Io's big sodium cloud looms even bigger

The large, crescent-shaped cloud of sodium atoms that stretches out into space from Jupiter's moon Io, fed by Io's volcanic eruptions, has intrigued astronomers since its discovery in 1973 from Earth. Studies of the fog-lamp-colored cloud have indicated that traces of it extend out into space from Io as far as 30 times Jupiter's radius, or about 2.1 million kilometers.

Now a group of researchers has observed the cloud again, finding evidence of its sodium atoms more than 32 million km out from Jupiter.

It is "possibly the largest permanently visible feature in the solar system," says astronomer Michael Mendillo of Boston University.

New observations by Mendillo and two co-workers, made with a ground-based telescope, reveal the cloud has an angular width of about six degrees, a portion of the sky, as viewed from Earth, equivalent to that of a dozen full moons placed side by side.

The sodium atoms are carried away from Io by processes associated with Jupiter's rapidly rotating magnetosphere, or magnetic field. The researchers, in fact, don't call the feature a cloud at all, but a "magneto-nebula."

Mendillo, together with Boston University colleague Jeffrey L. Baumgardner and graduate student Brian C. Flynn, reported their results last week at the American Geophysical Union meeting in Baltimore.

The group photographed the cloud on Jan. 25 from McDonald Observatory in Fort Davis, Texas, using a 100-millimeter telescope. Mounted on the telescope was a filter and a light-intensifying detector that allowed the astronomers to measure the small amounts of sunlight reflected from sodium atoms even at great distances from Jupiter.

Sodium, however, is only the most conspicuous part of the chemical cloud surrounding Io. "Now," says Mendillo, "we can pay attention to materials with fainter spectral lines, produced by other elements." Other observations have detected both sulfur and oxygen in Io's cloud.

In addition, there remains the tantalizing possibility of using the equipment to look at additional parts of the solar system, for, say, atomic clouds outside other planets. "Some folks have suggested that we look at other targets, such as Saturn," Mendillo says.

The telescope and filter used by the researchers cost a total of about $50,000, says Mendillo, who makes a point of citing the sodium image as a reminder that significant scientific findings can result from a modest investment.

"In the era of the Hubble Space Telescope, from which we all expect exciting results, it is encouraging to realize that ground-based astronomical instruments of all sizes can still play an important role in space science," he says. "This is particularly important to university-based research groups where the training of graduate students can proceed along time-scales much shorter than those associated with major space missions."

– J. Eberhart

Fossil dogwood alive in eastern Asia

The last of its kind had fallen in a lush tropical forest, some 4 million years ago – or so botanists reckoned. Apparently only fossils remained of this unique group of nut-bearing trees belonging to the dogwood family. But when two paleobotanists compared the fossil dogwood's woody fruits with those of the living *Diplopanax stachyanthus* – a rare, East Asian species classified within another family – they saw nuts of a not-so-different color.

Diplopanax stachyanthus, they found, is a "living fossil," a member of an "extinct" genus of dogwoods that once flourished over much of Europe and Asia. Paleobotanists Richard Eyde and Xiang Qiuyun report their discovery in the May AMERICAN JOURNAL OF BOTANY. Working at the Smithsonian's National Museum of Natural History in Washington, D.C., Eyde and Qiuyun, now at Washington State University in Pullman, examined 15-million-year-old pecan-shaped fruits of a dogwood subfamily Mastixioideae, and compared them with those of a modern *Diplopanax.* The shape of their seed chambers, a key taxonomic feature of the dogwoods, proved nearly identical.

Diplopanax was discovered in China in 1928, but classified then as a member of Araliaceae, the ginseng family. Botanists first suspected a dogwood lurking in the ginseng ranks in 1978, but not until Eyde and Qiuyun held it up to its ancient ancestors last year did *Diplopanax* emerge as the lost survivor of the woody-fruited dogwoods. Eyde died from cancer last week, only a few days before his discovery was published.

Alice Tangerini, Smithsonian Institution

Diplopanax stachyanthus

Steven R. Manchester of Indiana University in Bloomington, believes Eyde and Qiuyun's discovery will help clarify his and fellow paleobotanists' deductions about plant life in prehistoric forests back to 65 million years ago. Manchester has been examining scattered bits of fossilized plants – like pieces of a petrified jigsaw puzzle – to reconstruct extinct species and infer their environs. Now, in *Diplopanax,* he has a living model showing how some of the ancient pieces might fit.

– W. Stolzenburg

NSF erred on Privacy Act

Until August 1988, the National Science Foundation (NSF) maintained it could refuse to release grant-proposal files requested under the 1974 Privacy Act – ostensibly because the agency did not index such files under the applicant's name. This potentially denied unsuccessful applicants grant evaluations and other materials that might help them appeal rejection of their grant requests. Now a just released internal memo by Philip Sunshine, counsel to NSF's inspector general, says the agency erred.

The NSF's Office of Inspector General began an investigation after a complaint by Jon E. Kalb charging that the agency violated the Privacy Act by failing to notify the public – through an announcement in the Federal Register – that these grant-proposal files existed and were subject to release under the Act (SN: 4/14/90, p.234).

Kalb, a geologist at the University of Texas in Austin, contends his reputation suffered when rumors that he was a CIA spy circulated during NSF's peer review of a 1977 proposal to fund studies in which he would participate.

Sunshine's memo says NSF developed a convoluted two-step indexing scheme to circumvent the Privacy Act. But "no matter how the [materials] were filed," they still were subject to the Privacy Act, according to NSF inspector general Linda G. Sundro in her semi-annual report to Congress.

The Justice Department reviewed the investigation's findings and "declined to prosecute," her report to Congress says. Thus, "it is not appropriate for anyone to conclude that there was a violation of criminal law and we have made no such determination."

News of the Week continued on p.363