Evidence suggests that people’s attitudes toward animals develop prior to adulthood and are fairly constant once formed (Kellert 1985; Takooshian 1988). The extent to which school environments influence the development of student attitudes is not known precisely, but there can be no question that the influence is there and that it may be considerable (Gammage 1982; Solot and Arluke 1997).

When a biology teacher chooses teaching methods that harm animals, what effect might that have on the developing values of the student? Conversely, when a teacher chooses not to harm animals and makes a point of explaining this to his/her students, how might the students be affected? The amount of influence will vary and it is difficult to measure such things, but it is important to consider the implications of how uses of animals in education may be influencing the views of students and the morals of society.

It is the position of The Humane Society of the United States (HSUS) that harming animals in education is detrimental to the development of healthy student values and attitudes toward animals. In fact, as has been argued by St.
Thomas Aquinas and Immanuel Kant, harming animals or being cruel to them may be harmful to society itself, by imparting to students a callous attitude not only toward animals but also, by extension, toward humans.

### 3.2 Student Feelings and Attitudes

Published surveys show that student concern about the use of animals in dissection and other educational settings is far higher than is borne out by student protest in the classroom (table 3.1). Rowan (1984) and Balcombe (1997b) have noted that student protest takes a great deal of courage in the absence of explicit leads from instructors, and the small number of student conscientious objectors in classes where dissection is used (and hence judged meritorious by the teachers) reflects this. Teachers, especially those who favor dissection, frequently report that conscientious objection to animal dissection among their students is a rare event (e.g., Offner 1995; Freeman 1995; Dudlieck 1998; Schmidt 1999). Based on such reports, Balcombe (1997b) estimates that unsolicited questions about or objections to dissection average about 3 to 5 percent of the class population.

#### Table 3.1
Published Studies of Attitudes toward Animal Use in Education

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Subjects</th>
<th>Principal Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adkins and Lock</td>
<td>28 U.K. high school and college teachers</td>
<td>One in three teachers in charge of biological sciences argued against the use of animals in the classroom, despite such use being extensive among those surveyed.</td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arluke and Hafferty</td>
<td>41 U.S. medical students</td>
<td>Moral uneasiness was initially felt towards performing terminal procedures on live dogs, but moral guilt was neutralized by learning absolutions, permitting denial of responsibility and wrongdoing.</td>
</tr>
<tr>
<td>1996</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bennett</td>
<td>110 U.S. medical students</td>
<td>78 percent of the surveyed medical students supported a student’s right to choose not to participate in required terminal dog labs, and 32 percent felt that, given a choice, they would not participate in such labs.</td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowd</td>
<td>191 Canadian undergraduates</td>
<td>In a retrospective survey, 27 percent of the surveyed students reported having exclusively negative reactions to dissection, and 38 percent reported both negative and positive reactions.</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td>142 U.S. ninth grade students</td>
<td>50 percent of the students responded that they would choose an alternative to dissection if provided and 90 percent believed that students should be given the choice.</td>
</tr>
<tr>
<td>1989</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downie</td>
<td>273 British undergraduates</td>
<td>35 percent of surveyed students in a first year biology course disapproved of dissecting purpose-bred rats, and 50 percent disapproved of infecting rats with tapeworms and killing them to be dissected.</td>
</tr>
<tr>
<td>1989</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authors</td>
<td>Study Subjects</td>
<td>Principal Findings</td>
</tr>
<tr>
<td>--------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Keith-Spiegel et al. 1993</td>
<td>482 U.S. undergraduates</td>
<td>62 percent of surveyed students felt that it would be unethical for their professor to require them to use electric shock on rats.</td>
</tr>
<tr>
<td>Lock 1994</td>
<td>Meta-analysis</td>
<td>Review of comparative studies on dissection practices finds that dissection and vivisection should be discussed in the classroom.</td>
</tr>
<tr>
<td>Lord and Moses 1994</td>
<td>200 U.S. undergraduates</td>
<td>56 percent of surveyed students objected to performing live-animal procedures and more than half said they would refuse to participate in the dissection of cats, rabbits, or monkeys if the situation arose.</td>
</tr>
<tr>
<td>McKernan 1991</td>
<td>972 U.S. high school students</td>
<td>72 percent of surveyed students felt students should be allowed to use dissection alternatives and 15 to 16 percent reported that they and/or other students asked for alternatives.</td>
</tr>
<tr>
<td>Millett and Lock 1992</td>
<td>468 14- and 15-year-old U.K. students</td>
<td>72.5 percent felt that it is wrong to breed animals for dissection, 83.5 percent felt that alternatives to animal experimentation should be found, and 38 percent &quot;would object to any animal material being used for dissection.&quot;</td>
</tr>
<tr>
<td>Smith 1994</td>
<td>106 Australian schools</td>
<td>34 schools preferred observational/behavioral studies to invasive use of animals, and natural habitats to classroom settings. Over 50 percent reported ethical objections and students nauseated by dissection.</td>
</tr>
<tr>
<td>Solot and Arluke 1997</td>
<td>15 U.S. seventh graders</td>
<td>Concluded from responses to fetal pig dissections that the exercise risks fostering callousness towards animals/nature and dissuading students, especially girls, from pursuing careers in scientific fields.</td>
</tr>
<tr>
<td>Willis and Besch 1994</td>
<td>144 U.S. medical students</td>
<td>Most surveyed students found dog labs to be helpful; 22 percent felt that this use of animals is morally wrong.</td>
</tr>
</tbody>
</table>

