Felsenfeld and McGhee began to focus on this region, isolating it from erythrocytes with restriction enzymes. The nuclease-hypersensitive region, they discovered, is 115 base pairs long and is located upstream from the globin gene. Then Felsenfeld and his colleague Beverly Emerson decided to look for a protein that leads to nuclease hypersensitivity. If there is such a protein, they expected it might bind specifically to the 115-base-pair region that is exposed whenever the globin gene is active.

They found such a protein, which appears only in erythrocytes and only when globin genes are active and makes the globin gene hypersensitive to nucleases. "We hope that this will turn out to be a transcriptional factor," says Felsenfeld. "So far it fits." But he and his colleagues still have more experiments to do, particularly studies to determine whether the nuclease-hypersensitive region to which the protein binds is an enhancer sequence. "We're very excited and we hope—that's all," Felsenfeld remarks.

Of course, in a sense, all that the enhancer work has done is to push the question of tissue-specific gene activity back a step. Instead of asking why globin genes, say, are turned on in erythrocytes at a particular time, researchers are asking what determines where and when a gene coding for a globin gene enhancer recognition protein is turned on. If every gene that is turned on has to have its own enhancer recognition protein, the problem of understanding gene regulation will be at least as difficult as it appeared before enhancers were discovered. "We hope there's some sort of degeneracy," Felsenfeld says.

Most of the investigators are betting that there are only a small number of these regulatory proteins. During differentiation, they believe, there may be some means of turning on a small set of genes coding for these proteins and this would lead to the activation of genes such as globin or insulin that distinguish one cell type from another. "The important thing is that it really does focus our attention on an aspect of differentiation that was unknown to us before, says Rutter. "We don't have the secret to differentiation but we have a powerful way to study it. This is by no means the end of the story but it is certainly a beginning."—**Gina Kolata**

Blooms in the Desert?

As researchers continue to sift through data from the proton-antiproton collider at the European Laboratory for Particle Physics (CERN)—data that last year resulted in the discovery of the long-sought W and Z particles—they have begun to encounter hints of something utterly new and unexpected. The particle physics community is correspondingly excited: the anomalous events occur at energies just beyond the W and Z mass, where the so-called grand unified theories of particle interactions had predicted a "desert" in which nothing new will be found.

"The desert," CERN's Carlo Rubbia told the American Physical Society (APS) during its meeting in Washington, D.C., last month, "is blooming."

Anomalies were reported at the meeting from both of the collider's main detectors, UA1 and UA2, albeit the anomalies are different in each case. None of the events seem to be explainable in terms of the standard unified theory of the electromagnetic and weak interactions, which predicted the W and Z particles. In particular, none of them seems to be either a top quark or a Higgs boson, which are the only remaining undiscovered particles in the theory.

The UA1 puzzle involves five events in which a proton-antiproton collision produces a highly collimated "jet" of charged particles shooting out to one side, while an unseen object—presumably a neutral particle of some kind—recoils in the opposite direction. Jets, of course, are ubiquitous in high-energy particle collisions; the problem is that these jets have an energy of 50 to 80 GeV, which is much too high to have been produced by a W particle. One and possibly two additional events feature overenergetic photons instead of jets.

The unseen neutral objects may well be neutrinos, concedes Rubbia, although they would have to be produced by some novel mechanism. But more exotic objects are also possible, such as the photino, a heavy partner to the photon predicted by theories based on supersymmetry (*Science*, 29 April 1983, p. 491).

Rubbia also noted another puzzle, perhaps related: too many Z particles appear to be decaying into multiple jets. Theory suggests that each additional jet should be suppressed by a factor of about 100, which should make four- and five-jet events rare indeed. But they are not rare.

CERN's Jean-Marc Gaillard told the APS meeting of a slightly different effect found at the UA2 experiment. In three or possibly four events that would otherwise look like the normal production and decay of a W, the decay products—an electron and an unseen neutrino—are accompanied by extraordinarily energetic jets. Gaillard declined to speculate on new particles or unknown phenomena. However, the events are *very* far from anything else seen in connection with the W's and Z's and essentially impossible to explain in the standard model.

In addition, the UA2 researchers have found preliminary suggestions of enhanced production of jets with an energy around 147 GeV. This might indicate the existence of a new particle of the corresponding mass.

The evidence in both experiments is admittedly arcane and fragmentary. Everyone would like more statistics. But for particle physicists used to dealing with such esoterica the evidence is intriguing. "It is suggestive of something important happening at 150 to 200 GeV," says Alfred K. Mann of the University of Pennsylvania, and a nonparticipant in the CERN experiments. "There is a sense of optimism that we are entering a region of mass—accessible to existing machines—with interesting new physics."

The April announcements have certainly served to whet people's appetites for the next experimental run at CERN, which starts in September and continues for 3 months thereafter. The major target will be the top quark, for which the detectors have been optimized. But both the energy and the beam luminosity will be higher than in previous runs, which should greatly improve the statistics for rare events. Moreover, the detectors will be computerized to the point that the researchers will know about events within hours, instead of months. The findings, if they come, should be dramatic.—**M. Mitchell Waldrop**