could make an X-ray microscope capable of resolving structures as small as 200 angstroms in living biological specimens. Electron microscopes have a resolution of a few angstroms, but the specimens have to be put through special preparation which may alter their structures. Light microscopes will take living specimens, but their resolution is limited to about 2,000 angstroms.

Further progress, the announcement says, will depend on improvements in the shaping of the mirror blanks on which these layers are deposited. These have been manufactured to visible light tolerances. X-rays will require a factor of 10 improvement. □

Toxic shock declines, as does tampon use

The saga of toxic shock syndrome has taken an unexpected turn. Just when publicity about the rare, sometimes fatal, disease was expected to boost the number of reported cases, the incidence of the syndrome appears to have dropped dramatically. In August 1980, the peak month, 119 cases were reported to the Centers for Disease Control but, after a steady decline, only 37 cases were tallied in December.

The most likely explanation for the sudden decrease in toxic shock incidence is that women have changed their tampon-wearing habits, says the CDC's MORBIDITY AND MORTALITY WEEKLY REPORT. The syndrome was reported last summer to be associated with tampon use (SN: 7/5/80, p. 6). Telephone interviews by tampon manufacturers indicate that from July 1980 to December tampon use dropped from 70 percent to 55 percent. In addition, Rely brand tampons, which were associated with an increased risk of toxic shock syndrome (SN: 9/27/80, p. 198), were removed from the market in September. The tampon manufacturers also report no decrease since September in the proportion of tampon users who choose highly absorbent tampons, which have been suspected of increasing risk of the syndrome.

Several possible explanations for the drop in toxic shock incidence have been discounted by the CDC. Seasonal variation is an unlikely cause because in 1979 the number of reported cases climbed steadily from fewer than 10 per month in August and September to 28 in December. Another explanation, this one stressed by Procter and Gamble (the manufacturers of Rely) in a press release, is that a change in the reporting system in September makes comparison with earlier counts misleading. Since September, physicians have reported cases to the state health departments instead of directly to CDC. The center, however, finds a decline even when it considers only cases reported through state health departments. □

Platonic chemistry: Now a dodecahedrane

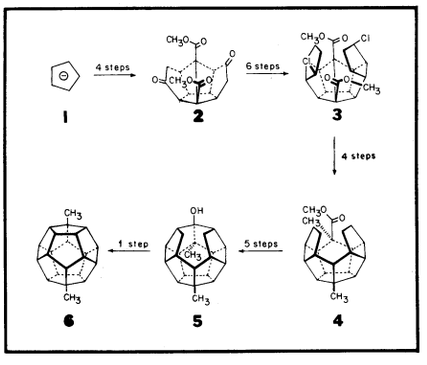
What do you get when you mix sophisticated organic chemistry know-how with the abstract thinking of Plato's time? Chemists trying to form polyhedrons out of carbons and hydrogens.

Platonic philosophers recognized five regular polyhedra: the cube, tetrahedron, octahedron, icosahedron and dodecahedron. When the heritage of these Platonic solids entered the realm of organic chemistry about two decades ago, researchers first constructed hydrocarbon cubes (cubanes) and tetrahedrons (tetrahedranes) with carbons at the corners of each polyhedral face. A hydrocarbon icosahedron—in which five lines intersect to form each corner—was ruled out because carbons can bind to only four other atoms. The octahedron also did not appear to be a feasible synthetic target because each corner carbon should have to bind to four other carbons at impossible, strained angles. The dodecahedron, therefore, was the only realistic, synthetic hydrocarbon-cage target remaining among the five Platonic solids.

Now, Leo A. Paquette and colleagues of Ohio State University at Columbus have constructed the first 20-sided hydrocarbon structure, or dodecahedrane, completing the possible set of wholly hydrocarbon Platonic solids. The chemists detail the synthesis of their Platonic solid — 1,16-dimethyldodecahedrane (labeled "6" in the diagram)—in the Feb. 6 SCIENCE.

The synthesis of dimethyldodecahedrane was quite a chemical challenge, says research colleague Gary G. Christoph. "The real problem is in trying to get all 20 [corner] carbon atoms in the right configuration so it is possible to finally close the structure," he explains. "The structure of the molecule looks like the lines on a soccer ball," Christoph says. "We're fighting nature to form these lines; if it were easy, nature would already have done it." But the organic soccer ball does not exist naturally; instead, it took 19 man-years of laboratory effort to produce the "unusual beast," says Christoph.

