

Since the Renaissance, the autopsy has been an important learning tool in the training of student doctors. Autopsies are now common events in teaching hospitals such as Stanford, but they still evoke in each student the ancient struggle between intellect and emotion.

# HEART OF THE MATTER

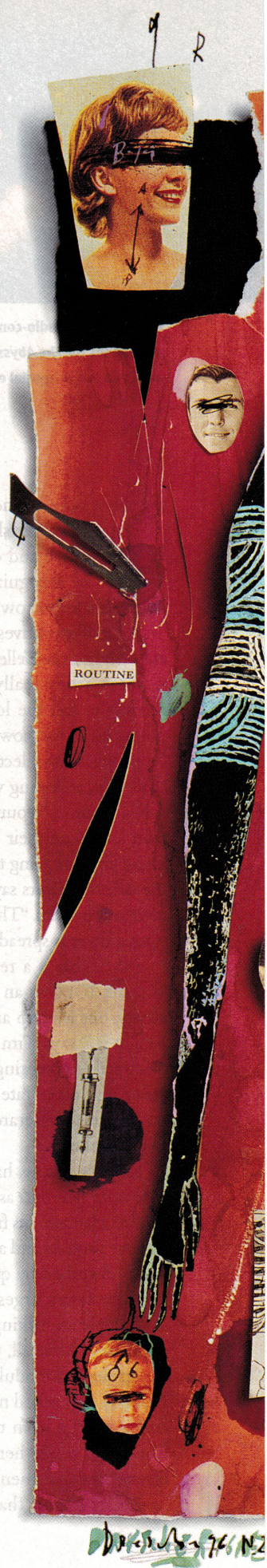
FOR A HECTIC HOUR THIS MORNING, I HUNT through the hearts of six dead babies. Pulling, pushing, poking. I am a pre-clinical medical student reviewing for my exam in pathology, and these dead baby hearts are but a few of the many specimens awaiting my analysis. I must study for this exam, not just in the library, but I must also prepare for it in the laboratory.

I unlock the closet doors in the pathology room and search through the many stacks of plastic bins. They are piled high, wedged from floor to shelf, shelf to shelf, and even shelf to ceiling. Each bin holds many plastic bags, and each bag seals a different piece of flesh. I glove my hands and reach forward to collect six of these bags for my morning review. The baby hearts rest in perfect stillness, and will remain so forever, floating in amnions of alcohol. I place the first bag on my tray and cut across the seal with my scissors. There is no "mucous plug," no "quick contraction," but the contents still emerge as slippery and sloppily as they once did before. I cradle the silent organ in my hands and tuck it gently into my tray.

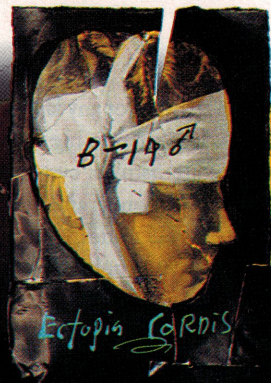
Perhaps it is the fumes, perhaps not, but as I hunch over this specimen to begin my investigation, I discover tears—my tears—dropping down onto the tray. The tray holds only a small gray tattered ball of muscle, detached and deflated, but this dead organ once dwelled within a living child. And so I find myself crying—for this single broken heart, for the six broken hearts I will study this morning. But most of all I cry for those

BY ADAM STRASSBERG

Illustrations by HENRIK DRESCHER



H E A R T



H E A D



Aorta

Anoxia

Diaphragm

cardiac

Defect

fibrina

↓  
coron

Coag

Hypox

muscle

Serosa

the top

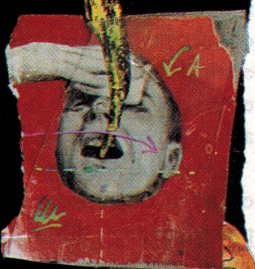
Therax

Neoplasm

Ar



DIAGNOSIS



other broken hearts still beating, the ones beating within the mothers and fathers of these dead babies.

