RESEARCH NOTES

BALLOONING BEHAVIOR OF *UMMIDIA* SPIDERLINGS (ARANEAE, CTENIZIDAE)

Ever since Baerg (1928, Entomol. News, 39:1-4) described the pre-ballooning behavior of *Ummidia carabivora* spiderlings, it has been assumed that at least some species of *Ummidia* disperse by ballooning, an uncommon mode of dispersal for mygalomorph spiders. Additional observations of pre-ballooning behavior in *Ummidia* spiderlings (J. Ragan, pers. comm.), the widely scattered distribution of *Ummidia* burrows (Coyle, F. A., 1983, J. Arachnol., 11:283-286), and the fact that distribution ranges of some *Ummidia* species bridge water gaps (Yaginuma, T., 1979, Bull. National Sci. Mus., 13:639-701; G. B. Edwards, pers. comm.) provide further support for this conclusion. The purpose of this paper is to describe, for the first time, the ballooning behavior of *Ummidia,* only the second non-araneomorph taxon that has been observed ballooning (Coyle, *ibid.*).

The 100-150 *Ummidia* spiderlings, clustered on top of a 0.9 m tall tombstone, were discovered by Sandra and Matthew Beachy at 1045 hr on 7 April 1984 in a graveyard on a flat grassy knoll just below my home five miles south of Cullowhee, North Carolina. During the period of observation (1100-1345 hr) I was assisted by Lloyd, Phillip, and Matthew Beachy, and my son, Alec. During this period the air temperature rose from 14-20°C, there were no clouds, and there were frequent gusts of light wind, ranging up to perhaps 20 knots and variable in direction (but primarily from the north). A single 2-3 mm wide band of multiple draglines, presumably marking the approach route of the spiderling brood, extended from the base of the tombstone northward through the grass for only 1.5 m before disappearing. Careful searches over a 10 m^2 area on this side of the tombstone failed to reveal the maternal burrow.

Early in the observation period almost all the spiderlings were clustered at each end of the central apical ridgeline formed at the junction of the two inclined (45°) surfaces that formed the top of the tombstone. As time passed, however, more and more of these spiderlings walked about, primarily along the ridgeline and edges of the top surface of the tombstone, always trailing draglines. Later observation of two of these spiderlings alive under a stereomicroscope confirmed that this dragline is a flat band of numerous fibers issuing from spigots on both sides of the spinning field. During the strongest gusts of wind the spiderlings would stop walking and "hug" the surface of the stone.

Ballooning activity commenced about 1115 hr and continued until the last spiderling departed at 1345 hr. Ballooning was accomplished in the following manner: The spiderling would move to an edge of the tombstone's top surface, tilt its cephalothorax upward, extend its pedipalps and first two pairs of legs off the substrate and out over the edge, and drop (or be blown off) a few to about 30 cm on its dragline (Fig. 1A). The breeze would push and lift the spiderling and its dragline up towards the horizontal and away from the attachment point as the dragline lengthened (Fig. 1B-1C). Eventually, after a few to several seconds, the lengthening dragline would incline slightly above the hori-

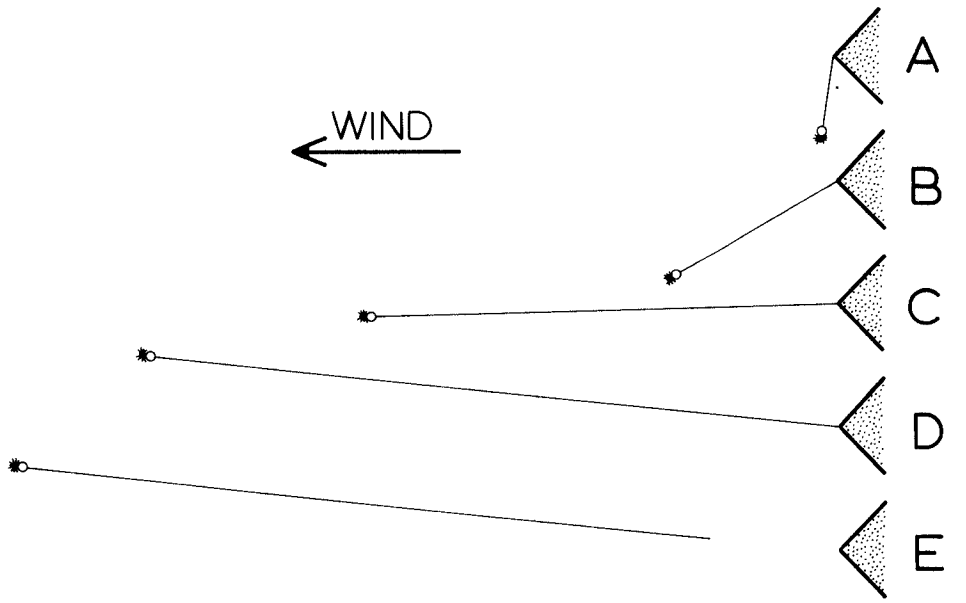

Fig. 1.—Diagrammatic representation of ballooning method of *Ummidia* spiderlings: A, Spiderling drops on dragline from edge of launching surface; B-D, Wind pushes spiderling away from launch point, and, as dragline lengthens, spiderling and dragline are lifted to and then above horizontal; E, Dragline breaks near attachment point and spiderling drifts downwind.

zontal (Fig. 1D) and break at or near the attachment substrate so that the spiderling would be airborne (Fig. 1E), drifting off in a slightly upward trajectory. Close observation failed to reveal any silk fibers issuing from the spinnerets other than those fibers that composed the dragline. Successful launchings like this were observed very infrequently. More commonly, after dropping on a dragline in the manner just described, the spiderling was either blown against the tombstone's surface (after which it ascended to repeat the launching process) or the spiderling drifted to the ground before the lengthening dragline could be lifted to the horizontal.

Although the method of ballooning is the same, the launching success of these *Ummidia* spiderlings was not as great as that of *Sphodros* spiderlings I have observed ballooning (Coyle, *ibid.*). Whether this low launching success is typical of *Ummidia* and is due to a heavier body (Coyle, F. A., M. H. Greenstone, A. L. Hultsch and C. E. Morgan, in prep.), a heavier dragline, some other inherent constraint, or whether it was due to the greater fluctuation in wind velocity and direction, is not clear. *Ummidia* spiderling draglines appear to have a higher tensile strength than those of *Sphodros* since the *Ummidia* draglines tended to become much longer before breaking (one was 6 m long) in spite of the higher wind velocities.

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