Astronomy

Ron Cowen reports from Tucson at a meeting of the American Astronomical Society

Hubble eyes the Cartwheel

Millions of years ago, a small, energetic galaxy plowed through the core of a large, quiescent one. Luckily for astronomers, this changed the dormant galaxy in dramatic fashion.

Like a pebble cast into a pond, the tiny intruder generated a ripple of energy that expanded outward from the center of the big galaxy. Traveling at about 320,000 kilometers per hour, the wave compressed gas and dust in front of it and ignited rings of star birth in its wake. This process has so far lasted for some 200 million years. At the forefront of the wave lies the bluest, newest batch of stars; closer to the core reside redder, older stars.

That's how astronomers believe the Cartwheel, a striking, ring-shaped galaxy complete with spokes and a brilliant, bullseye core, got its shape (SN: 4/18/92, p.248). Images recently taken by the Hubble Space Telescope depict with unprecedented clarity the Cartwheel's highly organized structure. The pictures also provide new clues to what the Cartwheel, located 500 million light-years from Earth, may have looked like before the fateful collision.

Hubble's pictures reveal hundreds of bright blue knots — individual clusters of newborn stars — that the expanding wave generated. Huge loops and bubbles indicate where massive stars, also formed in the aftermath of the collision, exploded as supernovas, hurling their contents into space. In addition, the images show in new detail the galaxy's true colors — its red center and blue outskirts — notes Kirk D. Borne of the Space Telescope Science Institute in Baltimore.

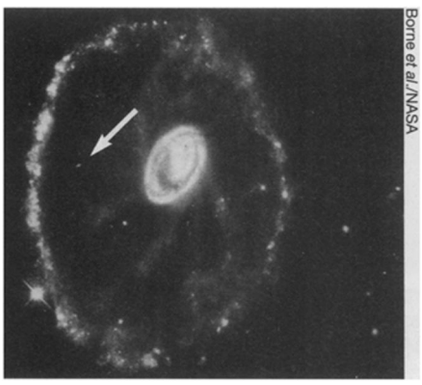
"This is a chronometer on the galactic scale," he says. "We see old and new stars separated in space."

Borne and his collaborators note that the galaxy's interior contains so little dust that Hubble's wide-field and planetary camera saw right through it, imaging a more distant galaxy that lies directly behind the Cartwheel.

This lack of dust suggests that before the collision, the Cartwheel was merely an immense cloud of hydrogen gas or a galaxy with a very low density of stars. If so, the collision awoke a sleeping giant, setting the Cartwheel ablaze with stars millions of years before the galaxy would otherwise have created them. "We see no evidence for a pristine population of stars underlying the pattern [of those generated by the interloper]," says Borne.

Although scientists had hoped the Hubble images might unveil the identity of the intruding galaxy, the pictures haven't narrowed the list of suspects. The lower of the two small galaxies to the right of the Cartwheel appears distorted and recently experienced a burst of star formation, features that make it a likely candidate. On the other hand, the top galaxy contains little gas, so the missing material may have been stripped as this galaxy passed through the Cartwheel.

A third galaxy, not shown in the accompanying image, also remains a suspect.



Borne et al./NASA

Hubble image of the Cartwheel galaxy, along with two smaller, neighboring galaxies. One of these neighbors may have careered through the core of the Cartwheel a few hundred million years ago, creating the galaxy's distinctive structure. Arrow indicates background galaxy seen through the Cartwheel's dustfree interior.

Behavior

Homosexual parents: All in the family

An increasing number of homosexual men and women in the United States raise children, whether as a result of artificial insemination, adoption, or winning custody of youngsters conceived during previous heterosexual relationships. Considerable social and legal controversy surrounds this trend, much of it focused on whether homosexual parents can raise well-adjusted children.

Three new studies, published in the January DEVELOPMENTAL PSYCHOLOGY, suggest that neither the absence of a father nor the presence of homosexual parents interferes with a child's emotional development. Moreover, a large majority of the sons of men who now classify themselves as homosexual are themselves heterosexual, contrary to popular notions that homosexual parents groom their offspring for a corresponding sexual orientation.

The latter finding comes from a study of 55 homosexual or bisexual men who reported the sexual orientation of their 82 sons age 17 or older. J. Michael Bailey, a psychologist at Northwestern University in Evanston, Ill., and his coworkers recruited the fathers through ads in homosexual publications and also contacted 43 of their sons. The sons' self-ratings of sexual orientation nearly always agreed with their fathers' ratings of them, so Bailey's group included in its analysis all of the fathers' ratings (except for those of seven men who were uncertain of their sons' sexual orientation).

Of the 75 sons included in the analysis, 7 (9 percent) were homosexual or bisexual. This proportion exceeds the 2 percent to 5 percent rate of homosexuality thought to occur in Western societies, but it falls far below levels of homosexuality found in male identical and fraternal twins (SN: 1/4/92, p.6). An inherited influence on sexual orientation may slightly boost the incidence of homosexuality in sons of homosexuals, the researchers propose.

Homosexual sons had not lived longer with their fathers than had heterosexual sons. Thus, imitation of homosexual fathers or parental encouragement to try homosexuality apparently played no role in sons' sexual orientation, the scientists hold.

The second study, directed by psychologist David K. Flaks of St. Francis Medical Center in Trenton, N.J., found healthy and largely equivalent emotional and behavioral adjustment in 3- to 9-year-old children of 15 lesbian couples and 15 heterosexual couples. Both groups of parents reported largely satisfying relationships and substantial knowledge of effective parenting skills. Lesbian couples were located through a lesbian-mother support group and, like the heterosexual couples, consisted mainly of two wage earners.

The third investigation involves 26 lesbian couples with 4- to 9-year-old children conceived through artificial insemination. Psychologist Charlotte J. Patterson of the University of Virginia in Charlottesville reports that the women display a high degree of satisfaction with their relationships, based greatly on an equal division of household tasks and responsibility for family decisions. Still, the biological mothers spent more time at home and fewer hours at paid employment than their partners.

Patterson also notes that children of these lesbian couples show good psychological health, compared to same-age children in 11 heterosexual couples with similar backgrounds and incomes.

"Studies to date show few differences among children of lesbian, gay, and heterosexual couples," writes Diana Baumrind, a psychologist at the University of California, Berkeley, in an accompanying comment. However, the data remain limited, since investigations focus on small numbers of couples who have not been selected at random and who have not been interviewed extensively or observed interacting with their children, Baumrind cautions.