

Kaskaskia gleditsiae gen. et sp. nov. Parasitic on Thornless Honey Locust in Illinois

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ABSTRACT

Kaskaskia gleditsiae gen. et sp. nov. is parasitic on thornless honey locust, causing extensive necrosis and eventual cracking and peeling of the bark in the trunk area under conditions of natural infection. Inoculations produced sunken cankers with necrosis, cracking, and peeling of the bark tissue. In natural and experimental infections, a brown discoloration of the sapwood was

observed above and below the margin of the diseased bark. The fungus is characterized by an aggregation of nonostiolate pycnidia on a fleshy hypostroma; hyaline, septate conidiophores, each of which consists of a basal cell bearing a series of radiating, sterile, or conidiogenous branches; and 1-celled, phialidic, hyaline conidia.

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The honey locust, *Gleditsia triacanthos* L., is distributed from the east coast of the USA to the central great plains. In Illinois, the thornless honey locust, var. *inermis* Willd., is commonly grown as a lawn tree or in landscape plantings. In June 1968, several thornless honey locust trees were dying in a planting on the campus of the University of Illinois, Urbana. From branch and trunk samples of diseased wood, a fungus was consistently isolated which could not be placed in any known genus. A second collection of this fungus was accidentally found in the fall of 1971 from a naturally infected tree in Champaign, Ill.

The widespread use of the thornless honey locust as a shade tree prompted the authors to investigate the symptoms, host range, and taxonomy of this new pathogen.

Symptoms.—Under conditions of natural infection, extensive areas of necrosis, cracking, and peeling of the trunk bark were observed along with a brown discoloration of the sapwood (Fig. 1). When inoculated experimentally, branch or stem cankers developed in the vicinity of the inoculated area within 6 to 8 weeks (Fig. 2). The cankers were sunken and extended 2-7 cm above and below the inoculated area. The infected bark was smooth and yellowish-brown, with dark-brown margins. Frequently cracking and peeling of the necrotic bark tissue occurred, and a brown discoloration developed in the sapwood.

Host range.—For two consecutive growing seasons, inoculation experiments were performed on hosts selected from among woody ornamental species commonly encountered in lawn and landscape plantings in Illinois. Thornless honey locust, hackberry, redbud, black locust, sugar maple, and sweetgum were used in these experiments. Each tree was approximately 4 m in height. The taxa and the total number of inoculations were: *Gleditsia triacanthos* var. *inermis*, 60; *Celtis occidentalis* L., 12;

Cercis canadensis L., 12; *Robinia pseudo-acacia* L., 12; *Acer saccharum* Marsh., 12; and *Liquidambar styraciflua* L., 12. No inoculation experiments were undertaken on the thorny honey locust, *Gleditsia triacanthos* L. var. *triacanthos*. The inoculations were made during the months of June, July, and September of 1969 and 1970. The bark in the areas to be inoculated was treated with 95% alcohol, as was the scalpel used in making the wounds. The inoculations were made by placing a 5-mm mycelium-agar disc behind a 1-inch V-shaped bark flap made by cutting through the bark to the cambium. After inserting the inoculum, each flap of bark was pressed back in place and wrapped with rubberized grafting tape to prevent drying of the inoculum and wound area. The controls included five inoculations of each host species with a disc of sterilized agar.

The fungus proved pathogenic only to *G. triacanthos* var. *inermis*. It was reisolated consistently from the margin of cankers but not from the discolored sapwood. The inoculations made in June and July produced more and larger cankers than those made in September.

Taxonomy.—Morphological and developmental studies support the view that this pathogen should be described as a new species in a new genus. The terminology used in this paper to describe conidiogenesis is that recommended by the Kananaskia Conference on Fungi Imperfecti (2).

Kaskaskia Born & Crane gen. nov.

