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COVER: Test animals can breathe for hours submerged in certain oxygen-rich fluorochemicals. These compounds are being studied for use as breathable liquids and substitutes for human blood. See p. 202. (Photo: William E. Schneider)

Publisher	E. G. Sherburne Jr.
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Advertising	Scherago Associates, Inc. 11 W. 42nd St. New York, N.Y. 10036 Fred W. Dieffenbach Sales Director

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1719 N St., N.W., Washington, D.C. 20036.
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Subscription Department
231 West Center Street
Marion, Ohio 43302

Subscription rate: 1 yr., \$10; 2 yrs., \$18; 3 yrs.,
\$25. (Add \$2 a year for Canada and Mexico, \$3
for all other countries.) Change of address:
Four to six weeks' notice is required. Please
state exactly how magazine is to be addressed.
Include zip code.

Printed in U.S.A. Second class postage paid at
Washington, D.C. Established as Science News
Letter[®] in mimeograph form March 13, 1922.
Title registered as trademark U.S. and Canadian
Patent Offices.

Published every Saturday by SCIENCE SER-
VICE, Inc., 1719 N St., N.W., Washington, D.C.
20036. (202-785-2255). Cable SCIENSERV.

September 28, 1974

Science News of the Week

New moon over Jupiter: No. 13

Jupiter, the solar system's most moon-rich world, now appears to be richer still. A faint, 20th-magnitude spot on a photographic plate has been tentatively, but confidently, identified as moon number 13.

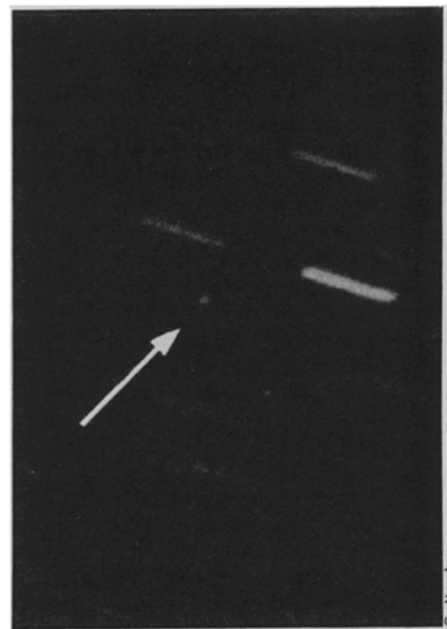
The discovery, if confirmed, will be the first of a new satellite in the solar system since the tentative identification in 1966 of a 10th moon of Saturn, named Janus. The twelfth moon of Jupiter, Adrastea, was discovered in 1951.

Hale Observatories astronomer Charles Kowal had originally intended simply to make some observations to refine knowledge of the orbits of Jupiter's small, outer moons. As he began, using the 48-inch Schmidt telescope on Mt. Palomar, he decided to expand his study into a search for possible new satellites. The outer moons are so small, planetologists have theorized, that they are probably fragments of a larger object or objects that broke up. Possible support for such a theory is the fact that the sixth through eighth moons out from Jupiter move in the direction of the planet's rotation, while the ninth through twelfth travel backward along their orbits, or retrograde. Where small fragments are known, reasoned Kowal, smaller ones are likely.

On Sept. 10, 11 and 12, he made a series of photographs of Jupiter and its lesser satellites. Due to the moons' dim light, he had to use two-hour exposure times, placing a partially smoked glass in front of the plate to keep the brilliance of Jupiter from washing out the images.

On Sept. 14, examining the plates, Kowal found his object, merely another faint smudge among the images of the planet's other moons, some 370 million miles from earth. At that distance, he estimates, the 20th-magnitude point of light is probably from three to five miles in diameter. Too small to rate a name, its formal designation will be an unromantic J-XIII, reflecting its order of discovery.

If it is a moon. There's a very remote chance," says Kowal, "that it may be a comet or peculiar asteroid in Jupiter's vicinity." The outer moons take as long as two years to circumnavigate the planet in their huge orbits, so a series of observations several days or even weeks apart is necessary to be sure that the newest discovery is in-



First photo of Jupiter's 13th moon.

deed a captured object, and not just passing through. Kowal believes it to be "more than 90 percent certain" that his find is a moon, probably in retrograde orbit. Charles F. Peters of the Jet Propulsion Laboratory says that the limited initial sightings tentatively suggest that it could be in orbit between the ninth and tenth farthest moons from Jupiter, at a very high inclination. Kowal, Peters, and other astronomers acknowledge that such conclusions are strictly tentative, awaiting additional observations, but the confidence is there.

Assuming that it is indeed a moon, it is the dimmest known in the solar system. Yet there may be as many as four or five more of magnitude 20, says Kowal, judging by a general astronomical rule-of-thumb that says the number of fragments from a breakup ought roughly to double with each one-magnitude reduction in brightness. There could, in fact, be a virtually infinite number of moonlets orbiting Jupiter, he says, if one includes fragments all the way down to the size of dust particles.

During Mariner 10's first flight past Mercury last March, a flurry of excitement was created when an improbably lined up star was at first thought to be a satellite of that moonless world. J-XIII seems like a better bet, but Kowal (who was unconnected with the Mercury adventure) is judiciously awaiting confirmation before he breaks out the champagne. □

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