by glial cells in culture and speculating on what the functions of these brain cells could be. "What we are lacking in the field is rigorous hypothesis testing," comments Barbara Barres, a Stanford neuroscientist.

The provocative notion that glia play a role in information processing within the brain, for instance, has no solid evidence to back it up. It rests largely on observations of the cells' behavior in culture, which may be misleading. "A culture reorganizes itself. It can lose its brainlike features," warns University of California, Riverside, neuroscientist Glenn Hatton.

The field is trying to move beyond simple cultures to establish the true roles of glia in the brain. Hatton, for instance, has been studying the hypothalamus, comparing control rats to lactating ones. He's found that in the lactating rats, glia that ensheathe and isolate neurons retract their extensions, allowing neurons to move closer and form gap junctions between themselves. It's unclear why this happens, he says, but it may show how glia can play a role in the brain's plasticity, its capacity for rewiring even when mature.

Indeed, there appears to be no end to the proposals being put forth for glia. Some labs are exploring the role of astrocytes in maintaining the blood-brain barrier, while others ponder whether glia help create circadian rhythms. No longer can neuroscientists look only at the brain's neurons and ignore the contributions of glia, Salm and others assert. "As time goes by," she says, "we'll see a complex and delicate dance that the two cells do together." And in stark contrast to the handful who listened to the presentations about glia in 1980, at this year's neuroscience meeting, hundreds of neuroscientists will join Salm in enjoying that dance.

–John Travis

Additional Reading

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HIGH-ENERGY PHYSICS

Making the Stuff of the Early Universe

Recreating the past isn't uncommon—biographers and psychoanalysts do it for a living. But few venture as far back in time as physicists at CERN, Europe's particle physics center at Geneva, are attempting to do. This week researchers will try to create matter that existed only in the first few instants after the Big Bang. "We will be studying the matter of the very early childhood of the universe," says theorist Helmut Satz of CERN.

The CERN physicists hope to be the first to create something called a quark-gluon plasma. Most subatomic particles, including protons and neutrons, are themselves made up of two or three smaller particles called quarks, which are in turn held together by particles called gluons. The theory that describes this interaction, called quantum chromodynamics (QCD), predicts that if protons and neutrons are pressed together with extreme force, they will rupture, spilling and intermingling their constituent quarks and gluons to form a hot, ultradense plasma. This state of matter was thought to exist in the early moments of the universe, but after the first 10 milliseconds it had expanded and cooled sufficiently for the plasma to coalesce into the kind of matter we see today—atoms with their separate nuclei.

Bringing the plasma back will not only yield insights into the Big Bang, physicists hope; it will also allow them to check the only remaining unverified part of QCD. To recreate the quark-gluon stuff in the lab, in the 1980s physicists began accelerating beams of ions to a very high speed and smashing them into stationary targets. The rationale for this strategy was that a heavy ion (one with a lot of protons and neutrons, together known as nucleons) from the beam would hit an atomic nucleus in the target, and the heat of collision would turn the two nuclei into a plasma fireball. Two years ago, U.S. researchers at the Brookhaven National Laboratory accelerated beams of gold ions with 197 nucleons. Bulk isn't everything, however; the ions also need to carry a high energy. And the Brookhaven accelerator could only boost the ions to an energy of 12 gigaelectron volts (GeV) per nucleon, which proved insufficient to create a quark-gluon plasma. "We've had interesting hints, but no conclusive signals yet," says Peter Braun-Munzinger of the State University of New York. "There's certainly a chance they will do it [at CERN] if the equipment is ready."

CERN has spent the past 2 years adapting its accelerators to handle lead ions with 208 nucleons. A new linear accelerator for lead was installed to create the beam, which will be hiked up to higher and higher energies as it passes through three of CERN's accelerator rings. According to CERN's Helmut Haseroth, the final beam will have a peak energy of 177 GeV per nucleon, and the lead ions will be traveling at 99.998% of the speed of light.

Although theory predicts this will be sufficient energy to produce a quark-gluon plasma, detecting it is far from easy. "There is no unambiguous signal," says University of Frankfurt physicist Reinhard Stock. "It is like in a criminal court: You must accumulate evidence." This is why CERN has arrayed seven detectors, each looking for different types of evidence (see table), such as the particular spectrum of photons emitted when the compressed nucleons transform into a plasma.

There is also one wild card in the pack of detectors: A 550-meter mass spectrometer looking for a predicted particle known as a "strangelet." The energy of impact will create a type of quark—dubbed "strange"— that is somewhat heavier than the usual ones. Some theorists believe that such quarks can remain in the plasma as it cools and their electric charge balances the charges on other quark types, making it more favorable for the plasma to condense into a giant, single nuclear particle—a strangelet—rather than separating into smaller nucleons.

Some believe that such strangelets, if they exist, could solve a number of astrophysical mysteries, such as that of the missing mass of the universe—large strangelets left over from the Big Bang may be simply floating around in interstellar space, and one such object the size of a tennis ball would weigh more than a trillion tons. Satz says that he thinks it "extremely unlikely" that they will find strangelets—although the result would be remarkable. But if the CERN researchers can create the never-before-seen plasma, no one will go home disappointed at their recreation of very ancient history.

–Daniel Clery

CERN'S QUARK-GLUON PLASMA DETECTORS

Detector Type	Purpose
Omega spectrometer to detect multiply-strange baryons and anti-baryons	Detect strangeness enhancement in quark-gluon plasma
Array of calorimeters for direct photon detection, plus some hadron detection	Detect formation of quark-gluon plasma
Pion and kaon spectrometer	Measure size of plasma in its final state
Electron spectrometer	Analyze initial state of quark-gluon plasma
Wide-acceptance hadron spectrometer	Analyze final state of quark-gluon plasma
Muon spectrometer	Analyze initial state of quark-gluon plasma
Charged-particle spectrometer	Detection of strange matter particles