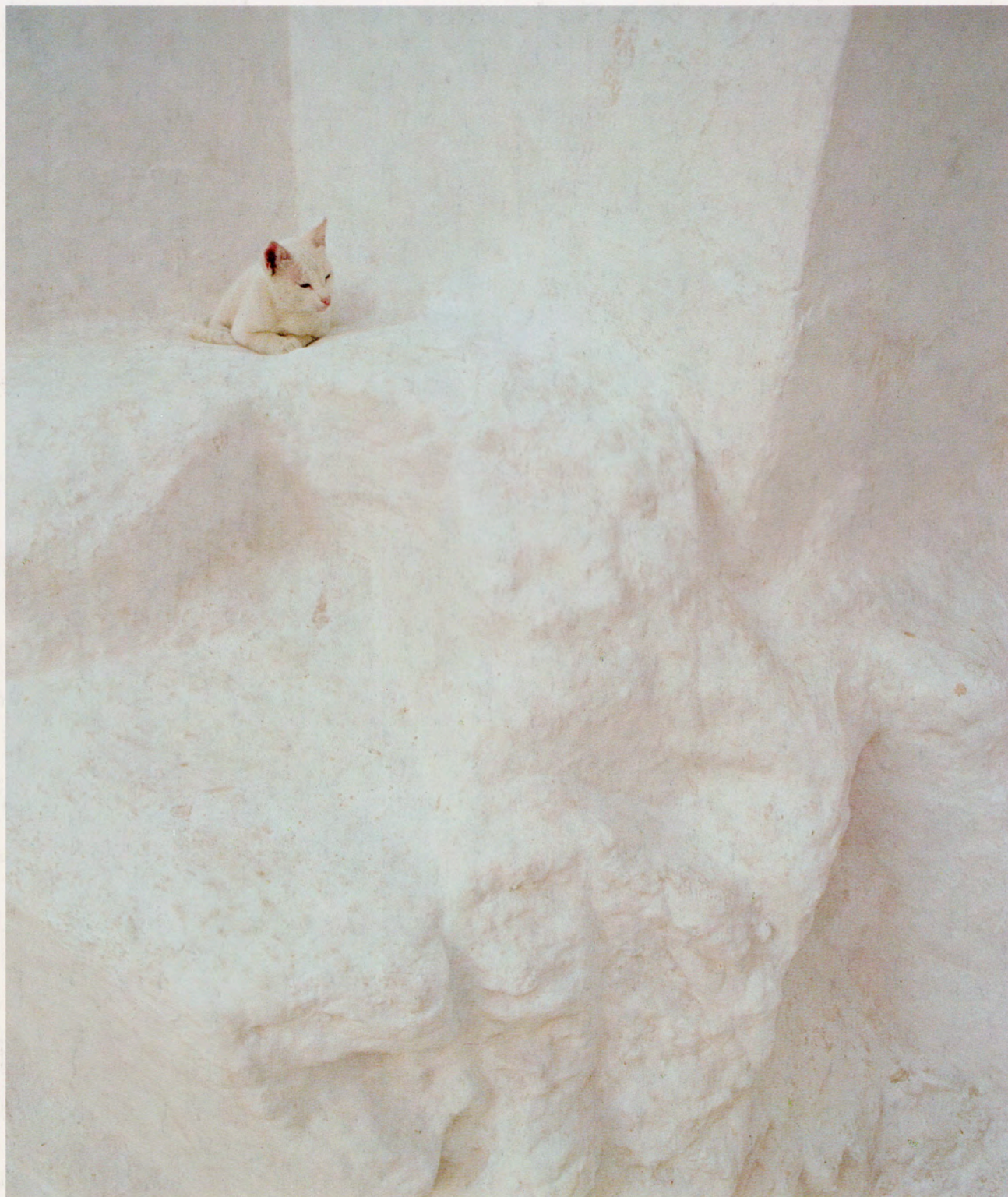


COMMUNICATION ARTS

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Cover photograph by Corson Hirschfeld

FREDRIC HARWIN

Like an Oreo cookie, Fredric Harwin is a multilayered thing. Highly trained in both art and science, he is an intriguing blend of two seemingly disparate worlds.

