The Kansas Board of Education "'dumbed down' our minimum requirements, but they can't dictate what is taught in the classroom," writes a Kansas resident. The salary situation for biomedical postdocs is discussed, and advice is offered to both faculty and postdocs. A News article about a postdoc's decision to leave science draws comment from a former lab member. It is pointed out that false-positive results by polygraphs are harmful. And a question raised in a previous letter about validation of evolutionary theory is addressed.

Keeping Calm About Kansas

Although the Kansas Board of Education (BOE) decision has made a mockery of science standards, it will probably have a net positive impact in most Kansas classrooms. Good science teachers will take this as an opportunity to explore the difference between science and nonscience. But from this whole episode, I question the response of some toward Kansas (Herbert Lin, Letters, *Science*'s Compass, 17 Sept., p. 1849). Disallowing credits from Kansas high school science classes would be purely political and symbolic because the BOE decision is unlikely to have a significant impact on the average quality of Kansas high school biology courses. The proposal to give biology credit on the basis of standard tests is fine, but only if applied to all students, not just those from Kansas.

An extremist minority has temporarily taken control of an elected political body in our state. They have "dumbed down" our minimum requirements, but they can't dictate what is taught in the classroom. Our governor has strongly opposed their decision, and their tenure will undoubtedly be vigorously challenged at the next election. In the meantime, it would help to remain cool-headed. One doesn't want to look too much like the church defending the doctrine. Lin's proposal sounds ominously similar to excommunication.

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The proposal by Lin for colleges to refuse to count as an academic subject any high school biology course taught in Kansas is provocative but may not be necessary. The Kansas Board of Education dropped the teaching of evolution and the origin of the universe from mandated state science curriculum standards, but did not ban them. It is up to each of the state's 304 school districts to decide what to teach and how to present it. Among the many efforts by scientists, the Kansas Geological Survey, with assistance from the National Academy of Sciences, is providing resource materials and offers of assistance to help school district officials make informed decisions about their curricula. A number of school districts have announced their intent to continue to teach evolution and cosmology. We are hopeful that others will as well.

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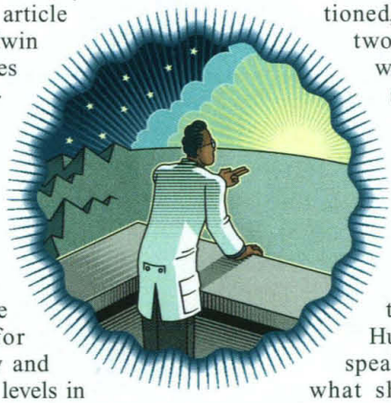
Postdoc Advice

My fellow postdocs and I read the special section "Postdocs working for respect" (3 Sept., p. 1513) with great interest. Of the many issues facing the biomedical postdoc, here we focus on one: money. We appreciated the recent increase in the de facto national salary levels [the National Research Service Award (NRSA) stipends], yet we believe that those holding the reins are still abdicating responsibility. In Jeffrey Mervis's News article (p. 1519), Wendy Baldwin of the National Institutes of Health (NIH) is quoted as saying that institutions may supplement NRSA levels; but ask a supervisor and you're likely to hear that his or her hands are tied because of the NIH. We ask the faculty to stand up for what is right—actively and consistently. The salary levels in effect until the recent increase were nothing if not shameful. We hope that future postdoc salaries will be determined on the basis of merit and humanity, rather than budgetary whims and windfalls.



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Another issue is cost-of-living (COL) increases. The NIH's technical excuse for avoiding COL increases is that postdocs are not employees because they are in training (p. 1520). As has been said, postdocs are the most dollar-efficient part of the research machine: When do we have time for all this training? The similarity of postdoctoral positions to ordinary jobs, where some start-up training is always necessary, is too often overlooked.

But postdocs must get their heads out of the sand and stand up for their financial self-interest. The first step is to negotiate salary before beginning a postdoctoral job. During employment, postdocs should ask for and expect significant raises and keep the larger picture in mind: What are the chances of landing a faculty position? Would it be enjoyable working for a pharmaceutical or consulting firm? What are lifestyle and family needs? Postdocs should seek advice from scientists ahead of them in both academic and nonacademic career tracks, as is most efficiently organized by a postdoctoral association or career office. Faculty must be sensitive to the tight academic job market. They should encourage the development of a range of skills and seek out nonacademic career opportunities for their postdocs. These are the competitive tonics postdocs so desperately need.