Conversely, teachers who are openly sensitive to student concerns report that many students do not want to dissect animals (e.g., Long 1997; Mayer and Hinton 1990). Asada et al. (1996) found that significantly more students raised concerns about doing classroom experiments on animals if their teachers were also concerned than if teachers had not expressed concerns.1

Quantitative studies corroborate this pattern of student concern (see table 3.1). In a retrospective study, 27 percent of Canadian undergraduate college students expressed exclusively negative feelings about the dissections they had performed (Bowd 1993). Nearly half (48 percent) of the undergraduates in Lord and Moses’s (1994) survey would refuse to dissect rabbits, and more than half would refuse to dissect cats (56 percent) or monkeys (67 percent). Fifty-six percent also objected to the idea of performing invasive live-animal procedures. In surveys of English high school students, 38 percent would object to the dissection of any animal material (Millett and Lock 1992), and between 33 percent and 50 percent would...
object to purpose-bred rats being killed for dissection (Downie 1989). Fifty per-
cent of the American high school students in Brown’s (1989) study said they
would choose an alternative to dissection if it were offered. Among medical stu-
dents, Bennett (1994) found that 32 percent would not do terminal dog labs if
given a choice, and Willis and Besch (1994) found that 22 percent felt dog labs
were immoral.

Why is there such a large disparity between the proportion of students who have
negative feelings toward classroom exercises harmful to animals (30 to 70 per-
cent) and the proportion who express their concerns to an instructor? A number
of sociological pressures may be keeping students quiet.

Obedience to authority, a well-established psychosocial phenomenon (Milgram
1974), is probably a major factor. Students commonly report being pressured by
the teacher to dissect (e.g., Carpenter 1992). (Studies showing high proportions
of students with negative feelings about dissection are mostly based on anony-
mous surveys where the student is not accountable to his/her teacher.) Related
factors that might keep students silent include peer pressure (Gilmore 1991b;
Solot 1995; Balcombe 1997b), fear of ridicule and humiliation (Heim 1981; Pina
1993; Solot 1995; Balcombe 1997b), and fear of receiving a lower grade (Bal-
combe 1997b). Parental endorsement may also persuade some students to par-
found that dissection received nearly universal endorsement from parents in her
study and that this endorsement sent students messages about the importance of
dissection.

Solot and Arluke (1997) provide a representative scenario of the pressure that
can be placed on students who desire not to participate in classroom dissections:

The teacher allowed students to not participate if they continued to
object and wrote a letter explaining why they were “opting out” of the activ-
ity. If they did this, they were given assignments to do from a textbook
about the human body while they sat in the hall outside her classroom. The
choice not to dissect was presented as only marginally acceptable; the
teacher did not explicitly announce the option and students needed to
express it repeatedly and emphatically to reach the point where they were
allowed even to submit a formal petition—the letter—asking not to dissect.
The alternative activity, textbook work, was certainly a less interesting
learning experience, and it was carried out in the hallway, not a site where
“real” learning took place in the school. (40-41)

Pressure to participate has also been reported in medical schools. Kelly (1991)
reported that in twenty-two U.S. medical schools, refusal to attend live-animal labs
hinders an individual’s chances for admission or promotion through the school’s
program, even though these labs are not mandatory. In a related example, a stu-
dent at Boston University Medical School attended an optional rabbit vivisection
lab because he saw professors become hostile to students who asked what the
alternatives were (McNaught 1998).