Harwin, 39, is a Portland, Oregon medical illustrator and ophthalmologist who knows the inside of the human body—particularly its cardiovascular system—as intimately as do most physicians. Certainly he has spent as much time as many of them directly observing heart surgery and communicating with surgeons on operating procedures and techniques. But he wields his particular talents not to save lives, but to instruct those in the medical profession who do.

His only use of the scalpel is to fashion friskets for his Paasche A-B airbrush—except that he employs clear .003 acetate rather than frisket paper, which he sculpts delicately with a number 11 scalpel blade for his fine detail work.

To Fred Harwin, beauty is much more than skin-deep. His esthetic appreciation of the human body beneath its protective epidermis exceeds that of most MDs. He regards this mysterious anatomical domain, charted usually only by surgeons, as starkly beautiful.

“People ask me how I can go into operating rooms and look at those guts,” he says. “I’m not looking at guts, I reply, but at the most vivid juxtaposition of textures and hues. Artistically it’s exciting and stimulating. The body is fantastic with its subtle layers of moving, shimmering color relationships.”

Harwin is a member of that select, and purposely small, body of graphic communicators whose training and proficiency in art must at least be equaled by a sweeping knowledge of the biological sciences. “We’re as much scientists as artists, in background,” he says. “Our college education is a mix of art, pre-med biology and humanities. In fact, most accredited medical illustration schools—there are only seven in the world, six of them in the U.S., one in Canada—require almost a pre-med background for admittance. All offer a two- to three-year graduate program.”

The University of Michigan, from which Harwin earned a master of science degree in medical and biological illustration in 1967, receives some 2,000 inquiries annually, he says. Yearly applications average 400, yet only three or four can be accepted. It is the same with the six other schools, all of them affiliated with medical universities. The schools are intentionally few in number and each accepts only three to six students a year, claims the Association of Medical Illustrators, to maintain a balance with the existing job market.

There are currently some 500 practicing medical illustrators in the world, according to the AMI, all but perhaps 50 of them in this country.

Harwin went on to serve two years as director of medical illustration at Wayne County General Hospital, a teaching affiliate of the University of Michigan Medical Center, before joining the Oregon Health Sciences University in Portland as assistant professor and director of medical graphics in 1969. For the past two years he has been director of ocular prosthetics at Good Samaritan Hospital’s Devers Memorial Eye Clinic. Shortly after assuming that post he also accepted the consultantship position of illustration managing editor for Springer-Verlag, a leading international scientific, technical and medical publishing firm based in New York, Heidelberg and Berlin.

He is mainly excited right now about the recently published Volumes I and II of the *Manual of Cardiac Surgery*. Both are magnificent, full-color primers of instructional illustrations and text depicting cardiac operating procedures from the surgeon’s perspective. Listed on the manuals’ covers in unprecedented fashion as co-author with cardiac surgeons Bradley J. Harland and Albert Starr, Harwin labored 3½ years on some 310 color illustrations.

In a review of Volume I by the doggedly critical *New England Journal of Medicine*, this praise was accorded Harwin: “The book is blessed with a medical illustrator who is not content with the watchful passivity of a photographer. He obviously shares with his surgical co-authors the ‘continuing ability to create and accommodate.’ ”