What would it have been like to comfort the hopeless parents of these dead babies? The title "Doctor" is so near for me, and yet it seems so far away. For now, I confront only the scattered remains of such bitter battles. I am still a "pre"-clinical medical student, but within the year I, too, will walk hospital halls, wear white robes and bear the Staff of Aesculapius. This simple emblem, a single staff surrounded by a single snake, is an ancient symbol for our physicians' guild, and an even older symbol of the healing spirit. The Staff of Aesculapius embodies the "dragon" of our intellect coiled about the "scepter" of our medical knowledge. And thus, before we students can wield this holy staff, we must first be taught to summon the charmed serpent that surrounds it. For it is this beast, the "dragon" of our intellects, that can safely swoop down upon the medical battlefield, grasp the casualties of war and fly away with their remains, far above the clouds of our emotion. There, the carrion can be devoured impassionately, in a studious feast of investigation and understanding.

I summon this beast as I face the six dead baby hearts before me. The muscles of my nose tighten against an acrid mist above my specimen tray but the vapor still manages to pierce deep into my lungs. My crying subsides in a fit of coughing, which ends in a moment of silence. I close my eyes to cast the spell of summoning. My dragon stirs.

I look toward the baby heart displayed upon my tray, but now I see it through my serpent's eyes. It has become so much more than a baby's heart, and so much less. The organ appears to me now as a defective four-chambered fluid-filled pump, built from contractile electric muscular tissue attached along a framework of fibrous cartilage. Two symmetrical tubes once encircled a laminated disk of embryonic cells, each tube then enlarged, and their centers fused. At 21 days past conception, this fused muscular center began to contract rhythmically. About a month more of growth—dilation, rotation, constriction, expansion—and this contracting tube became a pulsating pump.

But it took many steps to cross this delicate bridge from contracting tube to pulsating pump, and many more to complete the

this dragon to hunt for any lairs of knowledge hidden within these catacombs. It returns to me with a treasure of cardiac abnormalities. There are fistulae, cysts and diverticulae—"secret passageways," "locked rooms" and "blind alleys"; stenoses, atresiae and neoplasms—"rock slides," "cave-ins" and "boulders"; and hypertrophies and hypotrophies—heart walls both "thick" and "thin." Many cardiac malformations staunch the flow of blood, others obstruct it, some divert it, a few even increase it. But most of these changes produce some sorts of errors, and all of these errors are invariably malignant. Some end the life of the fetus instantly, others curse the child with a slow but certain death.

The more horrible defects appear in patterns, and these patterns combine into syndromes: atrial septal defects, ventricular septal defects, hypertrophic cardiomyopathy, tetralogy of Fallot, coarctation of the aorta. Monstrous words for wordless monstrosities.

**B**UT I PURSUE EACH SUCH BEAST ALONG ITS path of wanton destruction. With my metal probes, I track these defects down into dried tunnels of blood and pursue them deep into empty caverns of muscle. From my textbooks and notes, I learn their signs and symptoms, their prevalence and virulence, their accessibility to medical intervention and their vulnerability to surgical attack. Finally, at the end of the hour, my morning review completed, I return the baby hearts to their plastic wombs. I fill each bag with a pint of formalin and seal the openings beneath a heated metal press. I remove my gloves and scrub my hands. I write a few final lines in my notebook, then slide it into my backpack and hurry down the hallway toward my next appointment. Sixty minutes down, 60 minutes to go.

As part of our course in pathology, each medical student has the opportunity to observe and assist in an actual human autopsy. But while death is a very reliable phenomenon, it is also very unscheduled. So if students wish to watch an autopsy, they must circle the department office like vultures. Earlier this morning, on my way to the pathology laboratory, I checked in with the course secretary once again. This time I was in luck. An autopsy was scheduled for this morning, and the resident agreed to let me attend.

And so I now rush down the hallway and veer into a side passage, which brings me directly to the main entrance of our autopsy laboratory. A red light blinks rhythmically above the door, and the resident motions for me to enter. The door opens into an anteroom of gowns, gloves, masks and sinks. I am instructed to disrobe and wash, and I soon stand in blue hospital scrubs beneath a white surgical apron. A cap covers my hair, my hands are gloved, goggles guard my eyes, and a mask shields my nose and mouth.