It is worth noting that teachers may also face pressure to maintain animal lab-
oratories. A biology lecturer at Illinois Wesleyan University believes his contract was not renewed because he included discussion of the ethics of animal use in his lectures to his students (Cincinnati Enquirer, 28 January, 1983—see Rowan 1984). In many cases, biology teachers are not merely encouraged but expected to use animal dissection in their classrooms, regardless of the teacher’s personal preference for teaching method (Sam Davis, personal communication, 10 April, 1999—Davis is a biology teacher at Christopher Columbus High School in New York). Teachers are also naturally inclined to employ methods with which they are taught, and there is a case to be made for de-emphasizing dissection and including the use of humane alternatives during the training of biology teachers.

All of these findings underscore the influence that teachers’ values and their teaching methods have on students’ attitudes and preferences. If a role of the educator is to stimulate critical thinking and not to indoctrinate, these findings suggest that teachers would do well to give students a choice whether or not to take part in a laboratory that they may find distasteful (Rowan et al. 1995).

Qualitative Studies

Most examinations of student feelings about animals in education have been based on quantitative attitude surveys (see table 3.1) that suffer from superficiality. Few qualitative studies of the impact of dissection on students exist. Two recent U.S. student theses may be the first such studies, and they offer considerable insight into the ways students perceive and respond to traditional classroom animal dissection exercises as well as the influences of demographics and the classroom environment.

For her undergraduate thesis at Brown University, Dorian Solot spent several weeks observing and interviewing students in a seventh grade class at a private school in Rhode Island (Solot 1995; Solot and Arluke 1997). She observed the dissections of fetal pigs by two separate classes from start to finish, interviewing fifteen students in all (eight girls and seven boys, aged twelve or thirteen years). Solot also supplemented her study with her own memories of dissection, which she recalled as being remarkably similar to what she observed, and with informal discussions she had with three parents and five teachers or administrators affiliated with three schools.

Consistent with the findings reported from student surveys (see table 3.1), “virtually all of the students felt at least somewhat negative, hesitant, uncomfortable, or ambivalent toward the prospect of dissecting” (Solot and Arluke 1997, 31). The students expressed concern for the origin of the animals they were dissecting. A number of them raised the question to their teacher in the days before the dissection, and nearly half spontaneously mentioned the pigs’ origins during the interviews. One student who approached her teacher about this was told that the mother pig ‘died of natural causes’ while she was pregnant. This response is untrue, and it reflects ignorance, a lie, or the disingenuous suggestion that for pigs in the meat industry, slaughter is a “natural” cause of death. Regardless, it was important to many students that their specimens were unborn and “already dead when you got ’em,” as one student said, and the teacher did what she could to minimize the connection between the dissection and the killing of an animal (Solot and Arluke 1997).

One of the boys in the class Solot studied expressed his surprise at how few stu-
dents looked forward to dissecting as much as he did and acknowledged that a
number of classmates almost opted out: “Some people weren’t that comfortable
with it but they did it . . . . There were a lot of people who really didn’t like it but
they did it” (44). One of the teachers Solot interviewed discussed her perception
that boys would be more subject to peer criticism if they objected and thus less
likely to vocalize their concerns. This reluctance carried over into the dissections
themselves. Solot (1995) observed that, in more than half the cases, one partner
did all the specimen touching and the other either watched or looked away.

As students finished up, they became more likely to play with the specimens’
odies and organs. Boys carried organs around the room with them to show them
off to other boys and “gross out” the girls. One boy whistled a death march as he
 carried his mutilated pig to the garbage can, dissection tools plunged through its
head and body like the victim in a gruesome stabbing. A boy and girl in another
class were repeatedly denied permission from their teacher to cut off their speci-
mens’ heads; both did so anyway at the end of the dissection, proudly parading the
decapitated heads around the room (Solot and Arluke 1997).

The students used a number of strategies to cope with their feelings about the fetal
pig dissections. The authors report that these were modeled on the context provided
by their elders and their society (e.g., teachers, older students, parents, the mass
media), namely, that fetal pigs are regarded as mere specimens and that one should
not feel ethically or emotionally uneasy toward them (Solot and Arluke 1997).