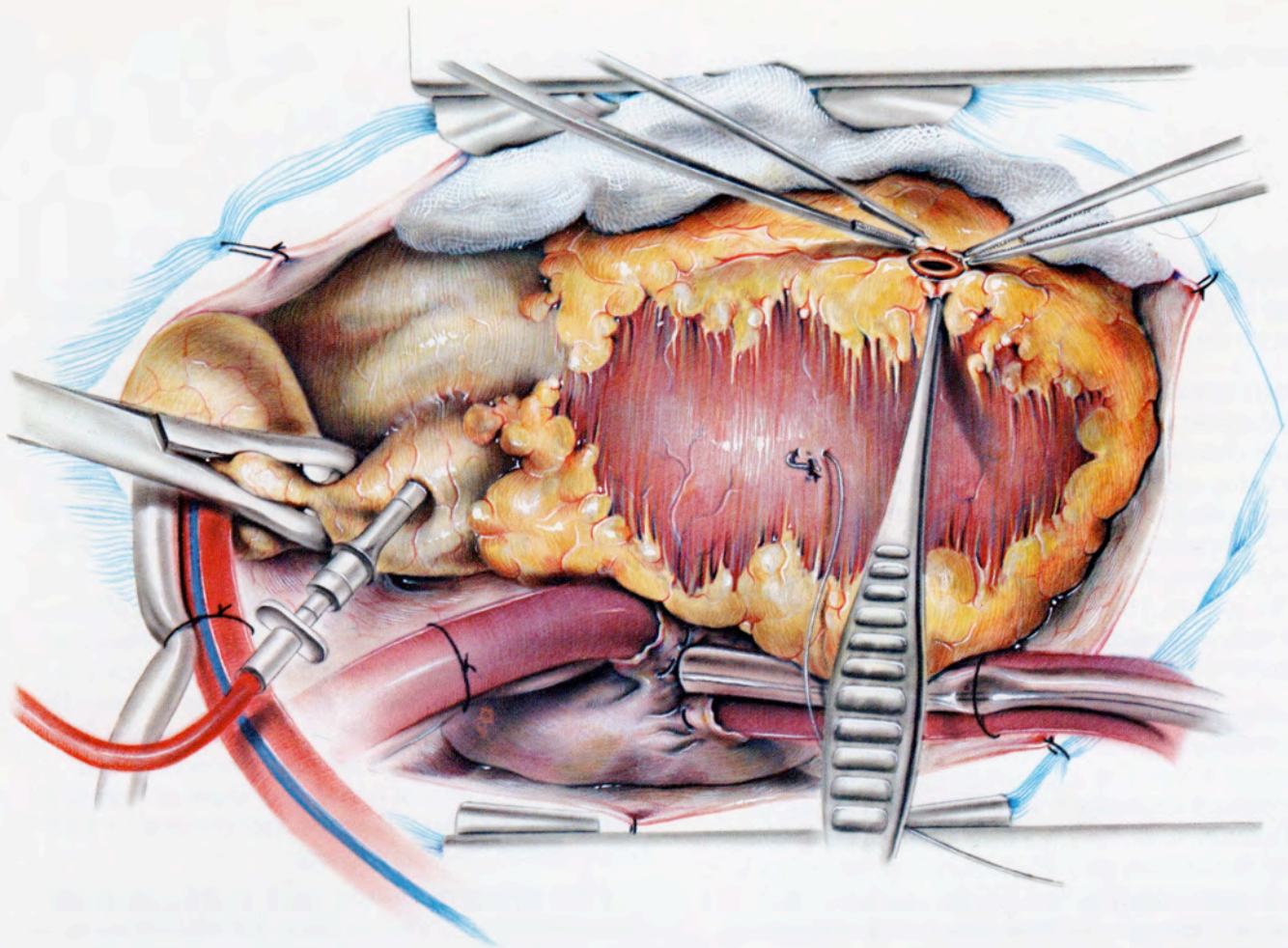
In the first volume’s preface, the Portland artist explains his attempt to wed surgical science with visual communication: “. . . it was necessary to develop an illustrative technique that would allow the audience to visualize accurately the surgical field, where observation is limited and orientation difficult, to represent it as the surgeon sees it, and to understand the anatomy, which is not always visible.

“In part, this was accomplished by painting on both surfaces of transparent paper to create the illusion of looking through superficial layers to the deeper structures. A combination of color media, including colored pencil, graphite, carbon, pastels, and transparent and opaque watercolors, enabled me to convey the field with minimal loss of reality or dimension.”

Thumbing through Volume I of the *Manual of Cardiac Surgery*, Harwin pauses at a stunning illustration identified as “Distal Left Anterior Descending Artery Anastomosis.”

Illustration of coronary artery surgery (bypass).

Spread from Volume 1, Manual of Cardiac Surgery.



Surgical Technique

Subclavian Artery Patch Angioplasty

A left posterolateral thoracotomy is made through the third or fourth interspace. The pleura is incised over the aorta, and the incision carried up the subclavian artery. Retraction of the medial pleural flap carries the vagus and recurrent laryngeal nerve medially. The ductus, distal aorta, area of coarctation, left subclavian artery, and arch up to the left carotid artery are dissected (Fig. 12-2). A heavy silk tie is passed around the ductus. The branches of the subclavian artery are tied, with tying of the vertebral artery to prevent subsequent development of a subclavian steal syndrome. The ductus is ligated. A vascular clamp is placed across the aortic arch between the left carotid artery and the left subclavian artery. Another clamp is placed distal to the coarctation. Heparin is not used. The distal subclavian artery is ligated and divided. A lateral incision is made in the aorta below the coarctation (Fig. 12-3) and carried through the area of coarctation into the subclavian artery (Figs. 12-4, 12-5). If present, any marked internal ridge of coarctation is excised. A suture is placed through the end of the subclavian artery and the distal portion of the aortic incision in order to align the



