strate the reliability of the chromatographic patterns as phenotypic expressions of definite taxonomic utility. The complex patterns exhibiting much interspecific variation are especially useful in these structurally simple organisms.

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Stimulation of Fungal Infection of Bentgrass

During an investigation of factors influencing plant fungal infection, the effects of guttation fluid were tested on conidia of *Helminthosporium sorokinianum* Sacc. ex Sorok. Guttation fluid was produced by growing seedlings of *Hordeum vulgare* L., barley variety Atlas 54, on paper towels wetted with tap water in closed containers at 75° F and a light intensity of 90 ft.-candles. Because barley produces large droplets, it was used instead of bentgrass. Fluid was collected daily from the leaf tips and frozen immediately. The samples were thawed, sterilized with a bacteriological filter and kept frozen until used.

Spores from cultures 4–6 months old, grown on potato dextrose agar, were washed thoroughly with triple-distilled water to remove contaminating nutrients. In infection experiments, spores were suspended in triple-distilled water, tap water, guttation fluid, or an infusion made from sterile *Agrostis palustris* L. leaves steeped in distilled water. Each was sprayed on 4-day-old *A. palustris* seedlings, variety Seaside, grown in sterilized quartz sand in petri dishes, and incubated at 75° F and a light intensity of 90 ft. candles. Plants inoculated with spore-tap water or spore-distilled water suspensions manifested water soaking, yellowing, and necrosis on 10 per cent of the plants in 6–7 days, whereas plants inoculated with the spore-leaf infusion developed the identical syndrome on 30 per cent of the plants in 6 days. Plants inoculated with spore-guttation fluid developed very severe symptoms on 99 per cent of the plants in 2–4 days; nearly all plants were dead in 6 days. Sporulation was abundant after 4 days, but was slight on plants inoculated with the remaining treatments after 9 days. Neither the guttation fluid nor leaf infusion was toxic to plants when applied alone. This experiment was verified twice.

To gain an understanding of these effects, slide germination experiments were conducted. Germination at 75° F averaged in 24 h approximately 40 per cent in tap water and distilled water, and 96 per cent in guttation fluid and leaf infusion. Apparent appressoria formation began in 8–9 h. Since they formed only at the bottom of the slides, contact stimulus appears necessary for their formation. Appressoria were most commonly oval, subglobose, obovate, obclavate, or pyriform. Formation of apparent infection hyphæ began several hours later. In distilled water and tap water, germ tubes were short to long, but sparingly branched; appressoria and infection hyphæ rare or absent. In leaf infusion, germ tubes were extremely long and profusely branched; appressoria and infection hyphæ rare or absent. In guttation fluid, germ tubes were short to intermediate in length and branching; apparent appressoria were very common, but infection hyphæ usually formed on only 20–40 per cent of the appressoria.

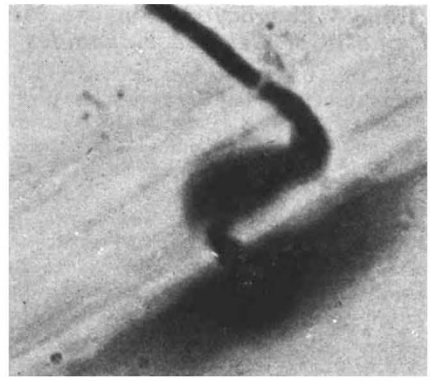

Fig. 1. Pyriform appressorium formed by germ tube of *H. sorokinianum* on leaf surface of barley. Note infection hypha penetrating host

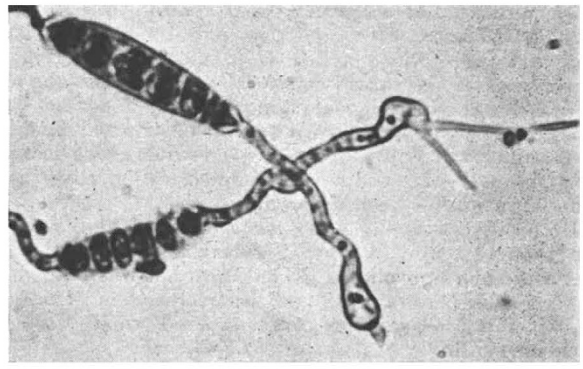

Fig. 2. Apparent appressoria and infection hyphæ formed by germ tubes of *H. sorokinianum* in barley guttation fluid on a plastic slide

This experiment was repeated with 4 samples of fluid from barley, with one from *A. palustris*, variety Seaside, and one from *Poa pratensis* L., variety Merion. Thus, the severe and rapid infection by the spore-guttation fluid inoculum probably can be attributed to the increased percentage and rate of germination, accelerated growth of germ tubes, and the increase in apparent appressoria.

That the infection structures formed on slides constitute true appressoria and infection hyphæ is suggested by: (1) the close morphological similarity of the guttation induced structures (Fig. 1) to true infection structures (Fig. 2); (2) the numbers of appressoria formed *in vitro* were correlated with rate of disease development and disease severity; (3) the apparent appressoria were usually thick-walled; (4) they adhered to the slides; (5) they formed only in contact with the slides. Contact with a hard surface has generally been considered the sole stimulus for appressoria formation[1], but Kerr and Flentje[2] recently presented evidence that the stimulus for infection cushion formation by the radish strain of *Pellicularia filamentosa* (Pat.) D. P. Rogers is both chemical and thigmotropic. Results of the present report also suggest that chemical as well as mechanical stimuli may be involved. Preliminary chromatographic analyses of 4 barley guttation fluid samples indicate that amino-acids are present at concentrations not exceeding 25 μg/ml. fluid.

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