

Features on the world of Ganymede



Illustrations: NASA

Ganymede, although larger than all but one of the 32 other moons in the solar system, remained little more than another point of light until Pioneer 10 took its picture. Dark, luna-like maria, possible craters and a bright southern region that could be ice add a new personality to the planetary family.

Ganymede, largest of Jupiter's 13 moons, was little more than a featureless point of light until Pioneers 10 and 11 took a close look. Now, aided by data from earth and space, scientists are beginning to assemble a picture of the huge satellite, which is fully a tenth bigger than Mercury.

The best photo ever taken of the 3,270-mile-diameter worldlet was made in December 1973, as Pioneer 10 flew by some 467,000 miles away. Though the image is not sharp enough to show features smaller than about 240 miles across, months of careful

enhancement by computer and eyeball have revealed what seems to be a north polar mare (similar to those on earth's moon) about 480 miles across and another, perhaps 800 miles across, near the planetoid's central region. In addition, says Tom Gehrels of the University of Arizona, mentor of the Pioneers' imaging devices, there appear to be large meteorite craters and a bright region to the south.

One possible source of such brightness could be a polar cap. Pioneer 11 detected no ultraviolet hydrogen "glow" or other direct indications of an atmosphere during its pass by Jupiter last month. But earth-based spectroscopic studies have suggested that Ganymede is largely covered with a layer of water frost (with possible traces of methane and ammonia) held in its icy state, Pioneer data indicates, by a temperature, even on the sunlit side, of 145 degrees below zero F.

The lack of a gaseous atmosphere is not so surprising, thanks to the Pioneers, as it might have been in the past. Prior earth-based studies had suggested a density almost a fourth higher than the spacecraft reported, with a correspondingly high escape velocity that might have been enough to hold a rarefied atmosphere in place. Analysis of Ganymede's effect on Pioneer 11's orbit, however, shows a density some 63 percent less than earth's and 40 percent less than even earth's moon.

Despite its lightly compressed mass, Ganymede manages to make its presence felt. Pioneer 11 reported slight changes in Jupiter's magnetic field in

Ganymede's vicinity, as well as a tendency—weaker than that of some other Jovian satellites, but definitely there—to "sweep away" charged particles trapped by the Jovian field.

Together with Saturn's Titan, Ganymede is one of the two largest natural satellites in the solar system—and well nigh a planet. □

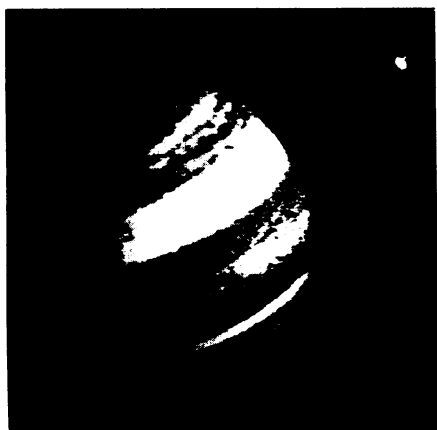
Do women have sex pheromones?

In an age of instantaneous electronic communication, why would humans need or want to release odors into the air to convey information? Lewis Thomas muses about this in his *Lives of a Cell* essay "A Fear of Pheromones." Pheromones are small molecules, such as the sex attractants of insects and mammals, that convey information. Until now, the presence of pheromones in humans has been only a subject for essays and philosophical speculation. But a team of medical researchers has changed all that by isolating aromatic chemicals from the vaginal secretions of young women.

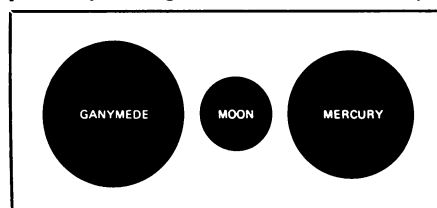
Richard P. Michael, R. W. Bonsall and Patricia Warner of the Emory University School of Medicine in Atlanta report the isolation in the Dec. 27 *SCIENCE*. They identified several volatile aliphatic (open chain) acids such as acetic acid, propanoic acid and butanoic acid in the secretions they collected. Michael and other colleagues earlier found these same substances in several monkey species and showed that in the rhesus monkey, they act as sex attractants. Whether or not they attract human males is not yet known.

Taking oral contraceptives apparently can disrupt the normal production of these acids, the team found. Thirty-two women tested were not taking the pill and fifteen were. The concentrations of the acids were cyclical in pill nonusers occurring in highest levels near the middle of the menstrual cycle (the most fertile time) and in lowest levels near the beginning (the least fertile time). In pill users, the secretion concentrations were approximately the same throughout the menstrual cycle and were lower than in nonusers. Vaginal bacteria produce the aliphatic acids, Michael says, and create a natural acidic environment that suppresses the growth of infectious yeasts. Oral contraceptives can change the acidity of the vagina (and reduce "pheromone" levels), perhaps by inhibiting bacterial growth.

Determining the effects of the chemical signals in humans will be difficult, Michael says, "and I'm not sure I want to go off in that direction. It's



Dwarfed by Jupiter in this Pioneer 11 photo, yet larger even than Mercury.



sure to raise a lot of emotion and I think many of the obvious approaches to the problem will be unsuccessful."

