of immature Miridae has "passed unnoticed" in hemipterological literature. Kullenberg (1944) concluded from his careful biological studies that mirids generally were "not seasoned against wind" but several workers had previously reported on a sticky, eversible organ that helps keep mirid nymphs from losing contact with their host plants under adverse conditions.

Crosby (1911) was one of the first to observe an extrusible organ in North American mirids. He noted that nymphs of 2 species occurring on apple trees, *Heterocordylus malinus* Reuter and *Lygidea mendax* Reuter, rarely fall from their host when disturbed but "have a curious way of getting a new hold. The posterior end of the alimentary canal can be extruded, and is covered with a viscid secretion. As soon as they strike an object in falling, this sticky organ adheres to it until the insect can regain its foothold." H. H. Knight, probably drawing on Crosby's observations (C. R. Crosby was one of Knight's teachers at Cornell University), further discussed the survival function of the mirid rectal organ in the introductions to 2 of his major works (Knight 1941: 2; 1968: 14).

In the European literature Petherbridge and Husain (1918) noted that nymphs of *Plesiocoris rugicollis* (Fieber) were difficult to dislodge from apple branches because "even when falling . . . they hardly ever reach the ground but obtain a hold on one of the lower twigs . . . by extending the posterior part of their alimentary canal which secretes a sticky fluid." Fulmek (1930) includes a good illustration of the "Haftorgan" of *Lygocoris spinolae*

(Meyer) (Fig. 1), and Speyer (1934) also refers to the rectum of mirid nymphs being inflated for use as an adhesive organ. Disagreeing with Speyer's interpretation, Kullenberg (1944: 457) (somewhat anthropomorphically) suggested that the rectum may become an adhesive structure only when nymphs learn to use it through experience; otherwise, the rectum is inflated only during defecation. It is interesting to note that Southwood and Leston (1959: 201) in their well-known book on British Heteroptera also discuss the mirid rectal organ and its function of holding a bug to a leaf or twig after it has been "suddenly jolted."

Leston (1979) observed a rectal organ in nymphs of the 3rd and 4th stage, in addition to the 5th or last stage. It should be noted that all nymphal stages possess such a structure. Beyer (1921) shows an eversible organ in the 1st-instar nymph of *Halticus bractatus* (Say). In addition, nymphs of all mirid subfamilies appear to have these structures; at least a similar structure is present in all subfamilies occurring in Pennsylvania (Fig. 2-6, 8-13), including the Isometopinae (Fig. 2). In the genus *Hyaliodes* Reuter the rectal organ is found at the tip of the so-called anal tube (Fig. 9). Knight (1943) erected the subfamily Hyaliodinae based primarily on the presence of this structure in adults. Akingbohungbe (1974) discovered that nymphs of several hyaliodine genera have a tail-like modification similar to the anal tube in adults, an observation that led him to support subfamily status of the Hyaliodinae. Adults of certain bryocorine genera may also possess a similar anal tube (see Schmitz 1969). This structure appears to be restricted to the

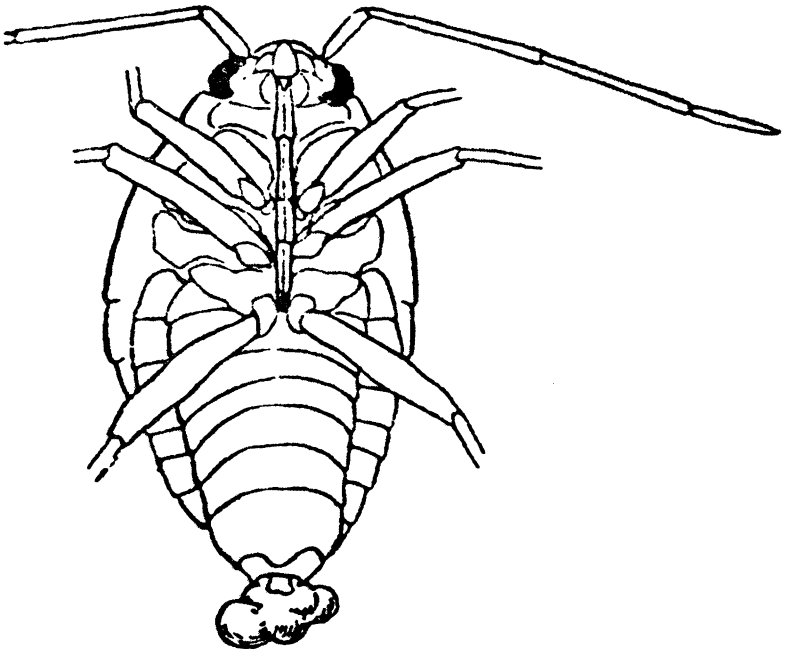

Fig. 1. Rectal organ ("Haftorgan") of *Lygocoris spinolae* (Meyer). From Fulmek, L. 1930. Z. Angew. Ent. 17: 78.

