Predicted El Niño Failing to Show

Last February, meteorologists eyeing the latest observations from the tropical Pacific saw the ocean warming in much the way it does in the earliest stages of an El Niño. Things looked suspicious. Would an El Niño be in full swing by this winter? At least one mathematical model had an unequivocal answer—it was predicting a 1986–87 El Niño, the first since the climatically disastrous one of 1982–83. Climate forecasters by nature hesitate to make strong statements, but they, including the originators of the predictive model, now see little prospect of an El Niño appearing this year despite earlier cautious expectations.

"It's very late in the game," says Eugene Rasmusson, who just retired from the Climate Analysis Center at the National Meteorological Center. "We haven't much of anything developing yet. It is very late for something to develop." Early tantalizing signs such as a warming of the sea surface in the eastern Pacific have faded away to the extent that May's Climate Diagnostics Bulletin, released in mid-June by the Center, contained no special discussion of the tropical Pacific, such as the February watch and March advisory issued by the Center. There simply was no longer anything particularly unusual going on there.

"I would be surprised if anything happened now," says Mark Cane. He and Stephen Zebiak of Lamont-Doherty Geological Observatory in Palisades, New York, developed the model of the tropical Pacific Ocean and the overlying atmosphere that since last December has been predicting an El Niño for the winter of 1986–87. The model's prediction of an apparently nonexistent El Niño event does not shake Cane's faith in the predictability of the phenomenon. The model's success in forecasting the three events since 1970 reassures him that El Niños are not inherently unpredictable. But "some situations are more predictable than others, and this may be a less predictable one," Cane says.

One specific problem that the model might have had lies in the western Pacific. Sea surface temperatures continue to be higher than normal there, and that warmth can induce stronger than normal winds along the equator from the east, which would be opposite the conditions of an El Niño. But Cane and Zebiak's model has trouble making the western Pacific as warm as it has actually been, so the conditions predicted by the model could have been more El Niño–like than they should have been. Another possibility, says Cane, is that the model may be setting the boundary between El Niño and non–El Niño conditions at the wrong point. If so, what should have been a prediction of uncertain or marginal conditions straddling the line between the two regimes could become a prediction of an El Niño.

Things may look bleak for Cane and Zebiak's prediction model this year, but this round is not over yet. Rasmusson would write off the possibility of any El Niño this year in light of the return to near normal in March and April, except for what happened in May. In mid-May two cyclones in the western Pacific, one on either side of the equator, pumped unusually strong winds along the equator from the west, as happens during an El Niño. Klaus Weickmann of NOAA's Environmental Research Laboratory in Boulder says that the surge actually began in the western Indian ocean as increased cloudiness and moved eastward as unusually heavy precipitation. Such atmospheric oscillations have been followed across the Pacific and even around the globe with periods of 30 to 60 days.

One hypothesis holds that, given favorable conditions in the tropical Pacific, the El Niño–like conditions induced by such an oscillation could push the Pacific into a full-blown event. No oscillation came through in March or April, generally considered the critical season for starting an event, so this one may be too late to make a difference. But Rasmusson is not sure. "The thing keeps us hanging. It's still an unresolved situation," he says. He recalls the 1982–83 event, which did not become obvious until June. And then there was the El Niño predicted for 1975. The early signs fizzled and it never showed that year; an authentic event appeared the following year. ■

RICHARD A. KERR

Plant Biochemistry Requires Unique tRNA

About 2 years ago, researchers at Carlsberg Laboratory in Copenhagen—the research arm of the brewery—quietly published some puzzling work on the conversion of glutamate to delta-aminolevulinic acid, the first committed precursor of chlorophyll. The problem, they found, was that when they purified various fractions necessary for the reaction, they discovered that the second fraction has no protein in it, indicating that it could not contain an enzyme. The investigators, says biochemist Dieter Söll of Yale University "were totally confounded."

The fraction turned out to contain RNA, and to solve the mystery of what this RNA could be doing, the Carlsberg researchers began collaborating with Söll and his colleagues, who are expert in working with RNA. Now they have an answer. As Diter von Wettstein of Carlsberg Laboratory reported at the First International Conference on Plant Molecular Biology, held in Savannah last fall, and Söll, C. Gamini Kannangara of Carlsberg, and their colleagues report in a paper in press at *Nature*, the RNA is a transfer RNA that participates in this metabolic conversion, acting like a cofactor for an enzyme. Not only is this a novel role for a tRNA, but it may be unique to plants. If so, it could be exploited to make herbicides that are not toxic to animals.

For decades, molecular biologists thought transfer RNA's had just one function—to transfer free amino acids to a growing peptide chain during protein synthesis. But, says Söll, "many, including us, have been looking for other roles for tRNA." And this search has been, to some degree, successful. Investigators have reported that tRNA's participate in several reactions other than protein synthesis. One tRNA is a primer for reverse transcriptase, another is a participant in the formation of the pentapeptide bridges in bacterial cell walls, and still another tRNA is a component of the ubiquitin and ATP-dependent proteolytic system of mammalian cells.

Yet says Söll, "except for the bacterial cell wall synthesis, the reasons for tRNA participation in these reactions are not clear." In the newly discovered plant reaction, the mechanism of tRNA participation can at least be strongly inferred. What seems to happen, the researchers propose, is that glutamate is activated by being attached to a unique chloroplast glutamate tRNA. Then a dehydrogenase reduces a carboxy group of glutamate to an aldehyde group. The direct involvement of a tRNA as a cofactor for an enzyme of intermediary metabolism, says Söll, "is absolutely novel."

Moreover, the researchers find the gene coding for the glutamate tRNA that participates in this reaction is in plants ranging from blue-green algae through higher plants. This suggests, says Söll, that the tRNA-dependent formation of delta-aminolevulinate for chlorophyll takes place in all plants.

Ever since RNA was discovered to have catalytic properties, in the self-splicing of some introns, researchers have been forced to view the molecule with new respect. This latest discovery extends that interest. ■

GINA KOLATA