Voyager 1: Bound for a changing Jupiter

"You would not recognize Jupiter," says Arthur D. Lane, assistant project scientist in charge of the Voyager 1 spacecraft's upcoming encounter with the giant planet. Though it would be difficult, of course, to mis-identify the distinctively striped behemoth of the solar system, a series of early photos (see cover) taken recently by Voyager does reveal marked changes from the Jupiter observed by the Pioneer 10 and 11 probes in 1973 and 1974.

Typical of the currently hectic space pace of interplanetary studies, Voyager 1 began its photo session only one day after a series of probes from another craft had penetrated the atmosphere of Venus. The Jupiter pictures were taken every hour for 20 hours, documenting two full rotations of the planet. Immediately following the photo sequence (during which Jupiter was also detected by infrared, charged-particle, radio-astronomy and other instruments), there took place a three-day full dress rehearsal, by the whole 300-member flight team, of the complex close-encounter activities that will occur as the spacecraft flies within 280,000 kilometers of the planet on March 5. A rainstorm over a tracking station in Madrid prompted some revised data-handling procedures, but the spacecraft performed perfectly, even triumphing over some former trouble spots such as a sticky instrument "scan platform."

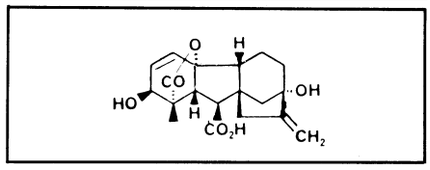
A conspicuous difference between Voyager 1's Jupiter and Pioneer's is that the famous Great Red Spot is less conspicuous, more muted in color. The wide, white band that used to enclose the spot now merely sweeps along its southern edge, replaced elsewhere by darker, more turbulent material that probably represents a deeper look into the atmosphere. The northern hemisphere shows the reverse situation: Where there were once thin bands of various hues, there now appears a wide, white swath much like that formerly seen in the south. A white, plume-like stream of cloud tens of thousands of kilometers long just north of the equator resembles one seen by the Pioneers — but it is apparently not the same one. Some of these and other changes have been monitored or anticipated by ground-based observers, but there is vast scientific value in getting Voyager's close-ups, which will be sharper than even the best Pioneer images while the planet is still two weeks away, and whose improved colors are a help in studies of Jupiter's exotic hues. The mission's full-time science begins Jan. 4, and by month's end, the planet will more than fill the camera's narrow-angle field. □

Gibberellin synthesis ends long quest

In 150 papers published from 25 different laboratories over twenty years, attempts to synthesize the plant hormone gibberellic acid have been chronicled. Two letters in the Dec. 6 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY wrap up that quest. Elias J. Corey, Rick L. Danheiser (now at Massachusetts Institute of Technology) and colleagues at Harvard University report the first complete synthesis of gibberellic acid.

In the plant kingdom, gibberellic acid is an important regulatory compound. It and more than 40 related gibberellins stimulate cell division and elongation in leaves and stems. They also influence sex expression and dormancy and, when a seed begins to sprout, trigger release of digestive enzymes that open the young plant's food reserves. Gibberellic acid is commercially produced from the fungus *Gibberella fujikuroi.* However, ability to synthesize the hormone should allow scientists to construct slightly altered compounds useful in determining how the substance performs its many functions.

Scientists have known the structure of gibberellic acid since the early 1960s, but synthetic chemists had come to suspect the molecule was hexed. Corey and coworkers say, "... the combination of overall molecular complexity, centers of high sensitivity toward many reagents, and a singularly diabolical placement and density of functionality serves to thwart all but the most sophisticated of approaches."



Gibberellic acid: Diabolical arrangement of sensitive groups challenged chemists.

The "most sophisticated" approach, taken by the Harvard scientists, employs a number of new synthetic methods, some of which may be crucial to synthesis of a variety of other compounds. For instance, a solid reagent succeeded in catalyzing condensation of two groups in just one of the two possible ways, but avoided any change in a nearby group.

Corey uses a general plan of attack that he calls antithetic analysis. The strategy is to start conceptually with the desired molecule and work backward, listing all possible precursors on continually branching pathways. Then he attempts the most reasonable laboratory route. Corey has as a long-term project the programing of a computer to use antithetic analysis to suggest approaches to new syntheses, teaming fast, unprejudiced computer memory with the synthetic chemist's intuition.

Whatever his strategy, Corey is at the forefront of organic synthesis. This year he completed two other major syntheses: antibiotic erythronolide B (the natural precursor of erythromycin) (SN: 7/29/78, p. 73) and antitumor agent N-methylmaysenine. Corey is known for his earlier syntheses of prostaglandins and other complex natural compounds.

Yet in the synthesis of gibberellic acid Corey and colleagues see a special importance: "... the achievement of one of the more intriguing and salient objectives in the area of organic synthesis." □

Recombinant DNA guidelines relaxed

After months of hearings and discussion, Joseph A. Califano Jr., Secretary of Health, Education and Welfare, announced this week that he has approved the guidelines prepared by the National Institutes of Health for research involving recombinant DNA molecules. The basic changes in research procedure follow the revisions proposed by NIH last summer (SN: 8/5/78, p. 87), but the new guidelines increase public participation as demanded at the open hearings (SN: 9/23/78, p. 213).

The new guidelines will apply to most recombinant DNA research performed in the United States. Califano requested the Food and Drug Administration to require that all recombinant DNA research submitted to satisfy FDA requirements must follow the NIH guidelines. Califano also has asked that the Environmental Protection Agency take all action within its authority to require that private research conform with the guidelines. The revised guidelines themselves apply to research conducted with or without NIH financial support at any institution that receives NIH funds. Other agencies of the federal government say they will also require guideline compliance in the research they conduct or support.

To increase public participation, the new guidelines require that 20 percent of the members of local Institutional Biosafety Committees must represent the general public. Most of those committees' records must be available to the public, and problems such as violations, illness and accidents must be reported to NIH. Local institutions must also develop training programs, health surveillance and emergency plans in case of accidents.

The revised guidelines exempt from their restrictions five categories of experiments, which include approximately one-third of the research covered previously. Most categories of restricted research have now been assigned to containment levels one step lower than in the 1976 guidelines. Califano says, "Since the likelihood of harm now appears more remote than once anticipated, the scientific community has now concluded that this downgrading is appropriate." □