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Dan Ferber's article "Irreconcilable differences" (3 Sept., p. 1516) highlighted the inherent problems of the unequal struggle between trainees and mentors to resolve severe differences. This serious issue was reduced to personal mudslinging by the use of two case reports. I was a postdoc at the time in one of those labs mentioned, and I witnessed how two intelligent people—who had started out their scientific relationship with high mutual expectations and great enthusiasm—found it difficult to handle the situation when the project didn't work out. In my experience, the supervisor, Ann Hubbard, is not shy about speaking out openly about what she thinks is right or wrong, a trait that in this case seems to have contributed to a trainee's decision to leave science. Similar situations have no doubt occurred elsewhere. Currently, the main option for disaffected postdocs is a formal grievance procedure. Perhaps a more effective way to avoid these situations is to implement advisory committees that evaluate the work of each postdoc on an annual basis and share the responsibility of guiding postdocs toward becoming independent researchers. To my knowledge, only Johns Hopkins University has

introduced such departmental committees, and only as of this year. I hope that more universities will follow.

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Response

Gudrun Ihrke states that a serious issue was "reduced to personal mudslinging" because the article described the specifics of two conflicts. The fact is that these two cases powerfully illustrate a larger problem: The lack of effective procedures to resolve serious differences between postdocs and advisors can and does damage people's careers. As the article and an accompanying article, "Getting to the front of the bus" (p. 1514) make clear, information about these kinds of situations has spurred postdocs to organize and push for better institutional protection. Johns Hopkins is indeed one of the first universities to require annual written evaluations of postdocs by departmental committees, as the accompanying article clearly states. But while postdoc activists called these committees an important step, they emphasized that effective grievance procedures are still necessary to resolve serious conflicts and hold both postdocs and advisors accountable.

Dan Ferber

Problems with the Polygraph

In David Malakoff's 3 September News of the Week article (p. 1467), the statement about polygraphs from the Department of Energy (DOE), that there are "no scientific studies" that cast doubt on their value "as an investigative tool," is incorrect. Allen Brett, John Beary, and I analyzed the polygraph's ability to generate a positive finding from those telling lies and a negative finding from those telling the truth (*1*). We used data from field studies of suspected criminals to determine the predictive power of the polygraph. Our analysis was weighted toward the most favorable evaluation of the polygraph because all of the studies had been performed by experienced operators in real-world investigations where truth or falsehood was subsequently determined by confession of the guilty party. We found that the polygraph detected those lying at little better than the rate predicted by chance alone. If an interrogator flipped a coin, with heads for liars and tails for truth-tellers, then the results would be about the same as with a polygraph.

If the polygraph were merely useless, it would not be so bad. Unfortunately, it is harmful because it generates a large number of false-positive test results that may incriminate people who are telling the truth. Suppose 1000 people were screened, and 50 of them were liars. The polygraph would generate positive results in 38 out of 50 liars and in 351 out of 950 truth-tellers, that is, more than nine false positives for every true positive. The polygraph gives the wrong answer 9 times out of 10, and who would want to use a fire alarm or a cancer test that was wrong 90% of the time?

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Evolution Flies

Although the editorial by Stephen Jay Gould (*Science*'s Compass, 25 June, p. 2087) was perhaps peculiar, David W. Hogg's statement (Letters, *Science*'s Compass, 30 July, p. 663) that the hypothesis of evolution has not been "validated" seems extreme. When Wallace and Darwin independently concluded (from the pattern of morphological types of plants and animals between islands and continents) that new species evolved from previously existing species and that many current species shared common ancestor species, they were suggesting an alternative to their previous view that each species was created independently. They knew nothing about molecular biology, but these two hypotheses make very different predictions about molecular biology. Creation theory predicts that molecular components and processes in one species will be unlike those in another species, whereas evolution predicts that they will be similar and that differences will occur in particular patterns representing evolutionary change. In this regard, evolution is a superior hypothesis because it makes more specific predictions and is thus more easily refuted.

The last 100 years have provided an enormous amount of information that fits an evolutionary pattern—from basic facts such as that all organisms contain proteins and nucleic acids, to the deluge of sequence data that derive practical value from the fact that the data fit an evolutionary pattern. In addition, the mechanisms by which genetic variation is produced and transmitted are now well known. From what has been learned about the internal mechanisms of organisms, computer models demonstrate that evolution is inevitable. And finally, evolu-

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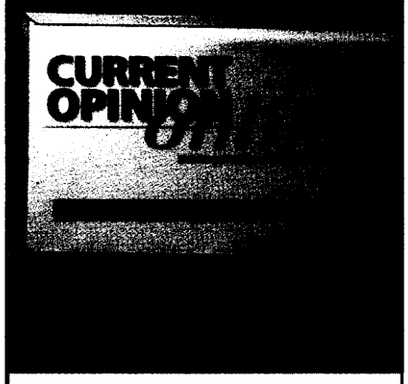

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