HISTORY OF SCIENCE

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Abstracts

The Story of Carbon Mesophase and Carbon Fibers. S. MROZOWSKI, Department of Physics and Astronomy, Ball State University, Muncie, Indiana 47306.——A study of the structure of premium petroleum cokes used in manufacture of graphite electrodes for the steel industry has revealed that their high performance is due to crystallite alignment with axes perpendicular to the axis of the needle particle into which such cokes break upon grinding (thus the name needle cokes). It was found further that needle cokes can be produced from any tar of petroleum or coal origin, if the process of heattreatment and solidification is properly carried out, and if all the quasi-solid components (so-called second phase) are removed beforehand. This led to a multimillion industrial production of specialized high grade needle cokes. It was sometime later that the mechanism of this process became clarified. Brooks and Taylor have discovered formation in the liquid tar of small balls with highly oriented molecular arrangement (mesophase) which grow rapidly in size and numbers in the tar in relatively narrow range of temperature, and if there is no second phase coalesce into a molecularly oriented continum, giving then a needle coke upon solidification. Such tar in the mesophase state has been used recently to make carbon fibers with highly aligned structures. Carbon fibers were first produced and investigated some 15 years ago. It was found that very high tensile strengths can be obtained, many times higher than for steels or other metals especially if the graphite crystallites are aligned with planes parallel to the axis of the fiber. Such fibers are incorporated into composites from which racket frames, skis, and many other objects requiring very high modulus of elasticity and strengths are fabricated (It is expected that in the near future even airplane wings will be made of such composites). Until now a partial crystalline alignment was obtained by stretching fibers while they are solidifying, but the new technique of using the mesophase promises even greater advances in production of very light composites with an exceptional one, two or tridimensional strength, as needed.

The Cumberland Road. B. ELWOOD MONTGOMERY, Department of Entomology, Purdue University.——Although we identify Road 40 as the Old National Road it extends rather far beyond the National Road both east and west.

When the Ohio Company (not to be confused with the later Ohio Company of Associates) was chartered by King George in 1749 a direct path was immediately cut through the forests by Col. Thomas Cresap and Christopher Gist guided by the Indian chief, Nemacolin. This pack saddle trail was used by

21 year old George Washington, accompanied by Christopher Gist, in 1753 carrying a message from Gov. Dinwiddie to the French at Fort le Boeuf. Washington cut a road along the route for his artillery and wagons the following year, when as a Colonel he led a military expedition against the French. It was as unsuccessful as the warning he had delivered the previous year. The road was further improved by the Coldstream Guards, forming the regular British army led to the disasterous defeat at the Battle of Monogahela by General Braddock in 1755. The road became known as Braddock Road and portions of it are so-called to-day.

George Washington appears to have been the first to propose the building of a National Highway in 1785. In 1806 Congress passed and President Jefferson signed a bill "to build a road from the navigable waters of the Atlantic to the river Ohio." Construction began in 1811 and the road was opened to traffic in 1818.

Long's Second Expedition in 1823 traveled the road to Wheeling. The narrative report of the scientific expedition compiled from the notes of Long, Say, Keating and Colhoun, contains very interesting observations on the condition of the road and political influences on its construction.

The National Road: An Introduction. GERTRUDE L. WARD, JOSEPH MOORE MUSEUM, Earlham College, Richmond, Indiana.——The concept of the National Road can be traced to George Washington as early as 1784. Washington feared that the settlers in the Northwest lands would form political and commercial ties with either Spain or England. When the Congress passed the bill for the construction of the road from Cumberland to Ohio in 1806, they funded the first internal improvement project of the young American nation.

The survey of the road in Indiana was completed by Jonathan Knight in 1827. Appropriations for construction came in 1829. Crews worked east and west out of Indianapolis, and west out of Richmond. By 1835, it was open to traffic across the state. When federal funding ended in 1839, the road had been completed only in Richmond, Centerville, Indianapolis and Terre Haute.

The plan called for the paving of the roadbed according to the Macadam process. However, the National Road was never surfaced for its entire length in Indiana. It was macadamed in Richmond, paved with flat creek stones set on edge at Centerville, macadamed in Indianapolis and Terre Haute. The rest of the road remained dirt.

Many early settlers benefitted directly from the construction of the National Road. Road work paid 63½ cents per day, higher than the usual rate for labor. Other workers were paid for the number of feet of broken stone they could pile. Local farmers supplied teams of horses and oxen; many of the laborers and contractors who came to work on the road remained as permanent residents.

The National Road: A Summary. PATRICK H. STEELE, Historic Landmarks Foundation of Indiana, Cambridge City, Indiana.——Several immediate benefits of construction and use of the National Road in Indiana are easily identified and documented. It created new jobs; increased the volume and quality of available trade goods; significantly reduced travel time, and attracted

craftsmen and laborers into the state. In addition, the National Road provided a medium for the relatively easy transfer of ideas and goods between people of various backgrounds. The National Road became the route of culture for the Midwest. It brought together and united settlers into towns, attracted new business enterprises, and provided the connecting link that kept the state growing.

The location of the National Road promoted the settlement and development of central Indiana. It provided an easier route to the newly opened lands in Illinois and Missouri. Several towns were platted or replatted to straddle the National Road. Vandalia was moved south to the National Road and became Cambridge City. Knightstown, named in honor of the surveyor Jonathan Knight, was created; Greenfield and Cumberland came into existance. The National Road became the Main Street of each of these towns.

In 1926, the Old National Road became part of the new U.S. 40 route with concrete sections replacing large segments of the old dirt road. By 1935 it was widened as the east-west, coast-to-coast highway. Towns again prospered and business flourished. With the construction of the Interstate system in the 1960's through traffic has traveled across Indiana on I-70 and U.S. 40 became obsolete. A new class of travelers has developed who are willing to take a slower trip across Indiana to experience vestiges of the 19th century. Preservation and restoration activity along the National Road are commonplace in eastern Indiana. Designation of the National Road as a Historic Civil Engineering Landmark was an important step. Perhaps an additional classification as a historic or scenic route would restore stature to Indiana's National Road.