Carposomata innata, maturitate erumpentia. Hypostromata bene evoluta, carnosa, plectenchymatica. Pycnidia super hypostroma aggregata, interdum coalescentia, oblonga, uniloculata, haud ostiolata. Pycnidiorum paries pallide vel saturate brunneus, durus, e cellulis pseudoparenchymaticis compositus. Conidiophora compacta, e pariete interiore loculi orta, hyalina, septata, e cellula basali clavata vel oblonga seriem ramorum rediantium ad apicem producenti composita. Rami vel steriles vel conidiogeni, haud, semel, vel bis bifurcati. Cellulae conidiogenae



Fig. 1-2. Symptoms and sign of a new disease of thornless honey locust caused by *Kaskaskia gleditsiae*. 1) Extensive areas of necrosis, cracking, and peeling of the trunk bark. 2) A sunken branch canker with the erumpent fungus fruiting bodies.

phialidicae, prominentes, apparatu apicali distincto praeditae, in conidiophoris terminales vel e ramo fertili lateraliter sub septo ortae. Phialoconidia hyalina, unicellulares, oblonga vel ellipsoidea.

Species typica: *Kaskaskia gleditsiae*

Fruiting bodies innate becoming erumpent at maturity. Hypostromata well developed, fleshy, plectenchymatic. Pycnidia aggregated on the hypostroma, occasionally coalescing, oblong, 1-loculate, nonostiolate. Pycnidial wall light to dark brown, hard, composed of pseudoparenchyma cells. Conidiophores compact, arising from the inner wall of the pycnidial cavity, hyaline, septate, consisting of a clavate to oblong basal cell bearing a series of radiating branches at the apex. Branches either conidiogenous or sterile, with 0-2 dichotomies. Conidiogenous cells phialidic, prominent, with a distinct apical apparatus, arising terminally on the conidiophores or laterally below a septum on a fertile branch. Phialoconidia hyaline, 1-celled, oblong to elliptical.

Type sp.: *Kaskaskia gleditsiae*

Named for *Kaskaskia*, the first capital of Illinois, established in 1703 as a French trading post and destroyed by the flooding of the Mississippi River in 1844.

Kaskaskia gleditsiae Born & Crane sp. nov. (Fig. 3-7)

Coloniae in agar cum Solano tuberoso et dextroso composito crescentes floccosae, luteae vel griseo-brunneae. Mycelium e hyphis ramosis, septatis, subhyalinis vel luteis compositum. Carposomata innata, maturitate erumpentia.

Hypostroma bene evoluta, 276-685 × 345-860 μ, carnosa, plectenchymatica. Pycnidia super hypostroma aggregata, interdum coalescentia, oblonga, 529-937 × 300-860 μ, uniloculata, haud ostiolata. Pycnidiorum loculi 93-387 × 60-486 μ. Paries pallide vel saturati brunneus, durus, 16-57 μ crassus, e cellulis pseudoparenchymaticis subhyalinis vel brunneis compositus. Conidiophora compacta, e pariete interiore loculi orta, 28.0-97.4 μ longa, hyalina, septata, e cellula basali clavata vel oblonga [3.5-] 4.6-11.5 [-13.5] μ longa seriem ramorum radiantium ad apicem producente constantia. Rami vel steriles vel conidiogeni, haud, semel, vel bis bifurcati. Cellulae conidiogeni phialidicae, prominentes, 7.6-14.0 × 1.2 μ, apparatu apicali distincto praeditae, in conidiophoris terminales vel e ramo fertili lateraliter sub septo ortae, in cultura proxime e hyphis vegetis productae. Conidiophorum rami steriles interdum fecundi exorti. Phialoconidia hyalina, in cumulo sublutea, continua, oblonga vel elliptica, [1.8-] 2.3-2.9 [-3.8] × 0.6-1.2 μ. Holotypus: ILLS 34832.

Colonies on PDA floccose, yellow to gray-brown. Mycelium composed of branched, septate, sub-hyaline to yellow hyphae. Fruiting bodies on host tissue innate becoming erumpent at maturity. Hypostroma well developed, 276-685 × 345-860 μ, fleshy, plectenchymatic. Pycnidia aggregated on the hypostroma, occasionally coalescing, oblong, 529-937 × 300-860 μ, 1-loculate, nonostiolate, opening by rupture of the wall. Pycnidial cavities measuring

