Is acid rain harmful? 'Yes, but...'

By Boris Weintraub
National Geographic News Service

WASHINGTON, D.C. — The infuriating thing about acid rain is this:

Nobody is absolutely sure about its effects. There are lots of ideas, but few are guaranteed to hold up.

Does acid rain affect lakes and rivers? Certainly, the scientists answer, some of them. But not all.

Does it threaten forests and cropland? Probably, the scientists say, but they aren't sure.

How do the acidic substances get into the air? Most likely, from the burning of coal, oil, and natural gas, which releases sulfur dioxide and nitrogen oxides into the air. There they circulate with the great air masses that form our weather systems.

But scientists aren't sure what happens then to airborne acid, so it is impossible to "prove" that acid rain in New York was caused by smokestacks in Ohio.

Does it affect animals? Scientists are pretty sure it is harmful to fish and amphibians indigenous to acidified waters. But how about mammals? Maybe, some say; but they don't know, and haven't been able to prove it

And what about mankind? Are we in any danger from acid deposition. Again, some scientists think so, others say no, and nobody has proved anything conclusively.

There are some things that scientists do know about acid rain, Anne LaBastille reports in the November National Geographic, and few of them are reassuring.

Among the certainties is the fact that 6 percent of all the ponds and lakes in the Adirondack Mountains of New York have no fish because of the high acidic content of their waters. The acidity has increased substantially in the past few decades, as burning of fossil fuels has increased.

The problem is not unique to the eastern United States. According to one chemist in Sweden, an estimated 20,000 of the country's 100,000 lakes are either fishless or about to become so.

The problem is thought to be the discharge that drifts northward from Europe's industrial belt.

Scientists have been working hard to find out more about acid rain, its causes and its effects. In the late 1970s, a nationwide network of 84 monitoring stations was set up to analyze samples of rain, snow, and dry fallout from 32 states. A similar group is monitoring samples from 55 sites in Canada.

Some areas of the eastern U.S. and southeastern Canada are receiving rainfall as acidic as vinegar, the studies show.

But what this means, what its consequences are, and what should be done about it — these are questions that have not yet been definitively answered.

While some scientists blame loose standards in some Midwestern states for permitting more than 10 times as much sulfur dioxide per ton of coal into the air as Eastern states allow, coal company scientists say there is no substantive proof that their smokestacks are responsible.

The Clean Air Act, which is up for reauthorization by Congress this year, requires that emissions from fossil fuel-burning facilities meet certain standards.

But each state is permitted to set its own standards, which leads some officials to blame the act for the increase in acid rain. Meanwhile, industry is reluctant to spend billions of dollars to modify existing plants unless it is proved they are responsible.

Such equipment, and others to control sulfur dioxide emissions, can make a difference, LaBastille writes. She cites the case of Japan.

Japanese officials issued stringent sulfur oxide controls in 1968 and encouraged the use of low-sulfur fuels and desulfurization. By 1975, emissions had dropped by 50 percent, even though energy consumption had doubled.

Even stricter limits have been set since then, and 1,200 scrubbers to reduce emissions from smokestacks have been installed, compared to about 200 in the United States so far.