Exploring this beast's potential utility is one of the next steps of the dodecahedral research. "It's hard to say what it's going to be good for," Paquette says, "because we have never before had it to study." Still, the researchers have some ideas. First, the ball bearing-like quality of the dodecahedral crystals may impart a lubricant property. In addition, modifications of the structure to enlarge the center space may make it possible to insert atoms in the vacant enclosure. Finally, the dimethyldodecahedrane's high degree of symmetry may be useful. Researchers have theorized that the more symmetrical a hydrocarbon is, the easier it can penetrate the body's cell walls. If this theory is proved true, then highly symmetrical hydrocarbons may make more efficient the delivery, for instance, of antiviral agents.



Meanwhile, Paquette and colleagues are striving for an even more symmetrical organic dodecahedron: The two extra methyl, or CH_3, groups on their present structure make it two degrees less symmetrical than its parent—one without the extra groups. Says Christoph, "We hope to have the parent compound within the next several months or so." □

Vitamins vs. mental retardation

Vitamin and mineral supplements can significantly increase the intelligence of retarded children, especially those with Down's syndrome, researchers report in the January PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. The work is reported by Ruth Harrell, professor emerita of psychology at Old Dominion University in Norfolk, Va., Dwight Newell of Old Dominion University, Ruth H. Capp of the University of Arizona College of Medicine, Donald R. Davis of the University of Texas, and Julius Peerless and Leonard R. Ravitz, private physicians in Norfolk, Va.

The researchers studied 22 severely retarded youngsters, eight of them with Down's syndrome, in order to test a hypothesis put forth 30 years ago by Roger J. Williams of the University of Texas — that genetically determined diseases such as mental retardation can be improved with better nutrition. The I.Q. levels of all the youngsters were tested at the start of the study. Half of them then received relatively large amounts of 11 vitamins and moderate amounts of eight minerals three times a day for four months. The other half got placebos three times daily during the same period. At the end of the four months, all of the subjects had their I.Q.s retested. Those who had received vitamins and minerals showed a statistically significant mean I.Q. score increase of five points compared with an increase of 1.1 points for the placebo subjects. When the placebo subjects got the vitamin-mineral supplements for a four-month period,

they, too, showed a significant increase in I.Q. — a mean increase of 10.2 points. For four more months, both groups of subjects continued to receive the vitamin-mineral supplements, leading to a total mean I.Q. score increase of 16 points over their baseline scores. The largest gain, of 25 points, occurred in a Down's child.

Thus vitamin-mineral supplements do appear capable of raising the intelligence of the mentally retarded, including Down's syndrome victims, Harrell and her colleagues conclude. They also report that the supplements led to more outgoing personalities, a height gain and loss of fluid in the face and extremities among subjects.

In the opinion of George Bouthilet, director of the President's Committee on Mental Retardation, located in Washington, the results of Harrell and her team would be of enormous importance if confirmed by other scientists. He cautions, however, that previous reports of nutrients raising the I.Q. scores of the mentally retarded have not been duplicated. Felix de la Cruz, a Down's syndrome specialist at the National Institute of Child Health and Human Development in Bethesda, Md., tends to agree with Bouthilet. If the results of Harrell and her colleagues can be replicated, he says, there would be reason for enthusiasm. Until now, though, he explains, studies suggesting that megavitamins can help various neurological problems, including Down's syndrome, have not been well-conducted — some, for instance, didn't use controls — or they could not be duplicated. Ped Tjossem, chief of the mental retardation branch of the NICHHD, says, "Some scientists have claimed that megadoses of vitamins and minerals can improve the I.Q. of the mentally retarded, but we've been unable to verify them. Thus I would be skeptical until I've seen the data [of Harrell and her colleagues]."

In contrast, Henry Leland, a psychologist with Ohio State University Medical School in Columbus, points out that there is fairly good evidence that nutritional supplements can help control the behavior of some autistic children, and that elimination of food additives from the diet can lessen hyperactivity in some hyperactive children. "So I can't rule out this diet thing" where the research of Harrell and her co-workers is concerned, he says. On the other hand, he adds, "it isn't great shakes" that somebody has raised the I.Q. scores of the mentally retarded with nutrients because it is easy to manipulate people's I.Q. scores with all sorts of techniques. So, for the results of Harrell and her colleagues to be truly meaningful, he asserts, they should show not an increase in I.Q. score, but rather that nutrients have made the subjects more teachable, more communicative, more responsible and independent. "If this type of thing improves," he concludes, "then we've got a treatment." □

Voyager 2: New plans for Saturn

The complex series of computer commands that will control the Voyager 2 spacecraft's scientific activities during its August encounter with Saturn took two years to develop, and was ready well before even the Voyager 1 Saturn flyby of last November. Project officials expected that a few changes would be necessary once Voyager 1's findings were available, but, says one scientist, "we weren't ready for this." Voyager 1's startling discoveries, particularly about the planet's rings, have prompted a radical revision of the agenda for Voyager 2, resulting in unanticipated long hours not only for the researchers, but for the teams that must translate the scientific requirements into the elaborate, detailed command "sequences" that will be radioed up to the craft's computer.

