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TEMPERATURE CHANGES IN HEAT PRODUCING PLANTS

Heat production in aroid plant flowers was first noticed by Lamarck (Thomas, 1960) and at present the details of the biochemical and physiological mechanisms involved are well documented (Dormer, 1960; Fischer, 1960; Forward, 1960; Hackett, 1957; James and Beevers, 1950; James and Clapham, 1935; Meeuse, 1966). There are no records of the daily cycle of temperature within the spadix. Although a few temperatures have been recorded, there is no indication as to the magnitude of heat production, nor has there been much work reported on tropical aroids.

The cycle of temperature changes during flowering of *Philodendron selloum* on the campus of the University of California, Los Angeles, and in my own yard, Anaheim, California were recorded. All plants were in the shade for most or all of the day. Temperatures of 28 spadixes were taken with a Schult-

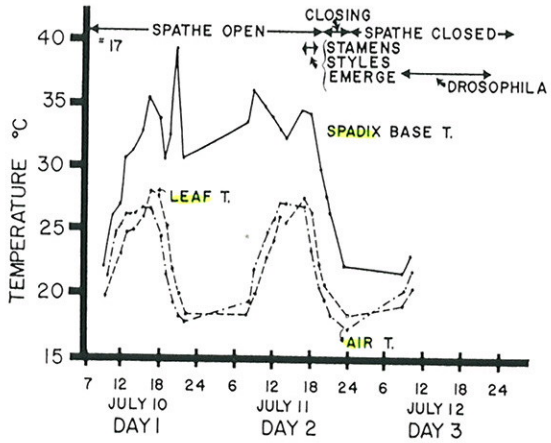

Figure 1. Spadix, leaf, and ambient temperatures of a single flower (17) of *Philodendron selloum*.

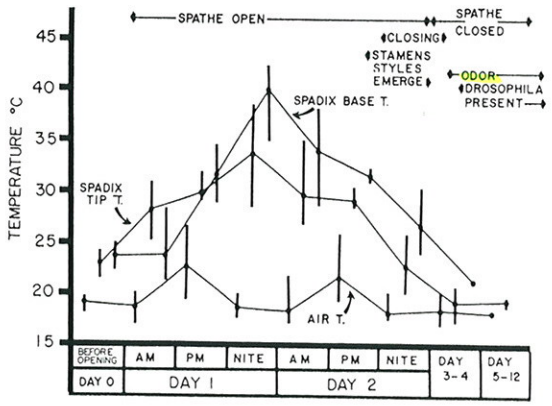

Figure 2. Summary of spadix and ambient temperatures of 28 *Philodendron selloum* flowering cycles. Vertical lines indicate range and dots indicate means.

heis quick recording thermometer or with a YSI Telethermometer thermistor Model 44TD using vinyl 402 or banjo probes. Temperature readings were taken as follows: *spadix tip*, within center of spadix, 1″ below tip; *spadix base*, within spadix 2″ below beginning of female flowers; *air temperature*, within spathe but 1″ away from and 2″ above bottom of spadix; and *leaf*, 3″ inside leaf base and 3″ below spadix. Morning temperatures were taken between 0830–0930, afternoon: 1300–1700, night: 2000–2200 hrs.

The cycle for a typical flower is shown in figure 1. A summary of all temperatures is shown in figure 2. At no time was the ambient temperature, measured at spathe base, above 26.7°C. Air temperatures at night at UCLA were usually below 20°C with fog present, yet a maximum temperature of 42.5° (AT: 18.5°C) was recorded within the spadix base, a figure 24°C above ambient. Thus (Fig. 2) the spadix temperature is rising while the ambient is falling. The tip of the spadix begins to rise in temperature before the base, but the latter reaches a higher maximum temperature.

As noted by others (Dormer, 1960; James and Clapham, 1935) the emergence of the flowers from the solid spadix gives a shaggy appearance to the spadix. Flower emergence follows the night after maximum temperature is reached (night of day 2). This is followed by the beginning of a strong odor and the appearance of *Drosophila*. The flies crawl about the flower, presumably pollinating the flowers. The spathe subsequently closes accompanied by a drop in flower temperature, an increase in the odor, and the decomposition of the flower. The *Drosophila* are present within the closed spathe for several days after closing and presumably lay eggs in the decaying flower.

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