Properly clothed and cleansed, I am invited into the chamber of the newly deceased. Two large metal tables lie perpendicular to one another. Each holds a highly specialized metal tub, with low sides, a single faucet, a sloping base and a large pitted drain.

**Most of all I cry for those other  
broken hearts, the ones beating within the mothers  
and fathers of these dead babies.**

final passage from pulsating pump to beating heart. Even just one single misstep can be catastrophic for these young patients and devastating to their families, yet to the medical student, this error can offer precious gems of insight. The study of such errors not only helps in their correction and prevention, but also aids in a more general understanding of the healthy human heart.

Over the next 60 minutes, with probe in hand, I explore the errors in these defective baby hearts. My fingers and forceps pick their way through inner chambers and outer tunnels. I summon the serpent off the Staff of Aesculapius and command

Both tubs measure seven feet by three feet, as each is designed to hold a single human body immersed in warm water.

I watch as the technician and the resident together lift a fresh female cadaver off a trolley and plunge it into one of these tubs. The technician washes this body in a soapy lather and then scrubs the skin with a coarse sponge. Finally, the remaining dirt is rinsed away with a thin hose extending from the faucet. A mix of water, soap, dirt and debris streams steadily down the cadaver and into the drain, but this flow is interrupted when the body suddenly slides forward. An arm flops out over the side of the tub, and I lurch forward to catch it. I grab a cold, lifeless cylinder of flesh between my gloved fingers as I aid the technician in repositioning the body.

This fresh cadaver feels nothing at all like the fixed human specimens from our earlier course in human anatomy. Their flesh was stiff and rigid; this flesh is soft and fluid. The body wriggles and writhes beneath each stroke of the technician's brush. It certainly seems lifelike, but it is far from alive. The chest still has tan lines from last year's vacation, the nails still have polish from last month's manicure, the hair still has braids from last week's coiffure. But the face—her face—has a countenance that could only be from last night's final defeat. I doubt she left our world comfortably and quietly. Her face wears a bitter expression of discomfort and disappointment, a furrowed brow, with a pouting mouth and nostrils flared out to the sides. This expression remains frozen, even as the technician pushes the face down into the rising bath water.

I listen to the sounds of running water, a creaking fan, a humming radio. The cadaver is deaf to these noises; she floats in silence within a clear pool. But I hear these noises, ever more acutely and each more distinctly. The technician changes the radio station and a Heavy Metal rock song blares out. The loud screech of an electric saw follows as the technician cuts a v-line along the cadaver's chest. He then slices down through the center of the abdomen, ending just above the vagina. Beneath this din of activity, colored clouds silently puff forth and expand into the surrounding waters.

Red, yellow, green, blue. Each emerges as a separate shade into the water, yet all brush together in a wispy stroke above the body. The colored clouds quickly congeal into a common brown, and this darkens the bath waters into a thick swamp. The technician reaches a practiced hand into the base of the tub and pulls the plug. As the murky fluid drains, the original cadaver is once again revealed, but she is now cleansed, sliced and ready for dissection.

The resident then begins a flurry of activity as he folds out the freshly cut flaps, exposing the insides of the chest and belly to his scrutiny. The human trunk contains two closed body

cavities—the thorax or “chest” and the abdomen or “belly.” These are separated from one another by a “dome of muscle and tendon” known as the diaphragm. These two cavities and the many organs within are each protected by a “watery, fluid-filled cushion” known as a serous membrane or serosa. Every organ is covered by its own separate serous membrane, and all of these membranes are actually contiguous with one another. Thus, a vast serosa, one single continuous fluid-filled sheath, covers all the organs in both the chest and the abdomen and coats all the walls in both cavities as well.

The resident scrapes a long metal trowel across the back wall of both trunk cavities and along the perimeter of the diaphragm. His intention is to separate the serosa and the diaphragm from the body walls, thus eviscerating all the organs of the cadaver in a single stroke. Because each of these organs is tethered together by this roughly continuous cloth of serous membrane, all of these organs can be lifted and removed together, at once, in one deft motion. The resident pulls hard, tugging away first the trachea and esophagus, then the heart and lungs, and finally the stomach, liver, pancreas, spleen and intestines. From his hand dangles a continuous necklace of human entrails, which he quickly raises above the cadaver and lowers onto the second table, into the second metal tub.

