

## Terminology to Describe the Differentiation Response by Germlings of Fungal Spores

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Wynn (6) has demonstrated that uredospores of the bean rust fungus (*Uromyces phaseoli* (Pers.) Wint.) will develop infection structures in response to a contact stimulus provided by a stomatal guard cell. A chemical stimulus is not involved. Newer studies have now shown that infection structures of this fungus will develop in the absence of a physical stimulus if potassium ions are incorporated into the germination medium (4). The problem of positioning (ie, the appressorium must form over the stoma to enable fungal penetration) suggests, however, that the bean rust fungus has developed a contact-dependent sensory mechanism for this purpose even though certain chemicals will also trigger differentiation.

These research problems have generated the need for terminology, which will encompass the mode of differentiation response. We propose that the germling response to contact stimuli, which results in formation of the infection structures, be described as *thigmodifferentiation*, and the response to chemical stimuli as *chemodifferentiation*. Word complexes for other environmental stimuli can be coined similarly. The example refers to the bean rust fungus, but it could apply equally to other rust pathogens. Wynn and Staples (7) recently employed the terms "contact tropism" and "chemotropism" to define these responses. Because tropisms are "turning or growth movements" (1), we believe that this was incorrect usage.

Thigmodifferentiation might also be used to describe appressorium formation by a wide range of contact-sensitive fungi. For example, it is well known that conidial germlings of *Colletotrichum truncatum* readily form appressoria when the germ tubes contact virtually any hard surface (see review by Staples and

Macko [5]). Similarly, the formation of appressoria by germlings of *C. piperatum* in a sucrose-containing nutrient medium (3) is a further example of chemodifferentiation.

Wynn and Staples (7) also used "contact tropism" to describe the directional growth of germ tubes in response to the stimuli received from the striations on the surfaces of leaves; this usage is correct and should be retained. "Thigmotropism," for example, was employed by Dickinson (2), to mean a growth or turning in response to a contact stimulus. This term might be applicable; however, the response is either towards or away from the stimulus. Germ tube growth always is perpendicular to the direction of the striation, but this response is a reorientation of germ tube direction rather than a movement, which reflects attraction or repulsion.

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