Figure 12-2

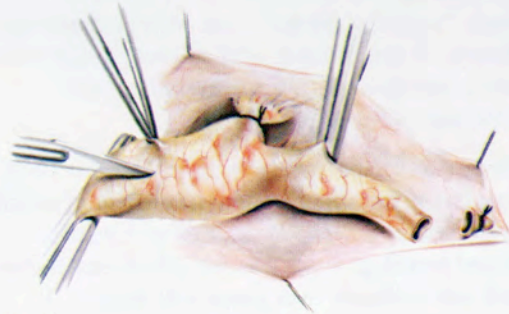


Figure 12-3



Figure 12-4

He pauses to admire it like an old friend. "For this project I created my base colors—my palette, one for the atrium, another for the ventricle, another for the aorta, etc.

"If I wanted purple I would combine a red and a blue, not mixing them but applying the red first, then the blue, producing an undulating effect and achieving the illusion of realism in the manner the light is reflected from the tissues. I also used pastel in conjunction with the airbrush, which rendered another subtle effect. My method was to apply the pastel dust onto a textured surface with long-handled, red sable, flat brushes. This bestowed a general tone and comprises a technique called 'carbon dust' employed by medical illustrators."

He digresses momentarily: "There are two basic schools of monochromatic medical illustration. One utilizes a wash technique, of which Tom Jones of the University of Illinois Medical School in Chicago is acknowledged to be the 'father.' The other school employs the carbon dust technique that Max Brödel from John Hopkins refined. My primary instructor at the University of Michigan was from John Hopkins, so I belong to the latter school which emphasizes the dry carbon dust method."

Harwin describes the subtleties of employing both sides of transparent material as surfaces for his art. "In illustrating both volumes, I used double-sided frosted mylar exclusively," he reveals, "working the back side with general tones applied by airbrush, in conjunction with colored, graphite and carbon pencil, pastel, and transparent and opaque watercolor on the near side.

"I found that placing colored pencil over airbrush wasn't too desirable in some cases, but that airbrush over colored pencil worked well. It depended on exactly what effect I wanted. Pastel over colored pencil gave me another effect, pastel over airbrush another, and airbrush over pastel still another. I worked back and forth, creating the desired color sensitivity. Some illustration ultimately incorporated four separate depths—applied to both surfaces as if each were the primary surface. A challenging aspect involved applying the reversed images to the far surfaces.

"I believe to truly understand media, one has to take it to the point of overworking. Then we can use media knowledgeably. Otherwise, the tendency is for the media to control the user."

Asked to define himself, Harwin draws a long breath, then: "I consider myself, above all, a visual communicator—a teacher and problem-solver—who just happens to draw, as well. The Springer-Verlag manuals represent a breakthrough because until now there's been a gap in utilizing color in medical communications print.

"We haven't used color merely for color's sake in these books, but as a teaching element—to elucidate and articulate information that black and white simply cannot, that just tone, carbon dust or wash cannot. So we're talking about color as a diagnostic tool.

"Until now the convention has been arteries are red, veins blue, lymphatics green, nerves yellow and muscles reddish brown. This may be fine in teaching anatomy, but for conveying surgical methods, color can and should be used as a vital communications device.

"My task is to portray what the *surgeon* sees," he stresses. "Visually, I have to differentiate between the subtleties of a vein and artery; how an artery, for instance, having a thicker wall, is more vascular and regular in diameter. Here, color is concisely informative. Tissue changes color for a reason—how much of it is ischemic or infarcted? Is it pathologically thickened tissue? How much of it has to be removed? What disease is present and what stage is it in? All this can be shown graphically.

"I not only have to make decisions as an artist concerning choices of media, amount of detail, format restrictions, etc., I also must make choices as they relate to the physician—because *I'm* illustrating, not him. How does the tissue respond to manipulation? How big of a surgical bite to take? How to accurately show the pouching or bellowing around the sutures of a vein-graft on the aorta in bypass surgery to facilitate blood-flow? . . ."

