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A review of: The alchemy of the heavens Searching for meaning in the milky way By Ken Crowell **Illustrated. 340 pp. New York: Anchor Books/Doubleday. 1995. \$24.95. ISBN 0-385-47213-7**

V. Surdin

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Book Review

THE ALCHEMY OF THE HEAVENS Searching for Meaning in the Milky Way

By Ken Crowell

Illustrated. 340 pp. New York: Anchor Books/Doubleday. 1995.
\$24.95. ISBN 0-385-47213-7

(Received November 25, 1996)

The author of the book, Ken Crowell, is a former professional astronomer: he wrote his Ph. D. (from Harvard) on the thick disc of the Galaxy. Recently, he has become a very active freelance science writer: he has written for a number of popular magazines, including *Astronomy*, *New Scientist* and *Sky Telescope*. He also writes for the “Star Date” radio programme, which is aired on two hundred radio stations nationwide USA. In addition he writes for amateur astronomers, for teachers, and for students.

What about *The Alchemy of the Heavens*? Let us to look over its Contents: Welcome to the Milky Way; River of Stars; Big Galaxy, Big Universe; Giving the Galaxy a Spin; Citizens of the Galaxy; The Demographics of the Milky Way; A Spiral Galaxy; Galaxy in Chaos; The Thick Disk; Shifts in the Galactic Wind; The Galactic Metropolis; Fossils of Creation; Older Than the Universe? An Intelligent Galaxy. You may be surprised why are there so many “Galaxies”? I guess we can find the answer in the Introduction, which is called *A New Galaxy*. It is about the recently discovered satellite-galaxy *Sextans*. Do you remember, just after the *Voyager* flybys near the giant planets, the book *The New Solar System* was published? The title of Crowell’s book should be *The New Galaxy*. That is why there are so many “Galaxies”.

Dr. Crowell discovered some interesting analogies: Density promotes nuclear reactions, because the greater the density, the more frequently nuclei collide – just as busy streets have more traffic accidents than quiet ones. And: “When a large mass, such as a satellite galaxy, moves through a sea of smaller objects, it is slowed down by their gravity, just as celebrities are slowed down when they walk through a throng of fans”. These analogies are not absolutely physically correct but very clear and obvious.

As Owen Gingerich noted in his review of this book which was published in *The New York Times Book Review*: “Mr. Crowell has a wonderful knack for the

apt analogy". Indeed, Dr. Croswell reminded us that some scientific ideas are close to musical ideas. Describing how our Galaxy may have been formed by the amalgamation of dozens of small galaxies smashing together, he notes: "If this theory was right, the Galaxy's origin had not the grandeur of a classical symphony but the reckless fury of a rock concert". He echoes Sir Arthur Eddington, the author of *The Internal Constitution of the Stars*, who in 1927 wrote: "I am afraid the knockabout comedy of modern atomic physics is not very tender towards our esthetic ideals. The stately drama of stellar evolution turns out to be more like the hair-breadth escapades on the films. The music of the spheres has almost a suggestion of - jazz".

It is a pity that not all the author's analogies are absolutely irreproachable. Trying to make the analogies clearer, Dr. Croswell occasionally loses some physical truth: "... billions of stars superimpose themselves on one another like the leaves of trees tangled together in a huge tropical forest".

Let me note a few useful features of the book. First of all, it has a huge and comprehensive *Bibliography* which will be especially useful for students. The big and detailed *Glossary* may be useful not only by general readers, but also by educators and journalists. There are dozens of black-and-white classical photos of our Galaxy and neighbouring galaxies in the book. I am sure the reader will understand that this short gallery of pictures is only the prelude to the magnificent collection of colourful sky photos obtained by modern astronomy.

When I asked myself who is the potential reader of this particular book, I could not answer this question, because it is an unusual book: not a monograph, not a textbook, not a popular sketch of "scientific frontiers". Perhaps it is a saga about lively science, about developing astronomy, and about the real scientific community. This side of scientific life is almost hidden from us professional astronomers. As a rule, we know only the scientific results of our colleagues, but we do not know how the problems were settled. Therefore the science described in this book is "science with a human face".

The Alchemy of the Heavens aims to be a book for the general reader. "Although other books describe how astronomers early in the twentieth century deduced the basic features of our Galaxy", author says "*The Alchemy of the Heavens* also provides a close look at the equally exciting developments that have occurred since 1950. Moreover, the astronomers who made these recent discoveries here provide revealing behind-the-scenes accounts of how the discoveries were made, how well or poorly other scientists received them, and how one finding provoked the next. In this way the story of our Galaxy is much more than just one of science; it is also a deeply human story, full of colorful and controversial characters who sometimes struggled as much with one another as they did with nature".

I was wrong in my preliminary statement: "he writes for amateur astronomers, for teachers, and for students". Dr. Croswell wrote this book for everyone, even for professionals. I like this book. And not only me: *The Alchemy of the Heavens* was a finalist in the *Los Angeles Times Book Prizes 1995*. It is a great achievement.

V. Surdin