The resident invites me in closer to this second table, to join him in his now unobstructed analysis. As he separates and examines each organ, I record his observations and catalog the measurements. The technician opens the skull, exposes the cranial cavity and removes the dead brain. After each organ is weighed, the outer surfaces are analyzed and the inner linings are probed. A microscopic analysis adds to this investigation, and so small sections of each organ are regularly sliced off for histological preparation. Finally, after each organ has been searched thoroughly for any possible irregularities, it is either stored for later cremation or salvaged, in a fixative, to become a new specimen of study for medical students and staff.

This autopsy is being performed at a teaching hospital, under the auspices of a medical school, and so, unlike the more commonly dramatized criminal autopsies of forensic science, the presumed cause of death is well-known. The autopsy is therefore intended far more for confirmation and instruction than for initial investigation. The resident explains to me that this



was the body of a 60-year-old woman who died late last night of a heart attack. Thus, a detailed analysis of her heart is in order.

The resident flushes the remaining blood from the heart with a small hose and then places the organ into a small tray. He passes me the knife and invites me to cut deeply across the heart and expose the inner chambers. My pathology textbook has several dense sections on heart disease and so I am familiar with what to expect, yet inexperienced at where to find it. The resident reveals to me the many colors of a scarred heart wall—black, brown, yellow, white. He guides me through the many textures of a damaged blood vessel—smooth, denuded, friable, fibrous and rough. He then masterfully brings this evidence together to interpret the probable mechanism for this recent death. This heart has suffered an “acute myocardial infarction secondary to atherosclerotic stenosis of the coronary vessels.” The “coronary arteries,” the arteries that provide blood flow to the heart, underwent “stenosis,” abnormal narrowing, due to “atherosclerotic plaques” of fatty debris and scar tissue. This “ischemia,” inadequate flow of blood to a tissue, was prolonged and so led to “anoxia,” inadequate oxygen supply to the tissue, which caused a “myocardial infarct,” a death of muscle tissue in part of the heart. This “myocardial infarct” was irreparably extensive and so caused an unrecoverable “arrhythmia,” deviation in the normal rhythm of the heart. “Cardiac arrest” ensued. The victim suffered an abrupt loss of consciousness, absence of pulse and cessation of breathing. Within minutes, irreversible brain damage and death followed. Within hours, last rites and an autopsy were performed. Her dead heart has been removed and is now resting within my gloved hands.

I gently balance this heart in my palm and open its cavities with my fingers. Perhaps this organ once pumped blood through the placenta of a baby, now a man or woman. Perhaps it is your mother's heart, alas; perhaps someday it will be mine. But I try only to see this organ through my “dragon's eyes,” the serpent of my intellect. I must refuse to see a mother's heart or a child's grief, and allow myself only to see what my serpent sees—an “acute myocardial infarction secondary to atherosclerotic stenosis of the coronary arteries.”

**I try only to see this organ through my  
“dragon's eyes,” the serpent of my intellect. I must refuse  
to see a mother's heart or a child's grief.**

But this dragon of my intellect has grown weary. For quite some time this morning, throughout this hour of autopsy and my prior hour of pathology review, he has been hovering above the clouds of my emotions in a studious flight of fascination. But he tires—I tire—both from this deceased 60-year-old woman and those six dead baby hearts. I look toward the clock and am relieved to see that the hour is nearly over. My dragon glides toward his lair to regain his strength, but suddenly he loses control of his landing. I feel faint. My peripheral vision narrows, my palms sweat, my shirt collar tightens around my neck and a

large lump clogs my throat. I drop the heart into the tray, move away from the table and swerve toward a chair.

I have never before fainted, but there is something about this cadaver, perhaps her age—my mother's age; and this something has managed to pull my dragon beneath an unexpected cloud of emotions. I rest for a minute in the chair as I struggle to quell a rising nausea. “It's okay, I'm almost done. The most interesting part is over anyway,” the resident says, giving me my opportunity to leave. “Why don't you go get yourself washed off and have some cold water.”

He packs the heart into a plastic bag with a pint of formaldehyde and places it inside a yellow bin. I thank the resident for allowing me to attend and exit into the anteroom. I undress, dispose of the now blood-stained hospital scrubs and return again to the comfort of my student uniform—baggy jeans and a sweat shirt.

