

ELASMUS POLISTIS (HYMENOPTERA: EULOPHIDAE)
RECOVERED FROM NESTS OF *POLISTES DORSALIS*
(HYMENOPTERA: VESPIDAE) IN FLORIDA

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Elasmus polistis Burks (Hymenoptera: Eulophidae) was first described from specimens collected in Maryland, Pennsylvania, and Georgia (Burks 1971). It has since been reported in Texas (Gillaspy 1973) and Oklahoma (Nelson 1976). *Elasmus polistis* is a gregarious ectoparasite that feeds on the larvae of *Polistes* paper wasps (Nelson 1976). They have been reported as brood parasites of *P. exclamans* Viereck (Gillaspy 1973), *P. fuscatus* (F.), *P. annularis* (L.) (Burks 1971), *P. major* (Beauvois) (Krombein et al. 1979) and *P. metricus* (Reed & Vinson 1979). *Elasmus polistis* was not found in nests of *P. carolina* (L.) (N = 51) or *P. apachus* (N = 7) (Reed & Vinson 1979), suggesting some host specificity or site specificity.

Female *E. polistis* usually oviposit on early-stage wasp pupae in capped cells (Reed & Vinson 1979). When the larvae of *E. polistis* eclose, they feed externally on the pupae until all edible material is gone. The larvae then migrate to the basal or closed end of the cell and build a wall out of their voided meconia. This wall separates the larvae from the host pupal remains and may protect the parasites from attacks by host wasps (Reed & Vinson 1979, Lutz et al. 1984). *Elasmus polistis* larvae pupate behind the meconium wall, and emerging adults burrow through the side of the cell to escape (Reed & Vinson 1979). Males usually emerge first and await females to emerge in order to mate (Strassmann 1981). Females may then oviposit on another pupa in the same nest from which they emerged.

The purpose of this paper is to report the first observation of *E. polistis* in nests of *Polistes dorsalis* (Burks) (= *P. fuscatus hunteri* (Bequaert)) (Krombein et al. 1979). This paper wasp is a common species in the southeastern United States and is found throughout North and Central America. Although they are commonly seen in the field, their nests are seldom encountered, because they nest in sheltered or inconspicuous locations (Krispyn & Hermann 1977). At present there are only three parasites reported for *P. dorsalis*; *Pachysomoides stupidus* (Cresson) and *Pachysomoides fulvus* (Cresson) (Rabb 1960) are brood parasites, while the other, *Xenos peckii* (Kirby), is an adult ectoparasite (Strepsiptera) (Krombein et al. 1979).

Polistes dorsalis nests (N = 10) were collected in Alachua County, Florida, in December 1994. Adults of *P. dorsalis* were removed from their nests by cooling them until they were immobile. The number of adults and cells in each nest were counted (Table 1). Nests were examined and retained in the laboratory in one-liter plastic jars

TABLE 1. *ELASMUS POLISTIS* PARASITES COLLECTED FROM *POLISTES DORSALIS* NESTS.

Nest	Coll. Date	No. Cells	No. of Wasps	Total <i>E. polistis</i> ¹	Emerged ♀	Emerged ♂
A	12/21/94	114	11	—	—	—
B	12/23/94	189	54	22	—	—
C	12/23/94	198	22	82	6	1
D	12/29/94	214	11	107	—	—
E	12/29/94	178 ²	13	149	12	21
F	12/29/94	204	14	—	—	—
G	12/29/94	70	17	14	—	—
H	12/07/94	90	15 ³	352	15	58
I	12/07/94	186	12 ³	107	—	5
J	12/07/94	92	5 ³	—	—	—
Total				833	33	85

¹Total number of pupae and pupal cases in a nest.

²Nest was damaged making an accurate count impossible.

³Some of the wasps evaded capture during collection.

capped with fine mesh screens. The nests were kept at 22°C at a 14:10 h (L:D) cycle for one month. Nests were checked daily for parasite emergence.

The nests were dissected after a month and the number of pupae and pupal cases counted to determine the total number of *E. polistis* in each cell and nest (Reed & Vinson 1979; Table 1). *Elasmus polistis* infestation was determined both by the presence of pupae and pupal cases and by the emergence of adults from nests collected during the experiment. The number and sex of *E. polistis* that emerged from each nest was recorded.