In her study of seventeen high school students enrolled in an elective biology
course at a rural North Carolina high school, Gracia Barr (Barr and Herzog in
press) observed students dissecting fetal pigs, interviewed them, and gave them
questionnaires about the experience. Nine of the students wanted to pursue
careers in science or a medical field. All enrollees had already dissected earth-
worms, crayfish, clams, and frogs during the course, and alternatives to dissection
were not offered to the students. The pig dissection comprised a significant por-
tion of the course, spanning several class periods. Though the teacher occasion-
ally expressed sympathy for the animals, there was little discussion of the
ethics of animal use in the course.

The students in Barr’s study were unambiguous in their approval or disapproval
of the pig dissection. Twelve of the students (71 percent) liked the experience; the
remaining five (29 percent) disliked it. Eleven students had no moral objection to
dissecting a fetal pig, which was described by the teacher as a byproduct of the
slaughter of pigs for food. Three students thought that dissection was unethical
(including one of the students who liked the experience), and three were unde-
cided. Despite the overall approval for the dissection, nearly all students (at
least fifteen of the seventeen) were reported as feeling at least some degree of
sympathy for the animals.

Many of the students in Barr’s study felt their confidence boosted by the dis-
section and felt more convinced that they were cut out for a medical career or
other hands-on work with living organisms. None reported that they were turned
away from science careers, a finding that Barr regards as not surprising since stu-
dents extremely averse to dissection would simply not take this elective course.

However, none of Barr’s students felt that the pig dissection changed the way they
regarded animals, and she found that even the most thoughtful and articulate ones had poorly developed ideas about broader philosophical issues such as the nature of living things and humans’ relationship with other animals. Almost none of the students reported that dissection had stimulated their curiosity about such issues.

The findings by Solot and Barr are instructive. Solot’s students were several years younger and their course was not an elective, so their greater misgivings towards the exercise is not surprising. Solot’s students were also a random sample, whereas many of Barr’s students were headed for science or medical careers. That Barr’s students lived in a rural setting, where communities tend to view animals in a more utilitarian manner (Kellert 1996), may also contribute to the difference in the findings.

Barr reports that the students in her study had not found the frogs, worms, clams, and fish dissections especially interesting, but that the interest level increased with a mammal (fetal pig), presumably because of the pig’s anatomical similarities to humans. Students may leave some dissections in awe of the complexity of living structures and interested in dissecting more of them. But does this awe foster a new level of respect for nature, as some dissection proponents have suggested? Students with animal dissection experience may express interest in dissecting more animals, but this observation provides no evidence about how much they respect animals or life (Solot 1995).

Squeamishness

“Squeamishness” is defined in Webster’s New Collegiate Dictionary (1986) as being “easily nauseated.” It is a feeling commonly associated with animal dissection and was reported by Solot and Arluke (1997) as the most common problem for the students in their study. However, it should be remembered that the students in Solot’s study were mostly pre-adolescent; with older students, squeamishness is not usually the basis of student conscientious objection (Balcombe 1997b). An example is Downie and Meadows’s (1995) study of students at a British university, where the dominant basis for the more than 300 students who opted for an alternative to animal dissection was objection to the killing of animals for educational use.

Squeamishness is usually perceived as a weakness, and it is also often seen as an inappropriate reason for a student to be excused from a dissection exercise (e.g., Snyder et al. 1992). But Sapontzis (1995) notes that such labels as “squeamishness” or “sentimentality” have been used to demean nonobjective thoughts associated with the animals, including feelings of revulsion or compassion. Perhaps squeamishness should be taken more seriously as a natural product of empathy for others. As Solot (1995) points out, those who call attention to squeamishness as a signal alerting us to the possibility of a problematic activity raise a point that should not be overlooked.

Desensitization

A prominent concern of dissection opponents is that exercises harmful to animals may tend to desensitize certain individuals, making them more callous toward animals and, by extension, toward other humans (Russell 1972; Kelly 1986; Morton 1987; Langley 1989; Gilmore 1991a). For Heim (1981), the desensitized person is either unaware of the animal’s suffering, does not care about it, denies its existence, or believes that such suffering is warranted by the importance of the work. Heim (1981) cleverly charac-
terizes desensitization in this context as “diminution by familiarity” (44). In Rowan’s (1984) words, “Problems appear when the cult of objectivity leads to the disregard or devaluing of normal sensitivities.” Solot and Arluke (1997) conclude from their study of high school fetal pig dissections that the activity risks imparting to students a callous attitude toward animals, nature, and the natural world.