He pauses, grinning sheepishly. "You literally have to shut me up. I love to talk about my work."

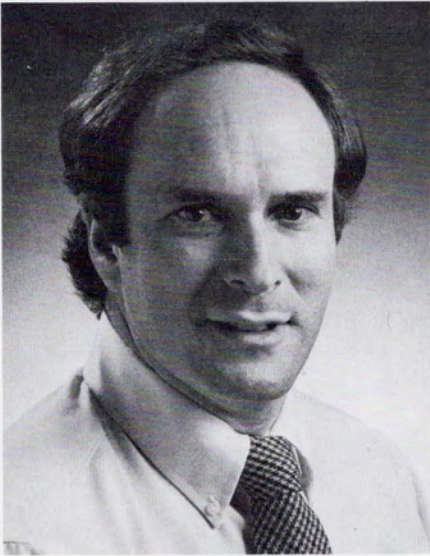
Harwin's articulate enthusiasm is warranted. Even in a rare field, he is a rarity, vigorously expanding the traditional scope of the visual communicator's contribution to the arts of medicine and surgery.

Part physician, part artist, his preference lies solidly in the latter role.

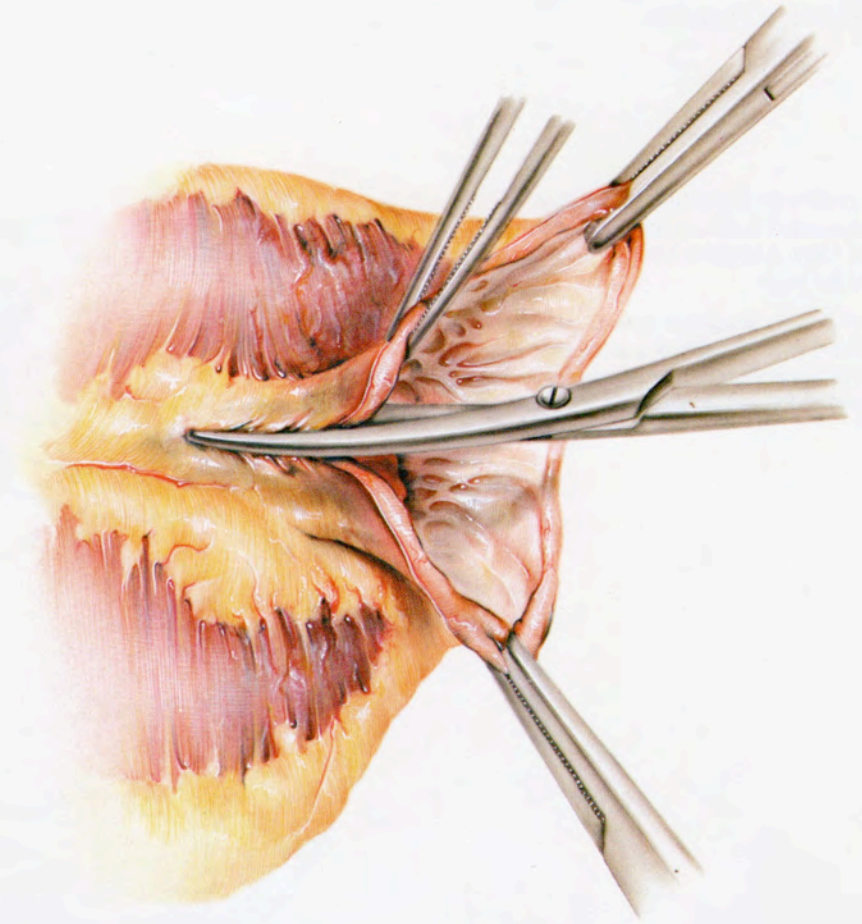
"Residents about to enter the operating room have kiddingly said, 'Come on, Fred, you assist on this one.' " Harwin's easy grin comes again.