AS I WALK DOWN THE NARROW PASSAGEWAY from our autopsy laboratory out into the main hallway, I cannot stop myself from thinking about this fresh cadaver—the sight, the sound, the smell, the feel of her new death. Sixty years of life, and she was dissected in just 60 minutes. I enter the hallway and continue down toward the cafeteria, passing the pathology room, where still earlier this morning I had studied six dead baby hearts. Six months of life, perhaps a little more for some, a little less for others, and these, too, were dissected in just 60 minutes. I continue toward the cafeteria for my lunch break, but first stop in the bathroom.

The laboratory fumes from the last two hours seem to have soaked into my sweat shirt; I cannot rid myself of this now familiar odor, this sticky-sweet smell of formaldehyde and plastic. I take off my sweat shirt, rinse it under the faucet and then dry it beneath the air-blower. But this only strengthens the smell. Perhaps it is these fumes, or perhaps it is their source—a fresh cadaver, a baby heart. Perhaps it is both, perhaps neither. But suddenly my nausea churns and rises. The dragon of my intellect crashes beneath my emotions. I start to cry, then cough, but then I feel it coming at last. I quickly kick open the stall and kneel by the toilet as I vomit my morning's breakfast of coffee, juice, a bagel and cheese.

I rise, relieved, and in control. My dragon once again soars above the clouds of my emotions. I wash my face and wipe away the remaining vomit and tears. The lab fumes seem to have vanished from my clothing, and I smell only a rosy scent from the air freshener above the sink. I comb my hair, rinse my hands and smile. I am no longer nauseous, but hungry, and I have a full hour for my lunch break ahead. One hour of lunch. Another 60 minutes of digestion. ☐

ADAM STRASSBERG is a second-year medical student. His last article for *Stanford magazine*, “A Body of Knowledge,” appeared in the March 1995 issue and won a silver medal from CASE, the Council for the Advancement and Support of Education.

## Letters to the Editor

of my time with the kids, and though I was doing well, my wife thought I should be at the office more. She herself was unhappy just tending to the kids, so she began acting as my office manager. She was always trying to push me somewhere, while I was content.

Two years ago, my wife took a job. Her ambitious personality, coupled with her unlocked potential, quickly propelled her to a managerial position. Now, she is a career woman, I am the primary caregiver—and we both love it (and each other). It doesn't matter who earns more. What matters is that we have each found an arrangement that suits our personal ambitions.

DAVID L. ROSEN, '81  
*Jerusalem, Israel*

Thanks to Rhona Mahony for her End Notes on the father being the "primary parent." The message from this piece is, I believe, that child-rearing is an enor-

mously important job and one parent should devote him/herself to it full time or close to full time.

A father can be as loving, patient and nurturing as a mother in this capacity. As a pediatrician and now the stay-at-home mother of two young girls, I have found raising my children to be a challenging and infinitely rewarding career move. In my pediatric practice, I had several families in which the father was the "home-maker"; it seemed to work quite well for all concerned.

Mahony's comment about life being "completely sane" for the wives of these male primary caregivers certainly has some merit—life with one parent at home is more balanced, calm and in control. And though I would argue that living with children rarely feels "completely sane," it is a wonderful, magical adventure nonetheless.

ELISE J. HERMAN  
*Ellensburg, Washington*

### DOCTOR'S DILEMMA

Thank you for Adam Strassberg's compelling piece entitled "Heart of the Matter" in the May/June issue.

I have worked in the entertainment industry since my graduation from Stanford seven years ago and recently have been exploring the possibility of going to medical school. While I've spoken at length with many medical students and doctors as a part of this process, no one was able to capture as poignantly as Strassberg the inherent struggle in trying to balance our own humanity with the scientific pursuit of knowledge.

