# Zones of goiter: Drinking water connection?

In the 800-kilometer-long Cauca-Patia Valley, tucked in the Andes Mountains of Colombia, South America, more than half of the school children in 1948 suffered from goiter — an enlargement of the thyroid gland, producing swelling of the neck, that is commonly caused by lack of dietary iodine. A goiter-prevention program that provided iodine ensued; nonetheless, surveys taken as late as 1978 indicate that goiter still persists in an average 15 percent of the population throughout the valley.

Enter Eduardo Gaitan, native of Colombia and now with the Veterans Administration Medical Center and University of Mississippi Medical School in Jackson. Gaitan embarked on a search for an explanation for the uneven distribution of goiter in the valley — the 15 percent average incidence fell in a range of from 1 to 42 percent — and found that it could not be attributed to socioeconomic factors or iodine intake or other dietary factors. He suggested that the incidence of goiter might be associated with the drinking water supplies of the various valley regions. At the recent American Chemical Society meeting in Seattle, Wash., Gaitan presented evidence to support his hypothesis.

If proved correct, the drinking water theory might help explain the persistence of goiter not only in western Colombia but also throughout the world, Gaitan reported. For example, an early-1970s survey of 8,000 school children in Michigan, Kentucky, Texas and Georgia indicated a 7 percent incidence of goiter — despite adequate iodine intake. Another survey has established a goiter prevalence of 8.4 percent in Breathitt County, Ky. And a nutrition survey of 10 states, stretching from California to Massachusetts, conducted from 1968 to 1970 by the Centers for Disease Control uncovered similar results, even though iodine intake was reportedly adequate in more than 99 percent of the subjects studied. These epidemiological data suggest that region-specific environment factors, other than nutritional iodine deficiencies, could be the culprit in goiter-occurring regions, Gaitan said.

In the case of Western Colombia, Gaitan found evidence that the environmental factor could be goiter-causing chemicals in the drinking water when he studied Candelaria, a non-industrial Andean town with a population of 8,000. There, a "high-goiter" district and a "low-goiter" district were supplied by different wells, Gaitan discovered. Chemical analyses, conducted by R. L. Jolley and colleagues of the Oak Ridge National Laboratory in Tennessee, revealed that water from the high-goiter district well contained 10 to 100 parts per million of both resorcinol, a known goiter-causing chemical, and phthalate esters, a chemical class that can be metabolically broken down into goiter-causing substances. Analyses of the low-goiter district water revealed no resorcinol and only trace quantities of phthalates.

The source of the two chemical contaminants of drinking water is unclear. In the industrial world, phthalate esters are well-known plasticizers — compounds added to products to increase flexibility. But Gaitan told SCIENCE NEWS that the pipelines of the Candelaria water system are not plastic-lined and that the researchers refrained from using plastic containers during analyses; as a result, plastics do not appear to be the origin of the phthalate esters. Gaitan suggests that both the phthalate esters and resorcinol, also an industrial chemical, in the deep (200-foot) wells of the Candelaria water system could be derived from humic materials (organic soil constituents).

To further test his hypothesis, Gaitan plans to continue his Colombia study, pinpointing, for example, the exact quantities of the two chemical contaminants in the drinking water. In addition, along with John Leatherland of the University of Guelph in Ontario, Gaitan plans next month to begin studying the goiter-plagued coho salmon of the Great Lakes. Also, he intends to probe why an Amazon Indian tribe, the Yanomamas, has a very low goiter incidence despite its very low iodine intake. *—L. Garmon*

# Onward into the infrared: IRAS and ISO

The U.S./Dutch/British Infrared Astronomy Satellite (IRAS) was launched barely 11 weeks ago (Jan. 25), and researchers are still calibrating its sensors and refining ways to process its data. Yet even its early performance has produced such a glowing prognosis that the European Space Agency may well have had IRAS in mind last week when it made its choice of the next ESA scientific satellite to be initiated: ISO — the Infrared Space Observatory.

Expected to be launched in the early 1990s, ISO won out in a lengthy selection process that had also included proposals for X-ray and ultraviolet astronomy satellites, another to monitor oscillations of the sun, and a Mars orbiter (SN: 2/5/83, p. 93). "I think probably the success of IRAS had a great deal to do with the decision," says IRAS scientist Douwe Beintema of the University of Groningen in the Netherlands.

Both IRAS and ISO are built around telescopes whose detectors are cryogenically cooled to within a few degrees of absolute zero. This is to keep the heat of the spacecraft and other sources (including the sun and even Jupiter) from masking the faint infrared emissions of targets such as embryonic and dying stars. Their roles, however, are dissimilar.

"I think the big difference is that IRAS is a survey satellite," says Beintema, "while ISO will be used as an observatory." Rather than concentrating on specific targets, IRAS is designed primarily for use by a project team making the first-ever survey of the entire sky at infrared wavelengths, making up for the limited coverage provided by earth-based telescopes, balloons, aircraft and sounding rockets (most of which also suffer from atmospheric distortion). By comparison, ISO is to be a facility open to what ESA says will be "a wide sector of the astronomical community," with their diverse, individual observing plans, many of which may have been inspired by IRAS's survey maps.

Of the three nations collaborating on IRAS, only Britain is making some of the satellite's time available to outside "guest observers," says B. Tom Soifer of California Institute of Technology. "They have solicited proposals from their entire astronomical community for some fraction of [Britain's allotment] of non-survey time," he says. "But the Americans and the Dutch are committing their non-survey time to [IRAS's own] science team." ISO, with no such survey duties consuming most of its time, will be the other observers' chance.

Another difference is ISO's planned operating lifetime — at least a year and a half. IRAS was originally planned to last about 15 months, says Soifer, but developmental problems resulted in its being launched with a predicted life of 243 days, based on the calculated time it would take for all of the satellite's cryogenic coolant (superfluid helium) to boil away. As it is turning out, the present helium leak rate is slower than anticipated, suggesting a lifetime of more like 330 days, a potential bonus for IRAS scientists and ISO's planners alike.

Only a fraction of the existing IRAS data has yet been processed, since researchers at Jet Propulsion Laboratory in Pasadena, Calif., are concentrating on just a portion of the sky while they refine their analysis techniques. But even the limited preliminary looks are promising, revealing previously unknown infrared sources among other highlights. One early finding that pleases the IRAS team is the detection of a characteristic spectral line of sulfur 4, from a planetary nebula known as NGC 6153 in the Milky Way. Though not an unexpected element, it is significant because it helps allay some pre-launch concerns that the satellite's spectrometer might not be able to identify bright, narrow spectral lines against bright continuum emissions from the same sources. Also spotted in the same nebula is a line that appears to be neon 3; if confirmed (a matter of finding it in repeat scans that have not yet been processed), says Soifer, it would be that element's first detection in the infrared. *—J. Eberhart*



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