"My answer has always been, 'You guys stick to the cutting and sewing. I like the pencils and brushes.' "

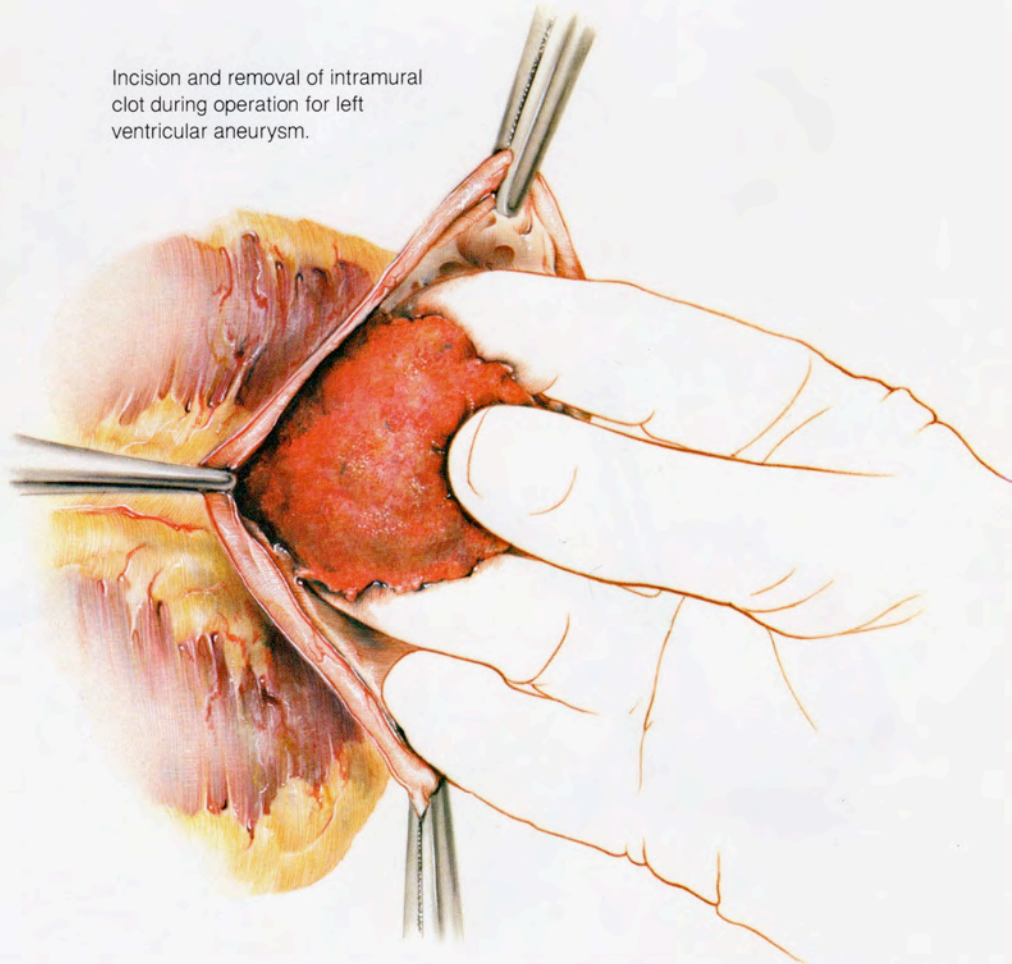
