"growth-associated" histone H1 kinase, which was first discovered some 15 years ago. Histones help to maintain chromatin structure and the phosphorylation of histone H1 by the p34 kinase might bring about the coiling and condensation of the chromosomes that occur as mitosis begins.

But many things beside chromosome condensation happen in a cell going into mitosis, and it is unlikely that histone phosphorylation could explain all of them. Two additional new candidates for a p34 kinase target are also intriguing, however.

One is the *src* "proto-oncogene" (also see box on p. 253). and the other is the enzyme that begins protein synthesis by transcribing genes into messenger RNA. "We think it means that there might be some tie between cell cycle regulation and transcription regulation," says Jeffry Corden of the Howard Hughes Medical Institute at Johns Hopkins University School of Medicine. Corden and Lars Cisek, who is also at Johns Hopkins, discovered that the gene-transcribing enzyme, RNA polymerase II, is phosphorylated by the p34 kinase.

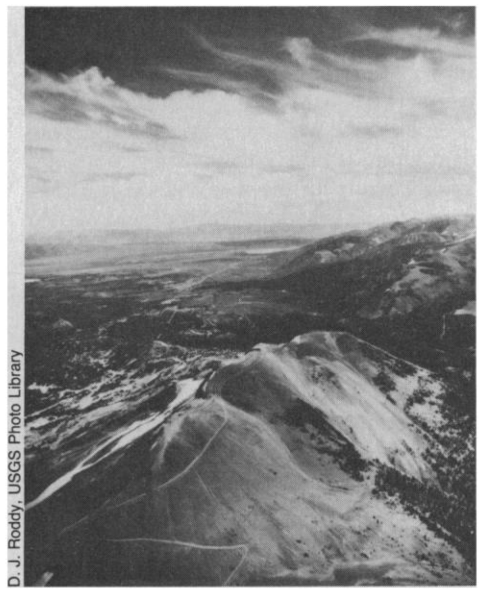
Another major puzzle concerns the activation of the p34 kinase. Indications are that this requires the removal of a phosphate from the kinase, but how this happens is far from clear. Also unclear is what signals the degradation of cyclin at the appropriate time in the cell cycle.

Researchers clearly have to do a great deal of work before they understand cell cycle control in all its ramifications. Nevertheless, the collaboration between the yeast geneticists and the cell biologists has proved to be a fruitful one. ■ JEAN L. MARX

Good News for Volcano Watchers

Something is stirring beneath Mammoth Mountain, but hardly anyone seems to care. The lack of excitement over a swarm of tiny earthquakes beneath this dormant but hardly extinct volcano on the edge of Long Valley, just east of Yosemite National Park, is in part a result of some recent—and very welcome—news. Volcanologists have discovered that even startling restlessness need not connote imminent disaster.

The good tidings, which should relieve the resort dwellers of Long Valley, emerged from a historical study of 138 calderas, the broad depressions like Long Valley that are the scars of huge volcanic eruptions. In trying to determine how often caldera rumblings turn catastrophic, U.S. Geological Survey volcanologists Christopher Newhall and Daniel Dzurisin drew on the geologic, geophysical, and geographic literature as well as historical records from Roman philosophers, monks, explorers, traders, and airline pilots.



A restless land. *Mammoth Mountain (foreground) shares the restlessness of Long Valley.*

The lesson from history was quite different than those from geology. "Most episodes of unrest end without an eruption," says Newhall. Indeed, "Eruptions are the exception rather than the rule. And unrest is almost universal among young calderas. They are so dynamic and in such a delicate equilibrium, really small disturbances can lead to unrest."

So how do you tell the difference between harmless unrest and precursors of disaster? That was what Newhall was wondering when Mount St. Helens began spouting ash in March of 1980, months before Long Valley's unrest became so obvious that May. "When I arrived at Mount St. Helens in 1980," he says, "I saw a gap in our efforts to predict volcanic behavior. There was day-by-day monitoring, and the geologic record of eruptions was well known. What we didn't have was a good look at historical records around the world looking for analogs to this volcano's behavior." In addition to minor ash eruptions, Mount St. Helens was steadily growing a bulge on its north slope. "If geologists had had a comprehensive literature search, they could have said that the only known outcome of such cases was a lateral blast." And that is just what happened, killing 60 people when it caught volcanologists by surprise.

To Newhall the lesson was that "it's impossible during a crisis to put together such a [literature] search." So in the case of the Long Valley unrest, he and Dzurisin took their time, 5 years of it. They found only one sure connection between caldera unrest and subsequent behavior. If a large part of the caldera floor began to bulge rapidly, at a rate of several meters per day, an eruption always followed within 3 days. A few kinds of less striking unrest usually, but not always, led to eruptions within hours or days.

There were also circumstances that did not lead to eruptions. Eruptions occurred during half of the episodes of unrest at all well-studied calderas, but six long-quiet calderas of the silicic type, including Long Valley, have had 28 episodes of unrest during the past century without an eruption.

That long-quiet calderas can be restless without erupting is good news to the inhabitants of Long Valley's Mammoth Lakes. The swarm of imperceptible earthquakes began there in early May and peaked with hundreds per day in late June. Was it a sign of magma or magma-heated water moving beneath the volcano? Since the 1980 series of moderate earthquakes, there have even been indications that magma could be heading for the surface from a slowly filling magma chamber more than 5 kilometers deep. Did all this geological rumbling portend an imminent eruption, the scientists and citizens of Mammoth Lakes naturally wondered? Newhall and Dzurisin's historical hindsight now allows such questions to be contemplated more calmly.

When Long Valley started acting up 8 years ago, "there wasn't the awareness of the pervasiveness of unrest," says Newhall. "I'm sure the Long Valley unrest was perceived as a more unusual situation than it is now." Then again, no one seems anxious to see another. ■ RICHARD A. KERR

ADDITIONAL READING

C. G. Newhall and D. Dzurisin, *Historical Unrest at Large Calderas of the World*, U.S. Geological Survey Bulletin 1855, (Government Printing Office, Washington, DC, 1988).