Mayer (1982) describes a contradiction in science education of (1) trying to instill ethical values of caring and respect and (2) trying to instill scientific attitudes of rationality and objectivity. Australian teacher William Smith (1990) notes the difficulty he has encountered in overriding the “‘cuddly-furry’ response” in seventh grade students. Too often, our use of animals in education reinforces a simplistic view that any manipulation of animals constitutes “science.” As Rowan (1984) points out, the unfortunate corollary of this is that any expression of concern for the animal is viewed as sentimental and unscientific.

Miriam Rothschild (1986) made the poignant observation that “just as we have to depersonalize human opponents in wartime in order to kill them with indifference, so we have to create a void between ourselves and the animals on which we inflict pain and misery for profit.” In her study of fetal pig dissection, Solot (1995) observed that some teachers attempted to remove the pig from the animal category altogether. Solot also notes the hypocrisy that the animals slaughtered daily to feed Americans will never see the collective outpouring of sympathy and resources that saved the lives of three individually identified whales trapped in Arctic ice in 1988. As one bumper sticker reads, “Why do you love some animals called pets and eat other animals called meat?”

Might these mixed messages create confusion for students trying to develop a cogent set of values toward life? The confusion would appear to have profoundly different effects on different students; some students may come to oppose all animal experimentation, while some others may turn off all moral concern and develop extreme indifference (Heim 1981; Nab 1989). Many students fit one of these two categories of attitude toward other life. The majority, of course, fall somewhere in the middle.

One indication that some students may become desensitized toward animals by dissection exercises is the inappropriate (though perhaps not abnormal) behavior of some students toward the dissected specimens themselves. Mutilation of dissected animals is very common (Berman 1984; Goldfinger 1993; Pendleton 1993; Pina 1993; Long 1997). When students mutilate their dissection specimens, the behavior tends to show a progression from initial apprehension, to confidence, then finally to mutilation. Solot’s study was illustrative of this. Even though squeamishness was common among the students of Solot’s (1995) study, students became increasingly immune to such feelings. At the beginning of the dissections, students made jokes like moving a pig’s legs to make it walk or dance, and there was a lot of uncomfortable giggling. By the end, however, some were deliberately mutilating and dismembering their specimens, some did crude explorations, such as pushing the animal’s organs into its mouth, and some boys were said to have races to see who could “dig out” their pig’s eyeball fastest (Solot 1995; Solot and Arluke 1997). At another middle school, a science department head removed dissection from the curriculum when she noticed that students’ demeanor toward the animals was no different than if they had been “playing with clay” (Solot 1995).
Researchers have found that students tend to gain an affinity toward whatever learning methods they are exposed to. Lock and Millet (1991) found that students’ attitudes toward dissection and animal research were reinforced by participation in or exposure to these endeavors. Strauss and Kinzie (1994) found that high school students’ opinion of frog dissection improved when they dissected frogs, while the opinion of students who used an alternative to the dissection improved towards the alternative. Veterinary students exposed to either survival surgeries or to terminal surgeries on dogs tended to support the method with which they had experience (Bauer et al. 1992a). Arluke and Hafferty (1996) documented initial moral uneasiness of medical students towards performing terminal procedures on live dogs and that moral guilt was neutralized by learning absolutions that permitted complete denial of responsibility and wrongdoing. When interpreting studies of student preferences for learning methods, however, it cannot be assumed that preferred methods are also better methods. A recent study reported that U.S. medical students scored significantly higher on questions from computer laboratories than from either didactic lectures or computer-assisted lectures, even though the students perceived didactic lectures to be the best learning method (Richardson 1997).

3.3 Teacher Influence

Without question, teachers can exert an enormous influence over their students. The amount of wakeful time the average North American child spends in the presence of a teacher is not much less than that spent in the presence of his/her parents and, in many cases, may be more. A teacher is every bit as much an authority figure as is a parent, and teacher attitudes, values, and personal preferences are apt to influence those of the student.

