

**ABSTRACTS OF PAPERS, 89th Annual Meeting of the  
Virginia Academy of Science, May 25-27, 2011,  
University of Richmond, Richmond VA**

**Aeronautical and Aerospace Sciences**

U.S. NAVY AVIATION EVENTS RELATED TO THE HAMPTON ROADS, VA AREA . M. Leroy Spearman. Langley Research Center, Hampton, VA & Robert W. Heath, Canon of Virginia, Newport News, VA. The Navy acknowledged a role for aviation in September 1910 when Capt. Washington I. Chambers was designated as the officer in charge of aviation matters. Soon Glenn Curtiss, a U.S. pioneer in aviation, began meeting with Chambers in an effort to convince the Navy of the value of aircraft for Naval use. In November 1910 Eugene Ely took off in a Curtiss airplane from a wooden platform built over the bow of a ship in the harbor at Hampton Roads, VA. In 1921 the Army Air Service at Langley Field, VA conducted bombing tests off the coast of Virginia in which Army bombers successfully sank a captured German battleship. The tests demonstrated the powerful striking force of air power. The Navy recognized the need for fleet defense and expanded the development of aircraft carriers. In July 1919 the Navy acquired a ship designed to launch and recover airplanes at sea. The ship was commissioned at Norfolk, VA in March 1922 as the USS Langley (CV-1) the Navy's first aircraft carrier. In October 1922, the first take off and landing were made from the CV-1 near Hampton Roads, VA. In November 1922, the first catapult launching was made from the CV-1 located at anchor in the York River near Hampton Roads. In 1933 the first ship designed and constructed as an aircraft carrier, the USS Ranger (CV-4), was launched at the Newport News ship yard. Since then, 28 aircraft carriers have been constructed for the U.S. Navy at that shipyard and Navy aviation was well underway.

SOME NACA/NASA AERODYNAMIC RESEARCH RELATED TO SECURITY AND DEFENSE. M. Leroy Spearman. NASA-Langley Research Center. Hampton, VA . The use of aircraft by European nations in World War I resulted in concern that the U.S. was lagging in aviation developments. This led to an act of the U.S. Congress in 1915 that established the National Advisory Committee for Aeronautics (NACA) with the charge to conduct aerodynamic research. The research began at Langley Field, VA in the early 1920's and over the years this research transformed low-speed, wood and fabric, propeller-driven airplanes into high speed, all-metal, jet and rocket propelled airplanes. This led to the fields of supersonic and hypersonic flight and provided for access to space. The need for space research led to the establishment of the National Aeronautics and Space Administration (NASA) in July 1958. The nucleus of the NASA was the existing NACA with the charge expanded to include space research. The Space Act does specify that the NASA should interact with other agencies on matters affecting security and defense. During the cold war era following World War II, the preponderance of Soviet Union military equipment was perceived as a threat. Accordingly, at NASA-Langley a research activity was undertaken to provide experimental and analytical information to assess a variety of

foreign aircraft and missile concepts of concern to our security and defense. Over the years research information has been acquired for eleven aircraft, twelve surface-to-air missiles, five air-to-air missiles, two air-to-surface missiles, two surface-to-surface missiles, five ballistic missiles, two anti-tank missiles, four reentry vehicles, and one wing-in-ground effect vehicle.

TRACING THE GROWTH OF U.S. AIRPOWER AND THE AIRCRAFT INVOLVED. M. Leroy Spearman, Langley Research Center, Hampton, VA The U.S. military first recognized a role for aviation in 1907 with the establishment of an Aeronautical Division in the U.S. Army Signal Corps. The U.S. Navy acknowledged a role for aviation in 1910. The Army procured an airplane from the Wright Brothers in August 1908 and began flight tests at Ft. Meyers, VA. A year later an improved Wright Flyer was accepted by the Army as 'Airplane No. 1'. Another American designer, Glenn Curtiss, was becoming well known and in 1911 a Curtiss airplane was the second airplane to be sold to the U.S. Army. The first airplane to be built for the U.S. Navy was a Curtiss airplane 1911. The first appropriation for military aeronautics was in the 1912 War Department for \$125,000. From these funds, orders were placed for three Wright airplanes and two Curtiss airplanes. War broke out in Europe in 1914 and it was apparent that a disparity existed between European progress and U.S. foot-dragging in the field of military aviation. In 1915 the U.S. Congress approved legislation to create a research facility to enhance aeronautical programs. In 1916 property was purchased just north of Hampton, VA that provided a flying field for aeronautical research and flight testing. Named Langley Field, a portion of the field was set aside for construction of the newly created National Advisory Committee for Aeronautics (NACA). The U.S. entered World War I in 1917 and did learn from flying and building European airplanes. Significant growth began in the 1920's with trainers, bombers, first Navy fighters and Army pursuits, observation airplanes, the first monoplanes, attack airplanes, first jet aircraft in early 1940's, first twin-engine fighter jets, swept-wing concepts, advanced supersonic designs such as the Century series of fighters - a total of over 60 military aircraft designs appeared from 1940 to 1980. Currently some aircraft using stealth technology are being deployed.

### **Agriculture, Forestry and Aquaculture Science**

YIELD AND RIPENING OF GREENHOUSE TOMATOES IN RESPONSE TO DAYTIME TEMPERATURE. Mark Kraemer & Françoise Favi, Agricultural Research Station, Virginia State University, Petersburg, VA 23806. Greenhouse-grown tomatoes are a high-value crop for limited-resource producers in the mid-Atlantic states. Increased heating costs in recent years have encouraged many to reduce growing temperatures. Measurement of photosynthetic rates indicated lower temperatures were feasible and some professional growers recommended them. However, little actual data was available in the published literature. Thus, we evaluated tomato yield differences between a warm and cool greenhouse sections. The average daytime temperature in the warm section averaged about 2°C greater than the cool greenhouse. Night temperatures were similar. Each section had 18 tomato plants (var. Trust) arranged in three rows.