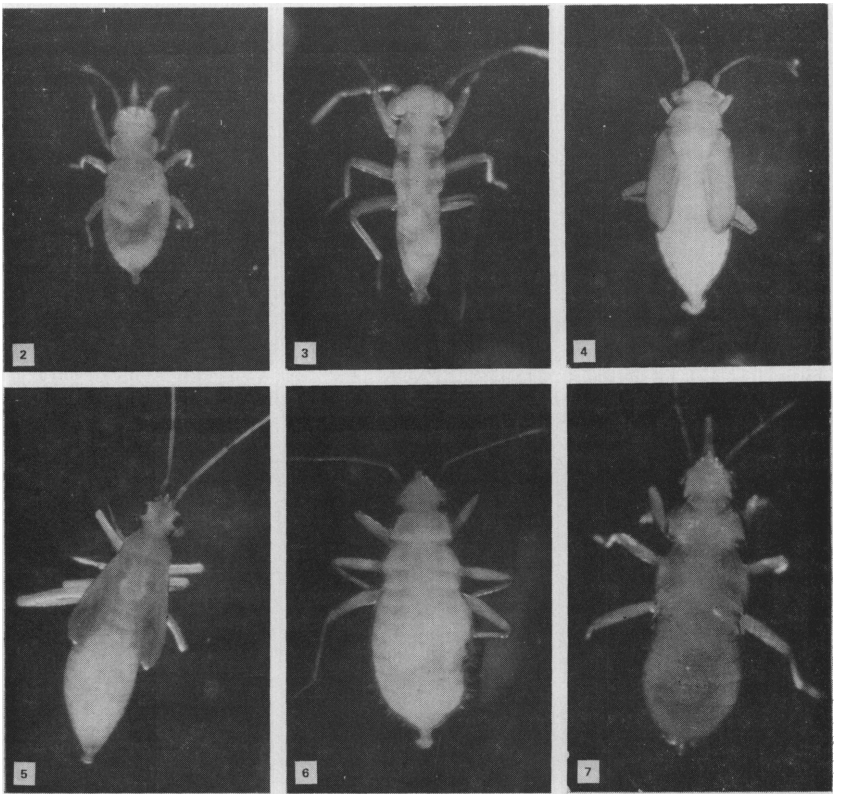


Fig. 2-7. Rectal organs of immature Miridae (2-6) and Anthocoridae (7). 2) *Myiomma cixiiforme* (Uhler) (Isometopinae), 2nd instar; 3) *Pilophorus crassipes* Heidemann (Orthotylinae), 1st instar; 4) *Lopus decolor* (Fallen) (Phylinae), 5th instar; 5) *Dicyphus rhododendri* Dolling (Bryocorinae), 5th instar; 6) *Deraeocoris nigritulus* Knight (Deraeocorinae), 3rd instar; 7) *Orius insidiosus* (Say), 3rd instar.

Hyaliodinae (and possibly Bryocorinae), while the rectal organ seems to be an unrelated structure common to all subfamilies.

The possession of a true rectal organ in adult mirids has received little, if any, attention, but a similar structure is present (Fig. 12-13). It may not be functional, or at least not aid in maintaining contact with the host plant. I have never observed adult mirids clinging to an insect net or collecting vial, as nymphs often do. Petherbridge and Husain (1918) remarked that adults of *P. rugicollis*, in contrast to the nymphs, are easily shaken from branches of their host.

My comments are not intended to resolve questions such as whether the mirid rectal organ varies morphologically among the subfamilies, whether a similar structure occurs in nymphs of related cimicoid families (my observations suggest that one is present in at least some Anthocoridae) (Fig. 7), or whether the organ can help elucidate relationships among higher taxa of