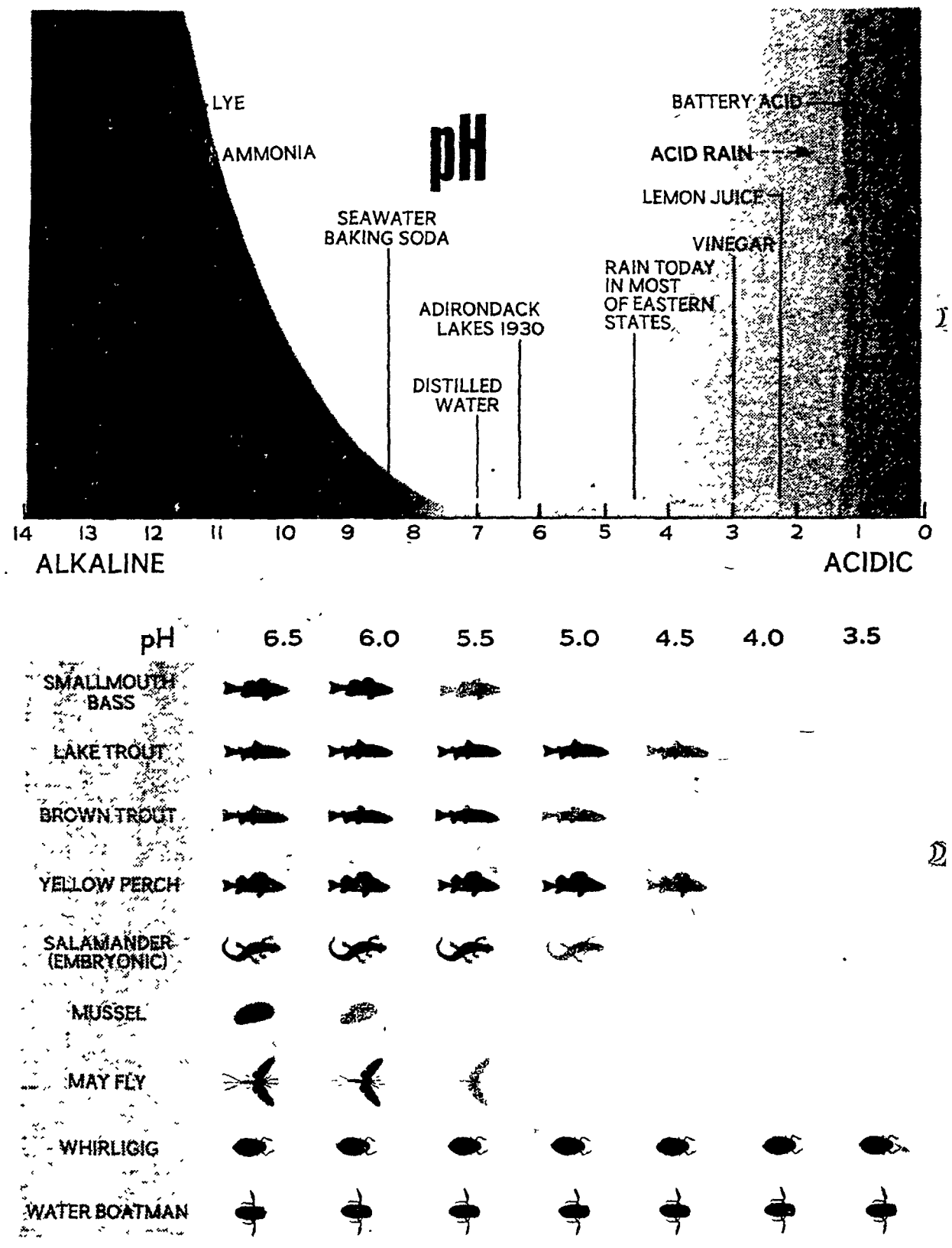

Diagram by William H. Bond, © 1981 National Geographic Society

Acid rain falls somewhere between lemon juice and battery acid on this pH scale, above, which measures the level of acidity. Scale ranges from highly alkaline, such as lye at left, to highly acidic, such as battery acid at right. Graph, below, shows mussels dying at a pH of 6.0, mayflies and smallmouth bass at pH 5.5. Acid-tolerant insects such as water boatmen and whirligig beetles survive and multiply even at pH 3.5.

Scientists test tomato response to potassium on sandy soils

NEWARK, Del. — Crops like corn and soybeans don't always respond to potassium fertilizer when grown on sandy coastal plain soils. This is true even when such soils test low to medium in potassium (K).

In an effort to understand better the behavior of K on these soils, scientists at the University of Delaware Agricultural Experiment Station decided to see how tomatoes—a crop which needs a lot of potassium—would respond to K fertilizer and lime on a Coastal Plain soil near Georgetown.

Soil scientist William C. Liebhardt, one of three investigators on the project, reported their findings during recent meetings of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America in Atlanta, Georgia. Working with him were graduate student Harris W. Martin and technician Jackie L. King.

The piece of land involved in the study has received various rates of potash and lime over the past 10 years. Corn and soybeans have not responded significantly to additional applications of K on this ground.

Tomatoes were grown on the same soil under irrigation at different levels of potash fertilizer and lime. The variety Redpac was used. This is a machine harvestable, 80-day fresh-market variety.

The topsoil was tested for acidity and important nutrients. Tomato leaves were analyzed for major and micro nutrient content. Since the soil is acidic, liming increased yield. But only moderate amounts of lime were needed—one ton per acre every four years, or a soil pH of 5.5 to 6.0.

Because soil and leaf potassium levels were adequate on unfertilized plots, potash did not increase total tomato yields in this trial, Liebhardt reported. However, added K did increase the marketable yield—all ripe fruits harvested in a once-over picking of the unstaked plants.

The work on tomatoes also confirmed previous research with corn and soybeans regarding various cation ratios (calcium, magnesium and potassium) and crop yield. The research shows that use of BCSR soil testing approach is in general not a valid approach under Delaware conditions.