—Lionel L. Fisher



Photograph by Wes Guderian

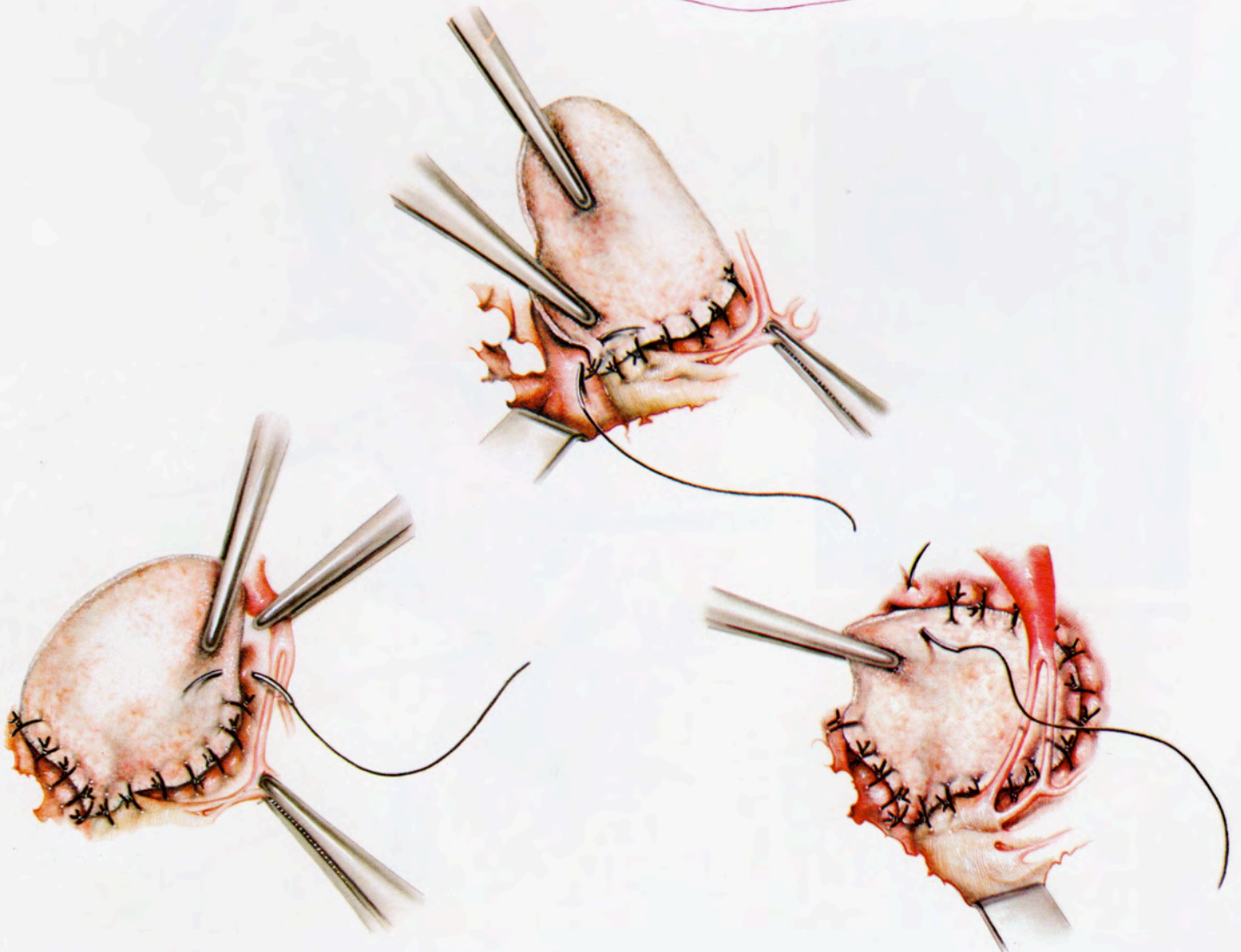
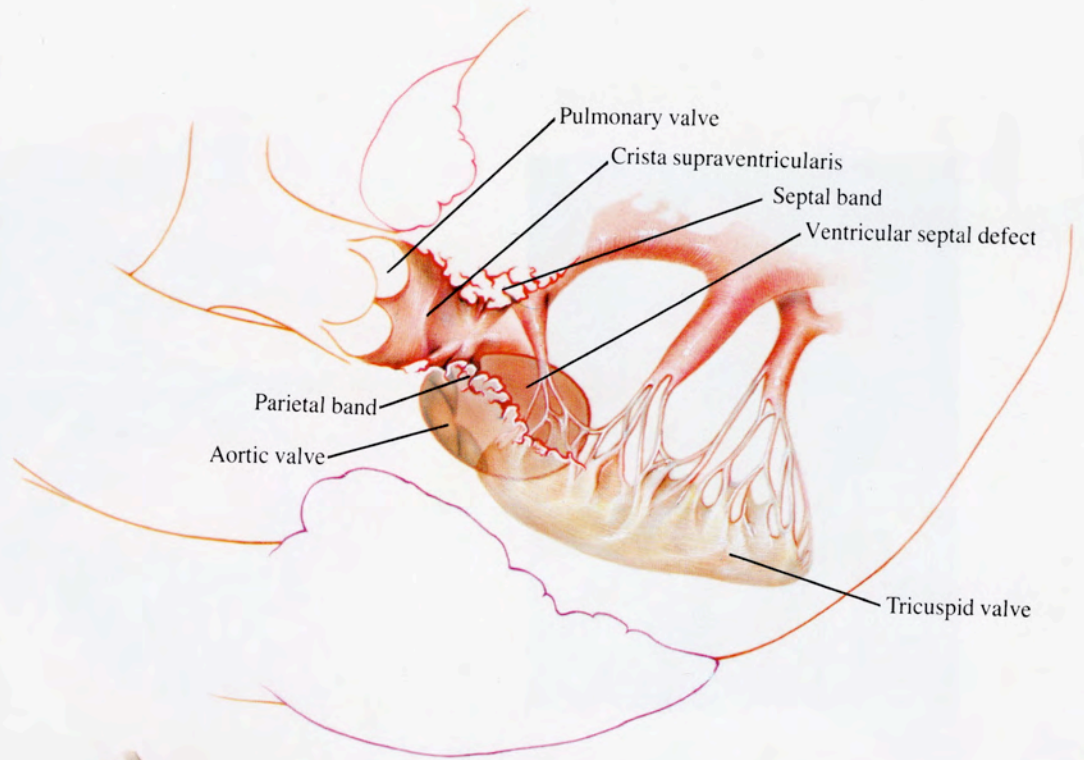