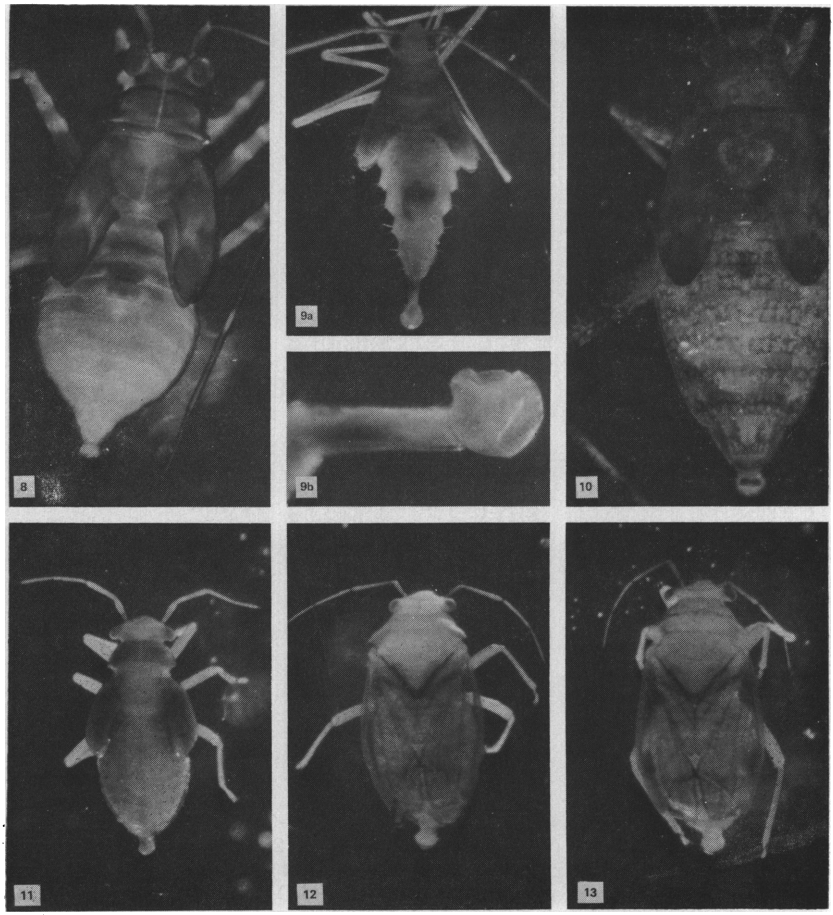


Fig. 8-13. Rectal organs of immature Miridae. 8) *Cylapus tenuicornis* Say (Cylapinae), 5th instar; 9a) *Hyaliodes* sp. (Deraeocorinae), 5th instar, 9b) close-up, lateral view; 10) *Phytocoris fenestratus* Reuter (Mirinae), 5th instar; 11) *Halticotoma valida* Townsend (Bryocorinae), 5th instar; 12) *H. valida*, adult ♂; 13) *H. valida*, ♀.

Heteroptera. Instead, I have tried to show that the mirid rectal organ, although inadequately studied, has been reported several times in the literature. There may well be additional, and possibly earlier, references than those I have cited.

ACKNOWLEDGMENTS

I am grateful to R. H. Cobben, Laboratory of Entomology, Wageningen, The Netherlands, for pointing out the note on rectal organs in Kullenberg (1944) and translating p. 457. T. J. Henry of this laboratory, E. R. Hoebeke,

Cornell University, and J. A. Slater, University of Connecticut, offered useful comments on the manuscript.

## Literature Cited

AKINGBOHUNGBE, A. E. 1974. Nymphal characters and higher classification analysis in the Miridae (Hemiptera: Heteroptera) with a subfamily key based on the nymphs. Can. Ent. 106: 687-94.

BEYER, A. H. 1921. Garden flea-hopper in alfalfa and its control. U. S. Dept. Agric. Bull. 964. 27 p.

CROSBY, C. R. 1911. Notes on the life-history of two species of Capsidae. Can. Ent. 43: 17-20.

FULMEK, L. 1930. Die grüne Schilcherwanze (*Lygus spinolae* Mey.) in Steiermark. Z. Angew. Ent. 17: 53-105.

KNIGHT, H. H. 1941. The plant bugs, or Miridae, of Illinois. Bull. Ill. Nat. Hist. Surv. 22: 1-234.

———. 1943. Hyaliodinae, new subfamily of Miridae (Hemiptera). Ent. News 54: 119-21.

———. 1968. Taxonomic review: Miridae of the Nevada Test Site and the western United States. Brigham Young Univ. Sci. Bull. Biol. Ser. 10(3): 1-282.

KULLENBERG, B. 1944. (preprint). Studien über die Biologie der Capsiden. Zool. Bidr. Uppsala 23: 1-522.

LESTON, D. 1979. The eversible rectal organ of certain Miridae (Hemiptera) and its function. Fla. Ent. 62: 409-11.

PETHERBRIDGE, F. R., AND M. A. HUSAIN. 1918. A study of the capsid bugs found on apple trees. Ann. Appl. Biol. 4: 179-205.

SCHMITZ, G. 1969. Monographie des espèces Africaines du genre *Helopeltis* Signoret (Heteroptera, Miridae) avec un exposé des problèmes relatives aux structures génitales. Ann. Mus. Roy. Afr. Cent., Ser. Quarto Zool. 168: 1-247 (1968).

SOUTHWOOD, T. R. E., AND D. LESTON. 1959. Land and water bugs of the British Isles. Frederick Warne, London & New York. 436 p.

SPEYER, W. 1934. Wanzen (Heteroptera) an Obstbäumen (II. Mitteilung). Z. Pflkrankh. 44: 122-50, 161-83.