There is no escaping the fact that science education, like science itself, is value laden rather than value free, and it involves the absorption not only of facts but also of attitudes (Morley 1978). There is also evidence that the attitudes of those around one may exert more influence on one’s attitudes and values than does information and knowledge. The human dimension of the student/instructor relationship can convey values, attitudes, and signals that transcend the content of textbooks and other written curriculum materials (Brennan 1997). Thus, even where a syllabus may be sensitive to the welfare and ethics of animal treatment, a teacher who is indifferent towards these issues will communicate this in both subtle ways (ibid.). Evidence further suggests that neither scientific literacy (Takooshian 1988) nor faith in science (Pifer et al. 1994) is a predictor of attitude toward animal use, and that this pattern applies to children as well as adults (Lien 1993).

In his examination of attitudes of elementary schoolchildren in Newfoundland, Lien (1993) made some intriguing observations. The main influence on whether or not children decided to write letters to their governments to protest seal hunts was not their knowledge of the hunts, but the degree to which they admired the adult who inspired or urged them to write the letters. Lien also found that the original attitudes of the children were usually deepened and expressed more decisively as their knowledge
increased. A curriculum module on whales, which demonstrably increased children’s knowledge of these animals but did not indicate that there was a right or wrong way to view them, resulted in children from fishing communities becoming more utilitarian in their view of whales and mainland children becoming more protective of them. These findings suggest that information and attitude learning are quite independent. Lien (1993) speculated, probably correctly, that learning is constrained by such factors as the need to fit into a group, and that attitudes are relatively more affected by the attitudes and prestige of the educator than by curriculum content.

The above findings indicate that teachers’ influence on students extends well beyond the information that they teach. The classroom is a place well suited to the cultural transmission of values, and teachers may have a substantial influence on the developing attitudes and values of their students.

Many examples exist of teachers using their influence to try to impress their own values and attitudes on students. Rollin (1981) provides the following anecdote: an instructor confronted his psychology student and told him that he might be “soft” and not “cut out for psychology” when the student expressed his horror at the instructor’s killing a rat by bashing the animal’s head against a wooden desk. An essay by William Jordan (1991) gives a graphic and disturbing memoir of institutionalized animal mutilation from his biology class of 1964 and warns of the cost to humanity and human decency that may accrue. Some science teachers even admit that one of their aims is to desensitize students.

From time to time, teachers step beyond the bounds of what the law allows, and a brief media flurry results. One recent case involved a high school principal taking a small group of science students into his garage, where they killed and dissected cats (Martinsville Reporter 1996). In another case, two Indiana high school students shot a puppy and took it to class to dissect after the teacher had instructed them to bring in a specimen of their own. The killing of animals was banned at a school in Wyoming after biology teachers slaughtered pigs on the school grounds (USA Today 1996). At an Ohio school, a biology teacher was charged with cruelty for killing piglets by bludgeoning them at his farm (one of his male students then bashed a still-living piglet against the pavement in the school parking lot after the teacher brought piglets to the school) (Nolte 1999).

One of the more subtle ways teachers influence students is by the teaching methods they choose. These methods can carry important messages about values and attitudes. The author of this monograph vividly recalls the instructor of his undergraduate genetics labs demonstrating the preparation of a meiosis lab to the class by taking a large adult male locust and methodically snipping off each of his six legs, then each wing, before finally severing the fully alive insect’s head. The impression left by this incident was that the instructor wanted to reinforce the objectivity he apparently felt was required of a good scientist.

It seems a fair conclusion, then, that teaching methods that harm animals can play an important role in formulating and reinforcing a dominionistic view (Kellert 1989) toward animals. As Shapiro (1992) has observed, dissection “is a clear instance of teaching that human interests take priority over those of nonhuman animals, and that science takes priority over nature.”
3.4 Alienation from Science

A sociological concern that has drawn the attention of some critics is that the dissection exercise may skew the personality traits (for better or worse) of students who are interested in pursuing careers in the life sciences. Keiser and Hamm (1991) argue that when dissection is not part of the curriculum, students may miss the opportunity to prepare for vocations and become valuable contributors in medicine and other health-related professions. The irony of this assertion is that many students aver that they switched career plans away from the life sciences when they learned that they were required to dissect animals (Orlans 1988b). As Brennan observes, “being forced to witness dissection . . . is a powerful disincentive for some people who would otherwise be interested in biological study” (Brennan 1997, 80). An unfortunate result is that invasive classroom exercises may weed out more compassionate students and select for those less sensitive toward others (Russell 1972, 1987; Finch 1988). The ramifications are evident when one reflects that compassion and caring for others are desirable traits in such professions as medicine, veterinary medicine, and nursing.