Incision and removal of intramural clot during operation for left ventricular aneurysm.



Location of ventricular septal defect in a patient suffering from tetralogy of Fallot, a congenital abnormality of the heart.

Three from a series of illustrations showing the suturing of a patch of Teflon or knitted Dacron double-velour closing the ventricular septal defect.



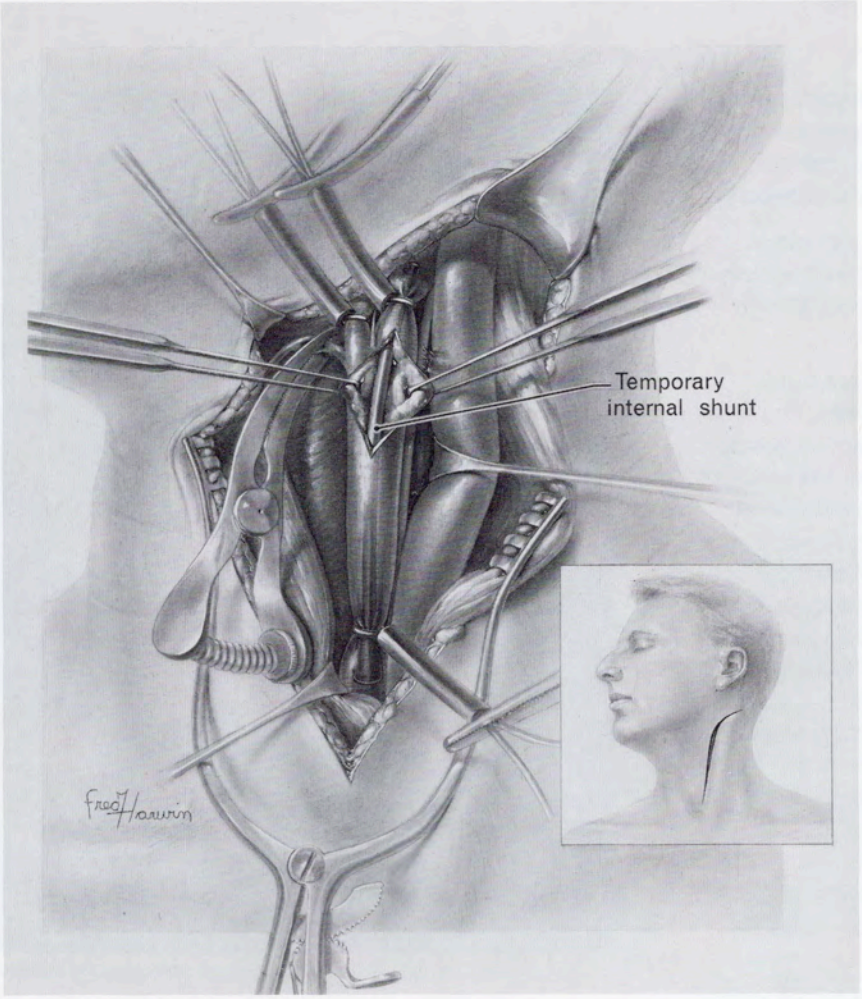


Illustration of a temporary internal shunt rendered in a dry carbon dust technique.

Painting of a honey bee.

Two examples of ocular prostheses. Harwin paints these from life, meeting with his patients for several sessions totaling about eight hours. A mark is necessary to indicate the top of the prosthesis so Harwin adopted a policy of creating an individualized, private mark for each patient.

