

Plans change for NEAR visit to an asteroid

Fragments of asteroids have bombarded Earth ever since the birth of the solar system. Now, an emissary from Earth is about to embark on the first extended visit to an asteroid. Loss of radio contact during a crucial maneuver will delay the mission for at least a month, however.

According to the original plan, on Jan. 10 a spacecraft would have met its intended mate, a near-Earth asteroid—the second largest—known as 433 Eros. Entering orbit about 1,000 kilometers from the rock and eventually coming within a few kilometers of its surface, the Near Earth Asteroid Rendezvous (NEAR) craft would determine the composition, shape, and density of Eros to an accuracy unprecedented for any asteroid. A suite of six instruments is poised to take millions of images and measurements over the asteroid's entire surface.

Late on Dec. 20, during a time when

NEAR was to fire its engine and head for Eros, the craft lost contact with Earth. Contact was reestablished a day later, but the earliest that NEAR could now enter orbit around Eros is Feb. 6—if it has enough fuel left to complete the firing maneuver. Alternatively, the craft could swing by Earth for a gravitational kick and attempt a meeting with Eros in 2002.

Planetary scientists expect that NEAR, during its year-long mission, will reveal the answer to several riddles. Recent observations have suggested that many asteroids—including 253 Mathilde, briefly visited by NEAR last June (SN: 7/12/97, p. 29)—are not solid objects but porous amalgams of rocky debris, loosely bound by gravity. This year's observations of Eros should determine whether or not this potato-shaped body is a solid chunk of rock.

In an article recently posted on the Internet, William Bottke of Cornell University

Johns Hopkins Applied Physics Laboratory



Artist's rendition of NEAR craft orbiting Eros.

and his colleagues argue that Eros is probably a pile of rubble. The researchers note that the asteroid is highly elongated. The team's computer simulations suggest that Eros' orbit once took it close enough to Venus or Earth to experience a gravity effect known as a tidal force, the same force that raises tides on Earth's oceans. The asteroid's rapid spin also suggests that the body once ventured close to Earth or Venus.

A tidal force occurs when a massive body exerts significantly different forces on the near and far sides of an extended object. A solid object can usually withstand tidal forces, but a liquid or a rubble pile would deform under the stress. Bottke and his colleagues suggest that this is how Eros got its elongated shape.

Other researchers are more skeptical. NEAR scientist Joseph Veverka of Cornell suggests past collisions could account for Eros' elongated appearance. Moreover, he suspects Eros is a fragment blasted off a much larger body. A mere rubble pile could not have survived such an impact.

NEAR scientists say they should have a rough estimate of the asteroid's density shortly after the craft begins orbiting Eros. Moreover, they expect to identify surface minerals by analyzing reflected light. If the overall density is considerably less than that of the surface materials, it's likely that Eros has numerous interior voids between chunks of debris gently stuck together by gravity.

A second puzzle concerns the descendants of Eros and other members of the so-called S class, the most common asteroid type. Researchers have long argued that ordinary chondrites, primitive chunks of solar system material that are the most common meteorites to fall to Earth, are chips off the S-asteroid block.

Although the color and mineral composition of S asteroids are similar to those of ordinary chondrites, the match is not exact. Scientists have proposed that bombardment by space debris has weathered S asteroids, altering their original surface composition, which persists in meteorites. High-resolution spectra of Eros may determine if S asteroids really are primitive and the parents of ordinary chondrites.

—R. Cowen

Douching associated with pregnancy risk

Women who douche frequently—and then become pregnant—appear more likely to have a low-birth-weight baby than women who don't douche, a new study shows.

Douching is a personal hygiene practice, but its health benefits remain unproved, says study coauthor Kevin Fiscella, a physician at the University of Rochester (N.Y.) School of Medicine.

In fact, some scientists link the practice to a vaginal infection that can arise when natural protective flora are killed off in the vagina (SN: 9/5/98, p. 158). Women with such infections have a higher risk of giving birth prematurely.

Other studies have suggested links between douching and ectopic pregnancy, a dangerous condition in which the fertilized egg implants outside the uterus. Douching may also increase incidence of infertility and of pelvic inflammatory disease, an infection within a woman's reproductive tract. The new study is the first to link douching with low-weight newborns.

Fiscella and his colleagues analyzed data collected from 4,665 women across the United States who had given birth before 1988. About half of the women douched regularly. In the December 1998 *OBSTETRICS & GYNECOLOGY*, they report that 9.7 percent of the women who douched gave birth to low-birth-weight babies, compared with 5.8 percent of women who didn't douche regularly.

To eliminate factors that might distort the results, the researchers accounted for differences in race, marital status, household income, smoking, alcohol consumption, and other lifestyle factors. Low birth weight was considered to be

5.5 pounds (2.5 kilograms) or less.

Frequency of douching mattered. Women who douched once a week or less were not significantly more likely to have a low-birth-weight baby than those who didn't douche at all. However, the 650 women in the study who douched two or three times a week were 40 percent more likely to deliver low-birth-weight babies than women who didn't douche. The 37 women in the study who douched daily showed 2.5 times the risk of those who didn't douche.

"This is based on statistics that are not perfect but which are the best [available]," says Albert G. Thomas, an obstetric gynecologist at Mt. Sinai Hospital in New York City. As such, the research "is a springboard for further studies."

Fiscella agrees that it's premature to suggest douching causes low birth weight in babies. "I look at this as an exploratory study," he says.

Some women may be douching early in their pregnancies, especially before they know they are pregnant, Fiscella says. Studies have suggested that bacteria from douching can enter the amniotic sac and affect a pregnancy.

Thomas counsels his patients not to douche. If they must, he suggests they avoid the middle of the menstrual month, a time when foreign bacteria can ascend from the vagina to internal organs.

The number of women who douche has decreased. A survey in 1995 found that 27 percent of U.S. women age 15 to 44 douched regularly, compared with 37 percent a decade earlier. In the 1995 survey, more than half of black women and 21 percent of white women reported douching.

—N. Seppa