Typically, the death of a dissected animal precedes its arrival in the classroom. However, when live animals are used in invasive course exercises, the potential to disturb and traumatize students increases. A student at a large state university (the University of Georgia) had this to say of a frog-pithing exercise: “It was the most unrespectful [sic], tormenting experience of my life. I spent almost half an hour in the bathroom crying.” Another student from the same class commented, “Sometimes I wonder, after taking science for the last three and a half years, if this school wants us to learn something or if they just want to know if we have the stomach to kill.”

Are there students who actually abandon aspirations of becoming doctors or veterinarians because of disillusionment with what they perceive as callous treatment of animals in education? The available data, while anecdotal, clearly indicate that there are (Orlans 1988b). Pat Davis, who has operated the NAVS (National Anti–Vivisection Society) Dissection Hotline since its inception in 1989, estimates that she has spoken with over a hundred callers who have either changed career goals or avoided biology studies entirely because of dissection assignments (Davis, personal communication, 3 December 1998). Hepner (1994) published statements from several student conscientious objectors to animal dissections in school; several of them changed career tracks away from the life sciences because of the dissections. Finch (1988) describes her own shift away from a career in science, marked by the occasion of frog dissections in her high school biology class. London University zoology student Stephanie Johnson (n.d.) reported that “one student in my year decided to give up zoology after the first year and change to botany simply because she couldn’t face the pressure she thought would be put upon her to dissect.” Krause (1980) recounts that his daughter avoided zoology classes (and became a vegetarian) after her teacher killed and dissected a fish he brought to class. Jill Kimmel, a biology teacher in Valparaiso, Indiana, almost switched careers away from biology because of her objections to dissection (Krause 1994).

Although dissection assignments undeniably turn some students away from the
life sciences, the influence that life science curricula might have on attitudes toward animals is not straightforward. In a study of personality differences between pro- and antivivisectionists, Broida et al. (1993) found that students majoring in fields in which they will be more likely to encounter animal experiments (e.g., psychology, biology, premedicine, and pre-veterinary science) were more opposed to animal experimentation than were students declaring other majors. The authors give two possible interpretations for this unexpected finding: (1) that opposition to animal experimentation might not steer people away from fields in which they are likely to encounter it, or (2) that students enrolling in such majors are relatively naive, and that exposure to animal experimentation may tend to make them oppose it (ibid.). The authors concluded that their sample of students was not adequate to distinguish between these possible explanations or others.

### 3.5 Teaching to Care

One of the most important criticisms one can levy at our present science education system is that it does not help to prepare young people to grow up to be caring, feeling individuals. Dissection is rarely broached as an ethical issue by teachers who employ it, despite the benefits of doing so (Orlans 1993; Downie and Meadows 1995). Sieber (1986) found that American biology students were keen to debate bioethical issues, but that their teachers were not. Schrock (1990), an outspoken dissection advocate, discourages teachers from getting into philosophical debates with their students. Bentley (1991), in her vitriolic review of NABT’s “insidiously evil publication” *The Responsible Use of Animals in Biology Classrooms—Including Alternatives to Dissection*, decries the inclusion of a chapter titled “Ethical Considerations,” which encourages middle and high school students to reflect on ethical problems in science. When it comes to resolving such problems, Bentley is “far from convinced that a seventh grade child can do it better” than professional ethicists. Therefore, she concludes, children should not be thinking about it at all. Berman (1984, 49) states that “we cannot really expect our students . . . to become misty-eyed over a rat.”

But the value of including ethical discussions and encouraging critical thinking among students is widely supported (National Research Council [NRC] 1990; Rowan and Weer 1993; Downie 1993; Rowan et al. 1995; Petto and Russell 1999). The NRC (1990) has recognized the need for biology curricula to “foster respect for the environment and for the need to sustain a biosphere favorable for the survival of life”(19). Of 1,610 responses to a survey sent to schools in Australia, Japan, and New Zealand, 90 percent of the respondents thought bioethics needed to be taught (Asada et al. 1996). A survey of 47 biology students at Glasgow University showed that students regard bioethics education as very important to prospective biologists in all branches of study (Downie 1993).