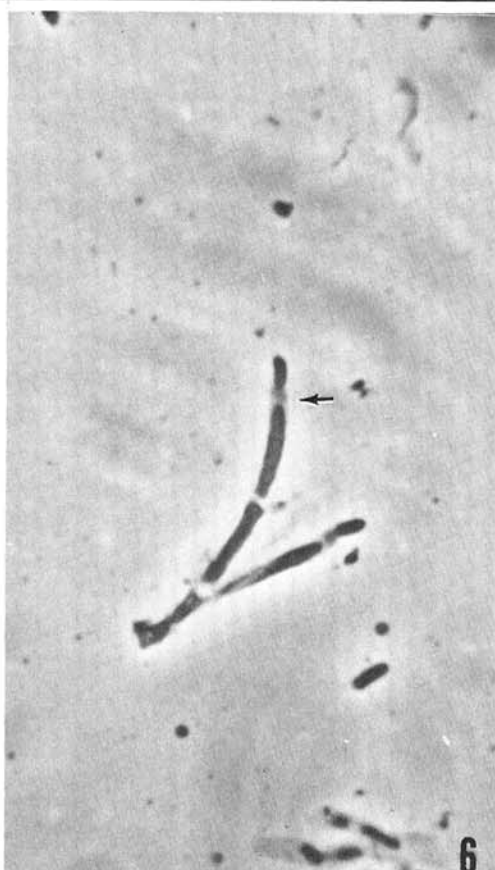
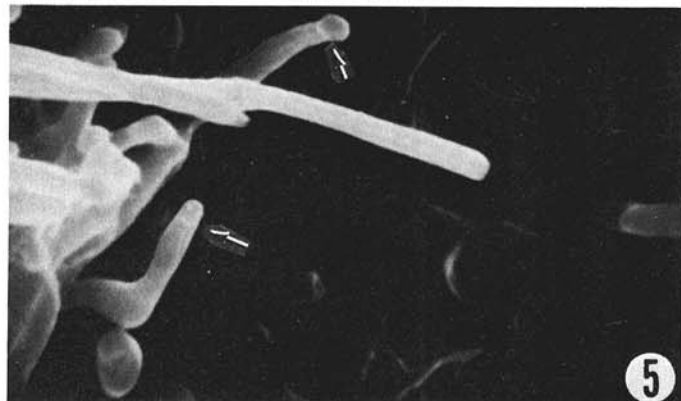
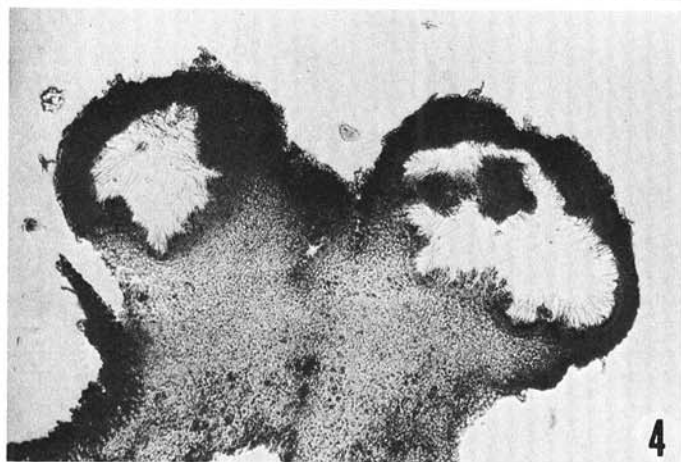
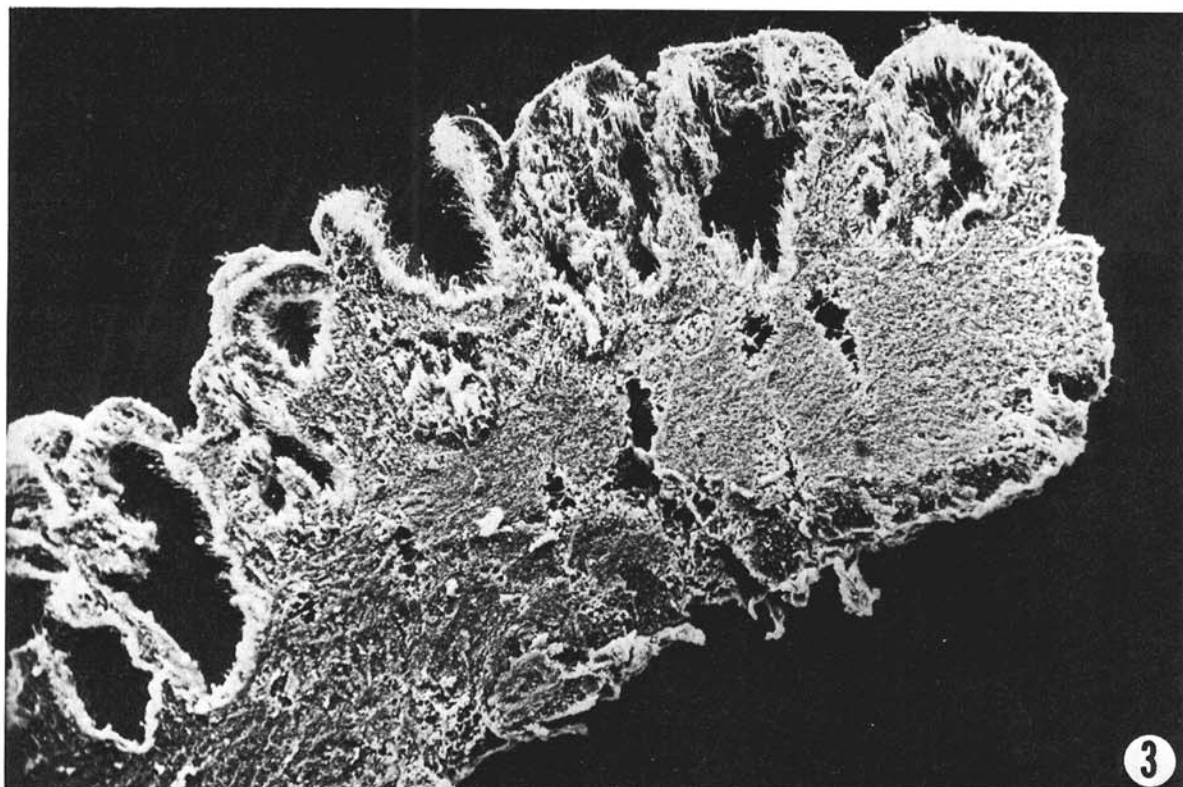


