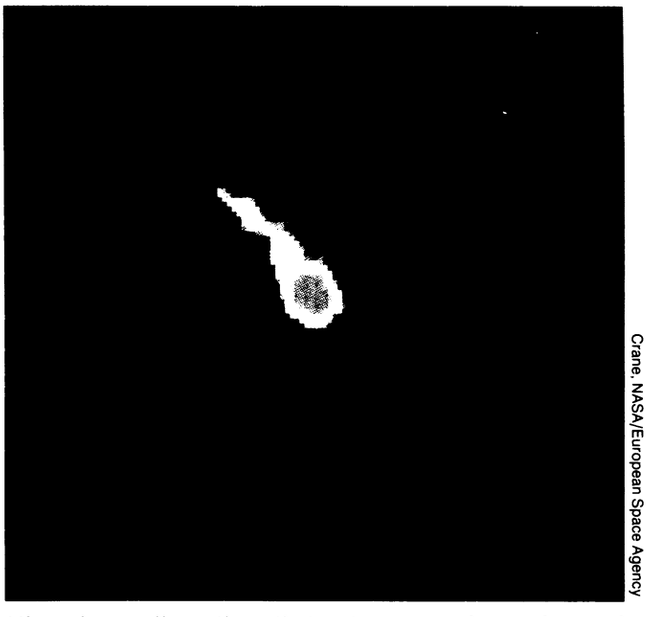
Hubble images reveal unusual galactic jet

Viewed from Earth in visible light, the elliptical galaxy NGC 3862 doesn't look like much. Indeed, its flat emission pattern, apparently devoid of sharp peaks and dips in intensity, once prompted researchers to describe this galaxy as "optically dull."

But orbiting 380 miles above Earth, the Hubble Space Telescope now reveals that the nucleus of NGC 3862 spews out a short jet of radiation, too short to have been detected with ground-based telescopes, in both visible light and the near ultraviolet. Moreover, this jet shines more brightly in the ultraviolet – at the shorter end of the electromagnetic spectrum – than at longer wavelengths, a feature diametrically opposite to the energy output of any other galactic jet yet observed.

"It appears that we are seeing a new type of phenomenon," says Philippe Crane of the European Southern Observatory (ESO) in Garching, Germany.

Researchers believe that a typical jet, possibly powered by a massive black hole or other potent energy source at the center of a galaxy, radiates because of the acceleration of electrons that circle strong galactic magnetic fields. This radiation, known as synchrotron radiation, has a higher intensity at redder, or longer, wavelengths. The well-studied jet in the galaxy M87, for example, fits this model perfectly, says Crane (SN: 1/25/92, p.52).



Ultraviolet image of the galaxy NGC 3862, viewed with Hubble's Faint Object Camera, shows jet (elongated white area) extending from the galaxy's core.

Crane, NASA/European Space Agency

Crane speculates that the unique radiation pattern from NGC 3862, a resident of the Abell cluster of galaxies, could represent a combination of two types of emissions: standard synchrotron radiation as well as radiation, primarily in the ultraviolet, from atoms that surround the jet and are heated by it. If this interpretation proves correct, it would mark the first time that astronomers have observed both types of radiation from a jet.

Crane notes, however, that recent observations with the ESO's New Technology Telescope in La Serena, Chile, found no evidence of atomic emissions. Alternatively, he adds, the jet's output may stem from galactic mechanisms not yet understood. – *R. Cowen*

Perinatal dioxin feminizes male rats

When delivered to pregnant rats, a very low dose of dioxin can not only demasculinize but also feminize the sexual development of male offspring, a trio of new studies shows. The lasting reproductive effects – both behavioral and physiological – occur at doses well below those causing visible toxicity.

Scientists at the University of Wisconsin-Madison had shown that overtly toxic doses of TCDD, the most potent dioxin, can reduce concentrations of androgens – the male sex hormones, such as testosterone – in the blood of adult animals. Because TCDD crosses the placenta, these researchers wondered if dioxin exposures before and immediately after birth might also alter androgen levels and the role of these hormones in a male animal's sexual development.

Thomas A. Mably and his co-workers provided such perinatal exposures with a single oral dose of TCDD to female rats on day 15 of their pregnancy – a time when organ formation in the fetal pups was nearly complete and the males were ready to produce androgens. Though the pups' TCDD exposure undoubtedly began *in utero,* notes Dick Peterson, who led the three Wisconsin studies, earlier data indicate a pregnant animal will eliminate most of the fat-seeking toxicant through breast milk. Peterson therefore believes nursing provided the bulk of the pups' dioxin.

In the May TOXICOLOGY AND APPLIED PHARMACOLOGY, his team reports finding that perinatal exposures to TCDD produced dose-dependent changes in androgens and their reproductive effects "into adulthood."

Compared to male pups whose mothers received no dioxin, TCDD-exposed pups developed smaller accessory sex organs (such as the ventral prostate), appeared to mature sexually more slowly, exhibited distinctly feminine-style regulation of one hormone related to testosterone production and expressed a greater willingness to assume a receptive-female posture when approached by a sexually stimulated male. Even the lowest dose of TCDD delivered – 0.064 microgram per kilogram of the mother's body weight, a level well below what the researchers had expected would produce any quantifiable effects – yielded consistent reductions in a male offspring's daily sperm production and sperm reserves.

Other recent studies suggest that TCDD may act as an "environmental hormone" (SN: 1/11/92, p.24). It now appears that the developing male reproductive system is more sensitive to the effects of this hormone-like toxicant than any other organ or organ system studied, the Wisconsin scientists write.

Though these changes did not affect the rats' fertility, Peterson notes, "that does not mean these findings do not have human health implications."

Male rats normally inseminate a female with up to 10 times as many sperm as are typically needed to ensure impregnation. Humans, by contrast, typically release only about as many sperm as would be required for fertilization. "As a result," Peterson and his coworkers write, human reductions in sperm production "similar in magnitude to that in rats would be expected to reduce fertility in man."

"Highly significant" is how Linda S. Birnbaum characterizes the findings. Director of environmental toxicology at EPA's health effects lab in Research Triangle Park, N.C., she was impressed by the subtle, permanent reproductive-system changes from very low-level TCDD exposures and by the "failure [of the team] to find a no-effects level."

"The real question is how general these effects are," Birnbaum says.

Her lab will repeat the studies with another strain of rats – and, eventually, other species. Unlike Peterson's group, EPA's experiments will also look at females, she said, "because there may be effects on them as well."

And if this effect holds in another species? "I would get very concerned [about the potential human-health implications]," Birnbaum says. – *J. Raloff*