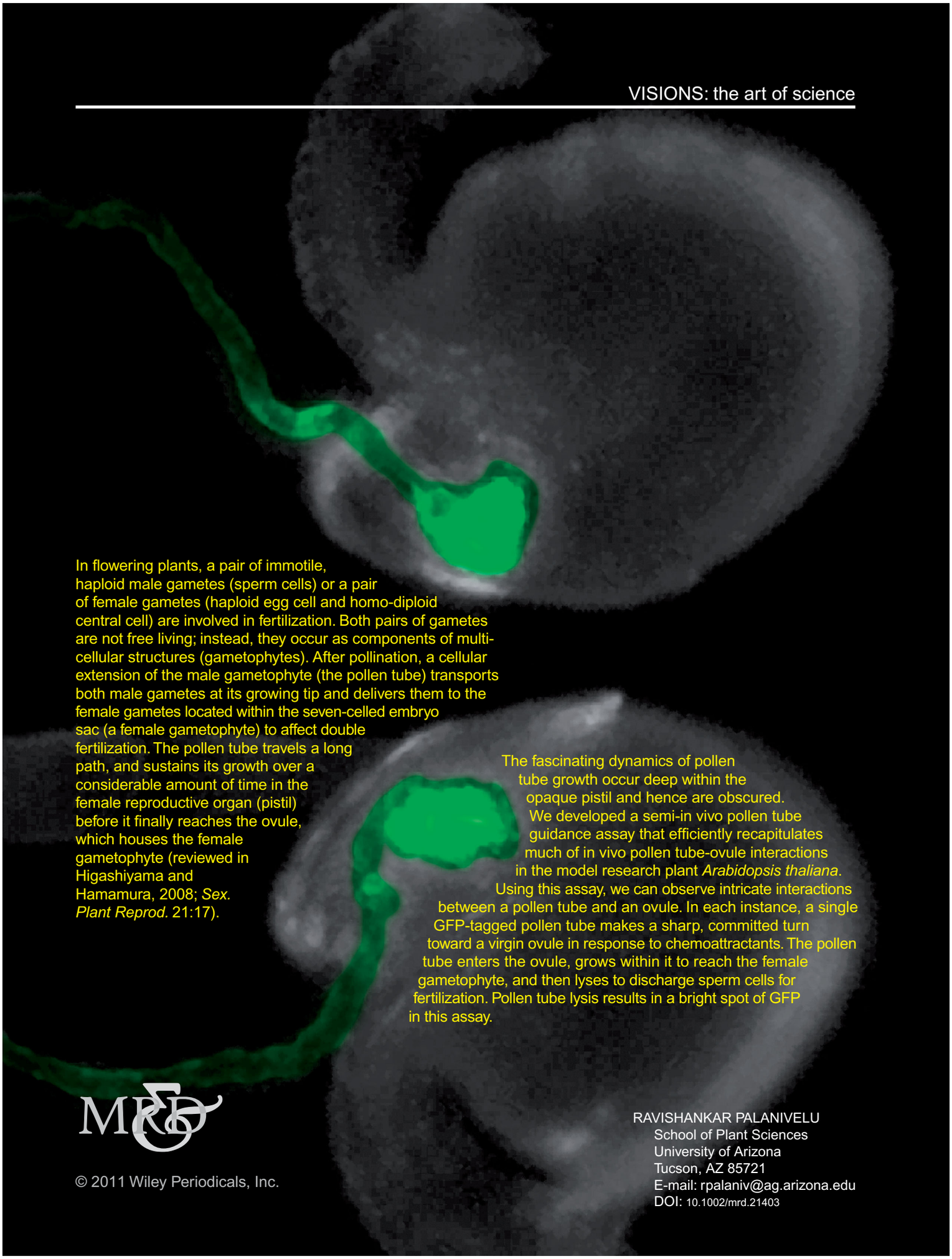

In flowering plants, a pair of immotile, haploid male gametes (sperm cells) or a pair of female gametes (haploid egg cell and homo-diploid central cell) are involved in fertilization. Both pairs of gametes are not free living; instead, they occur as components of multi-cellular structures (gametophytes). After pollination, a cellular extension of the male gametophyte (the pollen tube) transports both male gametes at its growing tip and delivers them to the female gametes located within the seven-celled embryo sac (a female gametophyte) to affect double fertilization. The pollen tube travels a long path, and sustains its growth over a considerable amount of time in the female reproductive organ (pistil) before it finally reaches the ovule, which houses the female gametophyte (reviewed in Higashiyama and Hamamura, 2008; *Sex. Plant Reprod.* 21:17).

The fascinating dynamics of pollen tube growth occur deep within the opaque pistil and hence are obscured. We developed a semi-in vivo pollen tube guidance assay that efficiently recapitulates much of in vivo pollen tube-ovule interactions in the model research plant *Arabidopsis thaliana*. Using this assay, we can observe intricate interactions between a pollen tube and an ovule. In each instance, a single GFP-tagged pollen tube makes a sharp, committed turn toward a virgin ovule in response to chemoattractants. The pollen tube enters the ovule, grows within it to reach the female gametophyte, and then lyses to discharge sperm cells for fertilization. Pollen tube lysis results in a bright spot of GFP in this assay.

RAVISHANKAR PALANIVELU
School of Plant Sciences
University of Arizona
Tucson, AZ 85721
E-mail: rpalaniv@ag.arizona.edu
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