This is an area that people love to speculate about, he says, "but what is really needed are hard data." □

Science advice controversy heats up

The debate over whether or not a President needs a council of science advisers in the White House has surfaced again with the designation of newly inaugurated Vice President Nelson Rockefeller as the Administration's chief negotiator on the issue. It is not yet clear whether Rockefeller is authorized to set up some sort of White House science advisory board or whether he is merely exploring alternatives.

As interest heightened, the Federation of American Scientists (FAS)—a lobbying group whose membership includes some 6,500 scientists, including half the country's Nobel laureates in science—wasted no time in stating what it felt to be the overwhelming consensus in the scientific community. Citing a recently conducted FAS poll, federation spokesmen said that most scientists feel a Presidential science advisory apparatus should be reinstated, with the most favored organizational structure being something like the Council on Science and Technology (CST) proposed by the National Academy of Sciences (SN: 7/6/74, p. 4). CST would be modeled on the lines of the already existing Council of Economic Advisers—a small, select group politically compatible with the President—rather than after the defunct President's Science Advisory Committee, whose size and political opposition finally led to its demise (SN: 1/27/73, p. 52).

Jeremy J. Stone, director of FAS, says his organization is particularly concerned that the Administration might try to adopt a new system of science advising without consulting the technical community, leading to an unacceptable alternative that would strain already tense relations further. He cites a rumor that Ford is considering a "Council of Scientific Advisers to the Office of Management and Budget," which, he says, would "bring down the same wrath" from scientists that the Nixon pardon had brought from those who wanted to see more deliberate consideration of that issue.

Though National Science Foundation Director H. Guyford Stever (nominally the present science adviser) has maintained formal neutrality on the issue, his public statements have tended to support the status quo. Stone reacts strongly to this posture, saying Stever is "betraying the legitimate, long-standing and virtually unanimous desire of the scientific community" by "failing to urge upon the President the solution

that has been so constantly urged . . . from virtually all responsible scientific quarters." Stone believes there is even more active opposition to science advising from White House staffers left over from the Nixon era.

Most sources feel that some sort of decision is imminent. As early as last summer, the National Academy of Sciences was reportedly asked to prepare a list of scientists who might be appropriately nominated to a White House advisory board, with the list submitted to NSF's Stever for review. Now, given the Rockefeller reputation for willingness to consult experts and for ability to carry out administrative matters with dispatch, some knowledgeable observers expect a decision could come within a month.

FAS Chairman Philip Morrison summarizes his organization's position by saying that a President must have some sort of technical advice and that present concern among scientists is that this advice come from experts representative of the larger technical community. □

Ford asks NAS aid on food research

At the World Food Conference in Rome, Secretary of State Henry Kissinger announced that President Ford would soon request the National Academy of Sciences to work with the Department of Agriculture and other Government agencies to "mobilize America's talent" in applying research and development to solve the world's long-range food problems (SN: 11/9/74, p. 292). During a Senate hearing on Dec. 18 on the outcome of the food conference, academy President Philip Handler read a letter he had received from Ford, formally requesting NAS help in coordinating such an R&D program.

Specifically, Ford stated the need to set research priorities, determine resources and set programs, and he asked the academy to work with other agencies in making an assessment of the current food problem and in determining how R&D capabilities could best be used. Handler has replied to the letter, but academy spokesmen have refused all comment on the matter until Ford responds.

Though few scientists would fault the idea behind the President's request (the President's Science Advisory

Committee sounded early warnings of the developing crisis years ago), the letter was both unusual and appeared hastily conceived. Generally such requests for academy help come from some Government agency (like the National Science Foundation) that would fund the NAS investigation, and prior informal negotiations work out details of the official request. Ford's letter, however, makes no mention of what funds could be expected, where they would come from, or how a new program would affect work in progress at the academy and the many agencies already involved in agricultural, climatological and nutritional research.

Still, the letter probably does reflect a serious new commitment on the part of the Administration to enter on what Ford called a "major effort" to apply science and technology to the problems of food production and distribution. Only two other such direct Presidential requests to the NAS have occurred in recent memory—a letter from John F. Kennedy, asking for a survey of the country's natural resources; and one from Lyndon Johnson, charging the academy with responsibility for studying the devastating 1964 Alaska earthquake.

The research proposed will certainly include renewed efforts to determine the likely severity and extent of climatic changes. Asked by SCIENCE NEWS what conclusions have been reached in an ongoing academy study of climate, Handler replied that so far arguments can equally well be made that the present, decades-long cooling trend is only a random "excursion from the norm" or that it is the beginning of a severe, long-term trend. Handler said weather changes can bring about as much as a 20 percent reduction in national crop yields, and that any drop of more than about three percent can "bring great human tragedy."

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In other testimony, Edwin Martin, who had been deputy chief of the U.S. delegation to the World Food Conference (SN: 11/30/74, p. 349), said that the United Nations General Assembly has adopted the conference report setting up a World Food Council and that the council is now being formed. He said the United States expects to enter negotiations on setting up a system of international food reserves by late January. As for the immediate impact of the conference itself, though he had drafted the famous cable requesting an immediate American donation of a million tons of grain for aid, he thinks such large meetings "are not in good shape to deal with operational issues. If you have a fire—and there is a fire—you call the fire department, not a town meeting." □