Out of about 100 command "links" (groups of commands governing individual observing episodes, such as a 3-by-5-photo mosaic of Saturn's limb) used in the 20 hours before and after the Aug. 25 closest approach, says Voyager assistant project scientist Ellis Miner, more than half have had to be modified, including about 20 that have been completely thrown out and replaced. "If we were editing a book instead of command sequences," says imaging team scientist Richard J. Terrile, "normally at this point we'd be changing a few paragraphs. Instead, we've been changing whole chapters." And because Voyager 2's instruments were already booked to capacity in the original plan, every added observation has meant dropping an old one, resulting, for example, in the elimination of all formerly planned satellite photos that would not have been sharper than similar pictures from Voyager 1. But the researchers don't begrudge the changes.

The rings: Saturn's major puzzle from the Voyager 1 encounter was the discovery of the "braided," or at least multi-stranded nature of the thin F-ring. Only a couple of photos show the phenomenon clearly, says Terrile, but Voyager 2 will make it a major target. Photos from above and below the ring plane, taken perpendicularly and at angles, should enable three-dimensional analysis of the braiding, while sequences of pictures will tell whether it changes with time and track it around the planet. Numerous proposed explanations for the braiding have flooded into Voyager headquarters from scientists and others around the country and elsewhere, but the project scientists are leaning toward a gravitational effect from the two tiny moons (S-13 and 14) whose orbits enclose the ring, possibly combined with electromagnetic or electrostatic influences.

Nearly as puzzling are the approximately radial "spokes" photographed by Voyager 1 in the wide B-ring. Several candidate hypotheses have invoked the presence of tiny particles, levitated (perhaps electrostatically) out of the ring plane and radially aligned by Saturn's rotating magnetic field. Voyager 2's cameras and ultraviolet spectrometer will try for a quick edge-on look as the spacecraft flashes through the ring plane (less than half as far from Saturn as Voyager 1), in hopes of revealing whether there is indeed such a small-particle "atmosphere." One idea is that the spokes may be triggered by electrostatic bursts (detected by Voyager 1), and the craft's plasma-wave and radio-astronomy instruments have been reprogramed for additional high-data-rate scans to find out more.

Eccentric or elliptical rings were also detected among the round ones by Voyager 1, whose successor will photograph them at selected fixed longitudes over a period of time in hopes of measuring their precession rate. Such rings are among perhaps a thousand or more thin "ringlets" discovered to be comprising the overall ring structure, and Voyager 2 will try to measure their number and width by tracking a star across the structure's entire radius to measure the times when the star's light is cut off. Other photos will tell whether the detailed structure found in the Cassini division between the A- and B-rings has changed since Voyager 1.

The moons: Giant Titan was Voyager 1's specialty; Voyager 2 will only make some polarization studies to analyze particle sizes in its dense atmosphere. The prime satellite target is Enceladus, strangely smooth and the shiniest known solid object in the solar system. Its brightness (a geometric albedo of about 100 percent) may be due to backscattering, says assistant imaging team leader Laurence Soderblom, which could indicate a fairly new surface — of interest since Enceladus may be subject to a lesser version of the same tidal stresses tentatively linked with Europa's myriad streaks and Io's volcanism. Evidence of surface relief will be sought by photographing the object's terminator at different positions.

The planet: Aurora-type emissions were detected near Saturn's equator by Voyager 1's UV spectrometer in scans of that portion of the planet's limb or edge. As a result, Voyager 2 is being programed to expand the search to cover the limb of the entire northern hemisphere. One goal is to see whether the emissions are stronger at certain latitudes, such as those where the upper atmosphere is penetrated by magnetic-field lines that pass through the rings. Photography of visible features in Saturn's cloudtops will be concentrated near the north polar region, where such details (though far fainter than Jupiter's) seem most prominent. Magnetic-field and trapped-particle measurements will be largely as originally planned, but with different results if Saturn turns out to be, as tentatively suggested, in Jupiter's magnetic tail during the flyby. □