From our reporter at the annual meeting of the Division for Planetary Sciences of the American Astronomical Society.

A spot of phosphorus on Jupiter?

The latest explanation for the color of Jupiter's tantalizing Great Red Spot is offered by Ron Prinn and John Lewis of the Massachusetts Institute of Technology: a thick haze of solid crystals of red phosphorus.

Early last year, Stephen Ridgway of Kitt Peak National Observatory reported detecting emission spectra from phosphene (PH_3) in the Jovian atmosphere (SN: 2/9/74, p. 91). If Jupiter still maintains a primordial solar abundance of water, says Prinn, any phosphene would normally be expected to combine with the water into several colorless products. Such reactions, however, would take a long time. If, on the other hand, the Great Red Spot is a storm cell, as several researchers have suggested, there may be enough rapid vertical mixing taking place beneath it to bring the phosphene up to higher, drier altitudes where ultraviolet radiation from the sun can trigger a different sort of reaction, one of whose products would be conspicuous crystals of dark red phosphorus.

The resultant layer of such crystals, according to Prinn and Lewis, would be not static, but cyclic. Too heavy for mere convection to support them, the crystals would drift back down through the atmosphere until they could recombine with water vapor, replenishing the phosphene supply. Continuing convection would perpetuate the cycle.

The cycle, however, depends on an adequate supply of water. Uwe Fink, a member of the University of Arizona team that recently discovered water for the first time in Jupiter's atmosphere (SN: 2/15/75, p. 102), points out that their results showed only about 0.1 percent of the required abundance. Fink suggests a Great Red Spot colored instead by ammonia polysulfide, a yellow gas which turns reddish with time. Prinn counters that some process may have depleted the water in the rising material of the Spot, so that the majority of the water vapor is below the depth from which the water emissions were detected—leaving it right where it would be needed to sustain the cycle.

Salty Io

The sodium-rich spectra that have been reported in the past from Jupiter's moon Io could be due to a mixture of 15 percent elemental sulfur and 85 percent of a mineral called blödite, according to Fraser Fanale, D. B. Nash, T. V. Johnson and D. L. Matson from Jet Propulsion Laboratory in Pasadena. Blödite [$MgNa_2(SO_4)_2 \cdot X\ H_2O$] "is one of only four 'salt' minerals that have been identified in meteorites," the team reports, "and the only sodium-rich one."

Titan: Locked and varied

A series of observations of Titan suggest support for the belief that Titan keeps the same face turned toward its host planet Saturn, and that its visual appearance is varied by either cloud patterns or surface markings. The photoelectric studies, reports G. W. Lockwood of Lowell Observatory, have shown a steady brightening of Titan, as well as a slight shift in color from yellow toward blue. Titan also appears to be brighter near the easternmost limb of its orbit than near the opposite side. Combined with the other findings, this may mean the same face is always turned to Saturn, but that the two hemispheres denoted by the sub-Saturn meridian are, for whatever reason, of different reflectivities.

Vinyl cyanide in the sky

Molecular astronomy is rapidly becoming a branch of organic chemistry. The most interesting and complex of the molecules discovered in interstellar space are organic, and many are the speculations that the origin of life may lie in the interstellar dust clouds.

Now there is a new first, the first molecule that contains an important structure for organic chemistry, the carbon-carbon double bond. Observations done at the radio observatory at Parkes, Australia, by F. F. Gardner of the (Australian) Commonwealth Scientific and Industrial Organization and G. Winnewisser of the Max Planck Institute for Radioastronomy in Bonn, West Germany, reveal the presence of vinyl cyanide ($H_2C:CHCN$), also called acrylonitrile, in the cloud called Sagittarius B2.

In Astrophysical Journal Letters (Vol. 195, p. L127) Gardner and Winnewisser remark that molecules with the carbon-carbon double bond belong to the olefins, a group of chemicals known to be highly reactive with a strong tendency toward polymerization. The presence of vinyl cyanide also suggests the presence of the simplest olefin, ethylene, but there is no way to detect ethylene by radio.

A cutoff for pulsars

In a recent issue of Astrophysical Journal Letters (Vol. 195, p. L69) F. Curtis Michel of Rice University remarks that if a pulsar like the one in the Crab nebula had been formed 10 billion years ago and had been slowing down ever since at the observed rate, it would have a pulse period of about 60 seconds. In fact "no pulsars are observed to have periods in excess of about 3 seconds."

Several explanations for this seeming cutoff have been put forward. Michel adds one that specifies an extinction of the pulsar phenomenon at the cutoff point. A pulsar's radio emissions are believed to be generated by electrically charged particles in a kind of pulsar atmosphere spiraling around the lines of the pulsar's magnetic field. As the pulsar spins down, the magnetic field at the "light cylinder," the boundary where an object spinning with the pulsar would have a linear speed equal to that of light, weakens. Weakening of the field leads to an increase in the radius of the charged particles' spiral. When this radius for a field line at the light cylinder equals the distance from the pulsar surface to the light cylinder, the particles are no longer bound by the field and can escape. Then radio emissions cease. Michel figures the escape point is reached at a spin rate that gives three-second pulses.

A lack of overstuffed nuclei

Now that physicists can accelerate rather heavy atomic nuclei and bang them against other nuclei, they are finding a number of strange phenomena in the behavior of gross nuclear matter such as quasifission, friction and a certain compressibility. A phenomenon that hasn't shown up, though theorists suggested it and an experiment looked for it, is the production of ultradense nuclei, nuclei packed more tightly than usual. Such abnormal nuclei were predicted especially by T. D. Lee and G. C. Wick. P. B. Price and J. Stevenson of the University of California at Berkeley looked for them in an experiment in which argon nuclei were struck against lead. They report in the Feb. 17 Physical Review Letters that they found none. But they recommend further searches, suggesting especially that a lower energy than they used might enhance the possibility.