It is refreshing and encouraging to learn that Stanford is training physicians and researchers who are grappling with these important issues. Just the fact that they are able to "feel" as well as "know" means that they are on the right track toward truly "understanding." Particularly in this era of managed care, it is more



FINE  
ANTIQU  
MAPS

**Martayan**  
*Lan*

Supplier to Museum,  
University &  
Private Collections

48 East 57th Street  
New York, NY 10022

800.423.3741 & 212.308.0018  
Fax 212.308.0074  
Gallery Hours: Mon-Fri, 9:30-5:30  
Saturdays by appointment

*Complimentary Illustrated  
Catalogue Available*

**Date someone  
who knows  
that a Poisson  
distribution  
is not a school  
of fish.**

Graduates and Faculty  
of **Stanford**, The Ivies,  
UC-Berkeley, Cal Tech,  
The Claremont Colleges,  
MIT, University of  
Chicago, Northwestern,  
Rice, The Seven Sisters

**DATE ALUMNI AND  
ACADEMICS**

THE  
**RIGHT  
STUFF**

800-988-5288

REACH  
MORE THAN  
**100,000**  
STANFORD ALUMNI  
WITH

THE  
**CLASSIFIEDS.**

Turn to page 112.

I'm worried  
about my  
alma mater,  
but what  
can I do?

**Political Correctness  
Declining Standards  
Trivial Courses  
Speech Codes  
Soaring Tuition**

Many alumni share your concerns. They have joined together to create the **Fund for Academic Renewal.**

The Fund will help alumni support the best in our tradition: programs, curriculum, courses, that exemplify **great books, high standards, and excellent teaching.**

Every dollar you give will go to the college of your choice. You can help your alma mater live up to its highest ideals.

Call for further information today: 800.678.8278. The Fund has programs of **National Alumni Forum.**

**WE** HAVE a customer who practices law for a living, pursues politics as an avocation, experiments in botany, studies philosophy, and that's just on weekdays.



**WE** CHOOSE to refer to this gentleman (and others of his ilk) as Renaissance men. Men who don't pursue a diversity of subjects just to accumulate a diversity of facts, but because broadening their knowledge in one area enhances their appreciation in all areas.

**S**UCH MEN are rare in our age ~ but not in our store. For our clothing is directed towards those who select a wardrobe not through a knowledge of rules, but a true understanding of style. Who can use the facts we provide ~ unsurpassed quality, flair, sophistication ~ to create an expression of their own identity, not some designer's. It is that expression that makes a man unique and interesting.



**D**OES A RENAISSANCE OUTLOOK truly enhance one's personal sense of style? All we can say is that the Renaissance men we're acquainted with always appear to be exceedingly well dressed.

**TO RECEIVE A COPY OF OUR NEW FALL CATALOGUE CALL 1.800.678.8278.**



**Paul Stuart**

MADISON & 45<sup>TH</sup> • NEW YORK  
JOHN HANCOCK CENTER • CHICAGO  
800.678.8278

important than ever before for those training in the medical field to examine the bigger picture.

LORI GOTTLIEB, '89  
*Los Angeles, California*

As a practitioner and student of alternative medicine, I would like to respond to Adam Strassberg's article, "Heart of the Matter." Traditional medicine has long taught its practitioners that in order to battle death they must know death. A medical student studies pathology, cadavers, disembodied organs floating in formaldehyde—without ever recognizing that death is at times nature's most beautiful form of healing. And when the pain becomes too unbearable, the medical student is taught, or Strassberg was, "to see [death] through . . . the serpent of [the] intellect . . . [to] refuse to see a mother's heart or a child's grief."

I believe that acknowledging that child's grief is as much a part of health care as is understanding the failure of that mother's heart. To me, an ideal health care system would be one whose practitioners spent more time studying babies than studying dead babies' hearts. To me, doctors should focus on the vital energy that sustains health, not the disease and death that threaten it. Strassberg's tears are part of what make him human. If he feels he has to suppress them in order to survive in his profession, then perhaps he should find a line of work more tolerant of his humanity.

KIRSTEN STADE, '95  
*New York, New York*

**BACK TO THE FUTURE**

Your "Then and Now" article in the May/June issue was most deeply appreciated, and it set me to reminiscing. Twenty-five years ago, I read the description of what then was a totally novel approach to career life planning: "Looking Backward to the Future." What a clever idea, I thought. What a practical technique to use in my classes on "Finding Your Life's Mission," offered through a local community college adult-education program. In the years since, my students have used