Fig. 3-6. *Kaskaskia gleditsiae*. 3, 4) Vertical sections through the hypostroma and aggregated pycnidia. 3) Scanning electron micrograph ($\times 75$). 4) Visible light micrograph ($\times 160$). 5, 6) Conidiogenous cells illustrating the apical apparatus (see arrows) and the phialidic conidia. 5) Scanning electron micrograph ($\times 4,590$). 6) Visible light micrograph ($\times 2,000$).

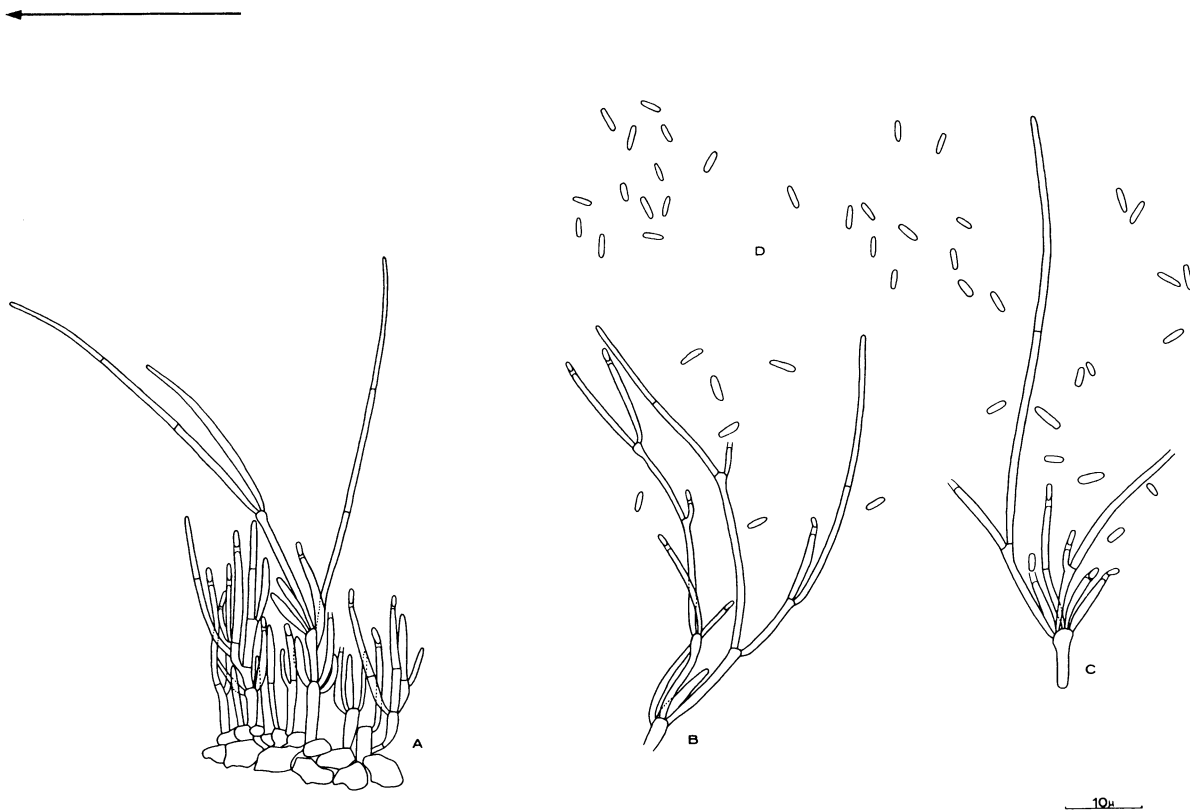


Fig. 7. Conidiogenesis in *Kaskaskia gleditsiae*. A) Compact layer of conidiophores arising from inner wall of the pycnidial cavity. B, C) Mature conidiophores illustrating the basal cell bearing a series of radiating, fertile, and sterile branches, the conidiogenous cells, and the phialidic conidia. D) Mature conidia.

93-387 \times 60-486 μ . Pycnidial wall light to dark brown, hard, 16-57 μ thick, composed of subhyaline to brown pseudoparenchyma cells. Fruiting bodies in culture somewhat acervular or lacking. Conidiophores compact, arising from the inner wall of the pycnidial cavity, 28.0-97.4 μ long, hyaline, septate, consisting of a clavate to oblong basal cell, [3.5-] 4.6-11.5 [-13.5] μ long, bearing a series of radiating branches at the apex. Branches either conidiogenous or sterile, with 0-2 dichotomies. Conidiogenous cells phialidic, prominent, 7.6-14.0 \times 1.2 μ , with a distinct apical apparatus, arising terminally on the conidiophore or laterally below a septum on a fertile branch; in culture produced directly from the vegetative hyphae. Sterile branches of the conidiophore occasionally becoming fertile, Phialoconidia hyaline, released in a cirrus, pink to yellow in mass, 1-celled, oblong to elliptical, [1.8-] 2.3-2.9 [-3.8] \times 0.6-1.2 μ .