Polistes dorsalis usually builds its nest close to the ground, in hollow logs or in rock piles (Krispyn & Hermann 1977). The site where the *P. dorsalis* nests were collected was unusual for this species because the nests were all under eaves of six small man-made shelters. *Elasmus polistis* was present in 7 of the 10 nests collected from this site with 4 confirmed by the emergence of adults (Table 1). Nelson (1968) and others postulated that *Polistes* nests in exposed locations, on structures, are more vulnerable to brood parasites. The relative high exposure of the *P. dorsalis* nests in this study, and the high density of *E. polistis* in the area on *P. exclamans* nests, probably increased the likelihood of *E. polistis* attacking *P. dorsalis* nests.

The number of parasitized cells present in each parasitized nest ranged from 1 to 15. The number of *E. polistis* collected per cell was 26 ± 2.6 ($\bar{x} \pm \text{SE}$), ranging from 5 to 55. This was considerably fewer than Reed & Vinson (1979) reported for *P. exclamans* ($\bar{x} = 48.9$, with a range of 6 to 103). The size of the host pupa most likely determined the number of parasitic larvae produced per cell (*P. dorsalis* is considerably smaller than *P. exclamans*).

The sex ratios of emerged *E. polistis* adults in this study favored the males which emerged at a ratio of 2.5 males to 1 female. The sex ratio in this study was the same as the 3:1 male to female ratio reported by Reed & Vinson (1979) for spring generations from other hosts. The large male-to-female ratio (3:1) in spring may be due to oviposition by uninseminated females of the previous generation (summer and fall) resulting from male progeny from unfertilized eggs.

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SUMMARY

This is the first report of *Elasmus polistis* parasites from nests of *Polistes dorsalis*, a new host record. A total of 85 male and 33 female adults of *E. polistis* emerged from 4 nests of *P. dorsalis* collected in Alachua County, Florida. An additional 713 pupae and pupal cases that were likely *E. polistis* were found in 7 of the 10 nests collected.

REFERENCES CITED

- BURKS, B. D. 1971. A North American *Elasmus* parasite on *Polistes*. J. Washington Acad. Sci. 6:194-196.
- GILLASPY, J. E. 1973. Behavioral observations on paper wasps. American Midl. Nat. 90:1-12.
- KRISPYN, J., AND H. HERMAN. 1977. The social wasps of Georgia: Hornets, yellowjackets, and polistine paper wasps. Research Bulletin 207. Athens, Georgia, 39 pp.
- KROMBEIN, K. V., P. D. HURD, D. R. SMITH, AND B. D. BURKS. 1979. Catalog of Hymenoptera in America north of Mexico, Smithsonian Institute, Washington, D. C. Vol. 2, 1510 pp.
- LUTZ, G. G., J. E. STRASSMAN, AND C. R. HUGHES. 1984. Nest defense by social wasps, *Polistes exclamans* and *P. instabilis* (Hymenoptera: Vespidae) against the parasitoid, *Elasmus polistis* (Hymenoptera: Chalcidoidea: Eulophidae). Entomol. News 95:47-50.
- NELSON, J. M. 1976. *Elasmus polistis* Burks (Hymenoptera: Eulophidae) reported in Oklahoma. Proc. Oklahoma Acad. Sci. 56:55.
- NELSON, J. M. 1968. Parasites and symbionts of nests of *Polistes* wasps. Ann. Entomol. Soc. America 61:1528-1539.
- RABB, R. L. 1960. Biological studies of *Polistes* in North Carolina. Ann. Entomol. Soc. America 53:111-121
- REED H. C., AND S. B. VINSON. 1979. Observations of the life history and behavior of *Elasmus polistis* Burks (Hymenoptera: Chalcidoidea: Eulophidae). J. Kansas Entomol. Soc. 52:247-257.
- RICHARDS, O. W. 1978. The social wasps of the Americas, excluding the Vespinae. British Museum of Natural History, London 580 pp.
- STRASSMAN, J. E. 1981. Parasites, predators, and group size in the paper wasp, *Polistes exclamans*. Ecology 62:1225-1233.