ing from a few miles in diameter to 25 and even 40 miles. It is an amazingly calm area, with gentle winds, sometimes topped with clear blue skies and filled with dazzling sunlight.

Birds and even butterflies and other insects fly in this eye, around which whirl hurricane winds at speeds of more than 150 miles an hour. Tropical storms become designated as true hurricanes only when their circular winds reach speeds of 75 miles an hour.

Huge Heat Engine

The hurricane is a huge heat engine. Its interior is warmer than the environment, with the warm core as the heat source. Air flows into this core, rises, expands, cools and sinks. As it cools, heat is released. This circulation produces kinetic energy in the form of wind. In one day, a large hurricane can release as much energy as a 13,000 megaton nuclear bomb.

The whole doughnut-shaped mass of hurricane is several miles high, and sometimes covers an area 600 miles in diameter. It moves forward at speeds of only a few miles a day when it is first starting, and later can move as fast as 100 miles a day. Hurricanes usually start to form in late June or July, and the worst storms are generated in August, September and October.

The first full-fledged hurricane of the 1966 season, Alma, hit the United States coast June 8, earlier than any other hurricane in history. Abnormally low pressures and high amounts of moisture near the Atlantic Ocean equator resulted in the creation of this early storm that spun over Cuba, slammed into the Florida coast and then blew out into the Atlantic. Hurricanes have been generated as early as January, but they blow themselves out and disappear in the sea without hitting land.

Those affecting the coast of the United States and the Caribbean islands start in the waters north of the equator in the Atlantic Ocean, the Caribbean Sea or the Gulf of Mexico.

Hurricanes are formed in other parts of the world, but they are called by different names: cyclones in the Bay of Bengal and the Indian Ocean, typhoons in the west or northern Pacific, baguios in the Philippines, and willy-willies in Australia.

As the sun's rays pour maximum heat on the tropical areas of the Northern Hemisphere at this time of year, enormous amounts of warm moist air are drawn upward from the oceans toward the sun. Gradually the heat energy is converted into rotating winds that are spun even more by the Coriolis force, an effect of the earth's rotation.

This year three series of satellites now in orbit are keeping photographic watch on the birth and path of hurricanes—the Tiros, ESSA and Nimbus satellites. Land-based, high-powered radar stations, each with a range of more than 200 miles, along the 3,000-mile stretch from Texas to Maine, are ready to pick up storm tracks as they approach land.

U.S. Navy and Air Force airplanes will track these storms and collect vital data on their shape, growth, direction, speeds and other behavior.

Already watch is underway for the next hurricane of the season, to be named in compliance with the system that uses girls' names in alphabetical order. These names are short, clearly pronounceable and easily recognized in the thousands of fast communications sent during the hurricane season.

• *Science News, 90:26 July 9, 1966*

Nature Note

Lightning

➤ BRILLIANT in beauty and frightening in power, a lightning stroke in a summer thunderstorm soars upward from earth at speeds of 80,000 miles per second. One of these spectacular lightning bolts can contain as many as 345,000 amperes of electricity—enough to light more than 100,000 homes.

Here's the way lightning works: as a huge cumulonimbus thundercloud billows several miles high in the sky like a giant cauliflower, the top of the cloud becomes positively charged, and the bottom negatively. The earth is normally negatively charged, but beneath the cloud an area of positive charge builds up. This mirror-image of the negative charged cloud above follows along under the moving cloud like a shadow, racing across fields and climbing church steeples, chimneys and other prominences that bring it nearer to the cloud.

When enough charge has been built up, a faint luminous streamer shoots downward in a series of steps, each about 150 feet long, pausing for about 50 millionths of a second between each step, and thus giving lightning the characteristic zig-zag effect. Other streamers push other channels through the charged air. Finally a streamer reaches earth, and instantly an intensely brilliant flash of lightning surges back along the path. Thus lightning is actually the return stroke, from ground to cloud, from positive to negative.

• *Science News, 90:27 July 9, 1966*

CONSERVATION

River Flows Clear Of Paper Mill Wastes

➤ WASTES from a commercial paper mill are being constantly scooped up by a large mechanical arm instead of being dumped into the nearby river.

In a $2.5 million effort to keep the Coosa River clean from what will soon be the nation's largest newsprint mill, engineers for Kimberly-Clark Corporation have put a water pollution control unit into operation at the mill in Coosa Pines, Ala.

The unit consists of a 274-foot diameter saucer-shaped basin where radial mechanical arms slowly move around to push the settled solid wastes to the center. Such basins, or clarifiers, are usually only 80 feet in diameter.

Up to 50 million gallons a day of water will be cleared and 60 tons of cellulose fiber wastes removed.

Researchers are looking for ways to reuse this waste. It cannot be dumped in the river, for it chemically takes on oxygen from the water, causing fish to die from suffocation. It cannot be used as soil fertilizer immediately, for it takes up valuable nitrogen from the soil. Only after the fibers have been left to "rot" for about 10 years, could they become useful as fertilizers.

• *Science News, 90:27 July 9, 1966*