That students often show a poorly developed ethical framework reinforces the need to include ethics in the school curriculum. Values education is an important field that needs attention for a civil society. There is a common failure across the entire education system to teach important concepts and values that transcend
the immediate academic field—what Daniel Goleman (1997) refers to as “emotional intelligence.” Few people can say that they were taught nonviolent conflict resolution. (Surely the history lessons, in which we study who went to war with whom, don’t qualify.) And few can claim to have taken a course whose goal was to help them understand their feelings, or how to nurture strong, loving relationships with others. Hendricks and Hendricks (1992) illustrate the problem well:

In the realm of emotions, many people are functioning at a kindergarten level. . . . In your formal education, how many courses did you take in dealing with feelings? Personally, we cannot remember one minute spent on learning about these key issues in school, whereas hours were spent on memorizing the geography of South America. It is incredible that we have such a societal blind spot. No one ever landed in jail or a mental hospital because of a difficulty with geography, but both institutions are packed with people who have difficulty with their emotions.

The emotionless way in which animals are encouraged to be used in education is part of this unfortunate legacy. And one of the gravest concerns about harming animals in education is the effect it might have on student attitudes about life in general. As Joseph Wood Krutch (1956) observed: “[The current method for teaching biology] not only fails to promote reverence for life, but encourages the tendency to blaspheme it. Instead of increasing empathy it destroys it. Instead of enlarging our sympathy it hardens the heart.”

As early as 1895, animal vivisection was prohibited in some schools on the grounds that it hardened the hearts of the young (Buetttinger 1997). According to Buetttinger (ibid.), no message had greater prominence in the antivivisection literature of the 1890s than the injury to youth as a result of their observing demonstrations of live-animal experimentation.

The connection between cruelty to animals and cruelty to human beings (including child abuse, spousal abuse, sexual abuse, and murder) has been documented (Lockwood and Ascione 1998), and it is increasingly acknowledged that violent criminals are not inclined to discriminate their victims on the basis of the number of legs they possess. However, there is no evidence that harming animals in a classroom has any negative social consequences. Indeed, there has been no attempt to garner such evidence, and it would be difficult to design a study to explore this possible relationship. Nonetheless, when the practice of classroom dissection was banned in 1998 in the state of Rajasthan, India, the principal argument put forward by proponents of the ban was concern over the potential repercussions of violent teaching methods on young minds (Abdi 1998).

There is, of course, great value in student exposure to animals, either in the natural setting or, if suitable, in carefully researched and devised captive situations (HSUS 1993). Such exposure helps students learn to appreciate the real animal and its experience of life, and to value animals as entities in themselves worthy of ethical consideration and not only as a means to an end (Petto and Russell 1999). Many biology classes today are providing no such learning environment.
3.6 Recommendations

1. Teacher training should be reformed to include exposure to dissection alternatives, and dissection of animals should not be a prerequisite for obtaining a science teaching license.

2. Students should be fully involved in ethical decision making in the classroom.

3. Conscientious objection should not be seen as a challenge to a teacher’s authority but rather respected as evidence of concern and reflection.

4. Concern for animals should not be labeled as “squeamishness” but should be acknowledged as a legitimate manifestation of empathy for others. “Squeamish” students ought not be pressured or humiliated into participation in exercises they find distasteful.

5. Teachers and students should be made more aware of the connection between animal cruelty and interpersonal violence; though mutilation of dissected specimens may only reflect a temporary desensitization, it should not be ignored or regarded as an excusable youthful indiscretion.

6. Ethics should be part of the education of all children, and dissections should not be conducted in the absence of ethical discussion about the origins of the animals and the moral implications of using them.

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1 When the author of this monograph shared his ethical concerns about a required fetal pig dissection with his students enrolled in a large freshman undergraduate biology course, a disproportionate number of them (12 out of 40, compared with reportedly 3 out of some 700 students enrolled in the rest of the class) elected not to dissect a pig, even though this option required a written statement of justification and a private meeting with course administrators.

2 Unlike the students in Solot’s study, who seemed to carry on fairly obliviously to her presence, Solot noted that the teacher acted suspicious of her, her topic of study, and her presence in the school during the weeks she visited. For this reason it was sometimes difficult to tell how the teacher’s awareness and apparent discomfort with the researcher’s presence affected her behavior in the classroom, and Solot sometimes felt certain that a specific comment by the teacher was made for her benefit only.