Holotype: Parasitic on *Gleditsia triacanthos* L. var. *inermis* Willd. Women's Gymnasium, University of Illinois, Urbana, Illinois. J. C. Carter, 17 June 1968, ILLS 34832.

Isotype: NY; IMI 151725.

Culture: ATCC 22647

Other material examined: Parasitic on *G. triacanthos* var. *inermis* at 1704 Ridge Road, Champaign, Illinois, J. C. Carter, 4 September 1971, ILLS 35113, NY, BPI, DAOM.

DISCUSSION.—The new genus *Kaskaskia* is distinguished by the fleshy, plectenchymatic hypostroma bearing a series of aggregated, nonstiolate pycnidia (Fig. 3, 4); the conidiophores, which are compact, hyaline, and septate, consisting of a basal cell bearing fascicles of sterile or fertile branches (Fig. 7-A, B, C, D); the conidiogenous cells which are phialidic with a definite apical apparatus (Fig. 5, 6, 7-A, B, C, D); and the conidia which are somewhat endophialidic, hyaline, and 1-celled (Fig. 7-D).

Kaskaskia gleditsiae is more acrogenous than pleurogenous, due to the variability of the latter character. The genus, however, is best grouped in the Coelomycetes with those fungi characterized by Sutton (3) as having elongated conidiophores composed of individual conidiogenous cells, each producing conidia from one phialidic aperture located immediately below the delimiting septum. Of the genera belonging to the above group, *Kaskaskia* is most similar to *Pleurophomella* Höhnelt (1) in hypostroma and pycnidial structure and

development. It differs from Höhnel's genus in the degree of branching of the conidiophores, and in the distinct apical apparatus of the conidiogenous cells.

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