concluded that the ancestral RNA for both molecules had only a moderate G+C content, well below that of all known hyperthermophiles and consistent with organisms that live at moderate temperatures (see figure).

To check their work, the team ran the model again with a different phylogenetic tree; the result was unchanged. To show that the model was not simply finding the average G+C content of all the organisms, they ran it again using only organisms with high G+C contents—and still found only a moderate G+C content.

Even so, it's difficult to extrapolate back billions of years, warns evolutionary biologist Norman Pace of the University of California, Berkeley, who has favored a hot origin for life. "Things get awfully murky back there," he says, calling the moderate G+C content "mud in already murky waters." And the last common ancestor of all living things must have lived some time after the very first stirrings of life.

But others welcome the result. "Statistical methods can be much more powerful than many people realize," says evolutionary biologist Ziheng Yang of University College London, who finds the analysis convincing, although he "would not take it as the last word" on the topic. Even Galtier agrees with that. But if he has his way, the evidence for a cooler ancestor will once again heat up the origins-of-life debate. **–GRETCHEN VOGEL**

PLANETARY SCIENCE

Pluto: The Planet That Never Was

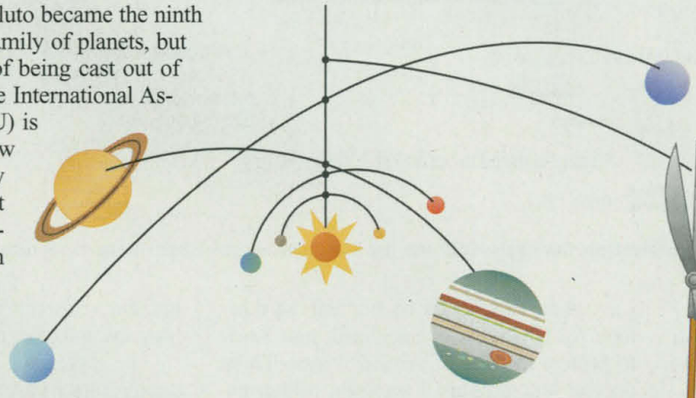
Nearly 70 years ago, Pluto became the ninth member of the sun's family of planets, but now it's on the verge of being cast out of that exclusive clan. The International Astronomical Union (IAU) is collecting votes on how to reclassify the icy body: as the first (and largest) of the so-called trans-Neptunian objects, or as the 10,000th entry in the growing list of minor bodies orbiting the sun. In either case, Pluto may officially lose its planetary status, leaving the solar system with only eight planets.

Children's books and planetariums may not acknowledge the loss. And Brian Marsden of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, who launched the discussion 6 years ago, says no one is trying to demote Pluto. "If anything, we're going to add to Pluto's status," he says, "by giving it the honor of a very special designation."

Cold comfort for Pluto, maybe, but its reclassification will at least end a long identity crisis, which began soon after its 1930 discovery at Lowell Observatory in Flagstaff, Arizona, by Clyde Tombaugh, who died in 1997. Pluto turned out to be much smaller than all the other planets (according to recent estimates, its diameter is only 2200 kilometers), and its orbit is strangely elongated. It didn't belong with either the Earth-like rocky planets or the gas giants.

A clue to its true nature came in 1992, when David Jewitt of the University of Hawaii, Honolulu, and Jane Luu, then at the University of California, Berkeley, discovered a small, icy object beyond the orbit of Neptune. Provisionally cataloged as 1992 QB1, this ice dwarf measures a mere 200 kilometers in diameter. Since then many more trans-Neptunian objects (TNOs) have been detected, some of which move in very Pluto-like orbits around the sun. These "supercomets" populate the Kuiper Belt, named after Dutch-American astronomer Gerard Kuiper, who predicted its existence in the early 1950s. "Pluto fits the picture [of the solar system] much better if it's viewed as a TNO," says Luu, who is now at Leiden University in the Netherlands.

At present, more than 70 TNOs are known, and apparently, Pluto is just the largest member of this new family, which explains why it was found over 60 years before number two. If astronomers had known about the other TNOs back in the 1930s, Pluto would never have attained the status of a planet, Luu says: "Pluto was lucky."



A couple of months ago, the kinship between Pluto and the TNOs led Richard Binzel of the Massachusetts Institute of Technology to propose that Pluto be made the first entry in a new catalog of TNOs for which precise orbits have been determined. It would then enter the textbooks as something like TN-1 (or TN-0, as some astronomers have suggested).

Marsden agrees that Pluto is a TNO, but he doesn't like the idea of establishing a new catalog of solar system objects, arguing that astronomers already have a perfectly serviceable list of numbered minor bodies (mostly asteroids). "The question is: Do we want to recognize [trans-Neptunian objects] with a different designation?" he asks. He points out that the Centaurs—TNOs that have been nudged well inside Neptune's orbit—have been classified as asteroids and says he sees "no reason for introducing a new designation system for objects of which we have representations in the current [catalog of minor bodies]."

Instead of making Pluto the founding member of a new catalog, Marsden wants to add it to the existing list. "The current number is 9826," he says. "With the current detection rate, we should arrive at number 10,000 somewhere in January or February." He notes that asteroids 1000, 2000, 3000, and so on have all been honored by the IAU with special names, including Leonardo and Isaac Newton. "What better way to honor Pluto than to give it this very special number?"

But the prospect of lumping Pluto with the solar system's riffraff outrages supporters of a new TNO category. "It's the most idiotic thing" she's ever heard, says Luu. Pluto is certainly not an asteroid, she says.

To try to settle the issue, Mike A'Hearn of the University of Maryland, College Park, is collecting e-mail votes from 500 or so members of IAU divisions on the solar system, comets and asteroids, and other relevant topics. "I wanted to arrive at a consensus before Christmas [1998]," he says, "but it may take a while, since the community as a whole doesn't seem to have a consensus." Neither proposal has attracted a majority: Although many people opposed Marsden's proposal, a comparable number were unhappy with Binzel's idea, A'Hearn says, because Pluto would still be an anomaly, being much larger than the other trans-Neptunian objects. A'Hearn says that if no consensus can be reached, Pluto will probably not end up in any catalog at all, making it the ultimate outcast of the solar system.

However the debate settles out, Pluto's career as a planet seems to be ending, and even astronomers are wistful at the prospect. "No one likes to lose a planet," says Luu. A'Hearn agrees. "It will probably always be called the ninth planet" by the general public, he says.

–GOVERT SCHILLING

Govert Schilling is an astronomy writer in the Netherlands.

CREDIT: TERRY E. SMITH