LETTERS

Leopard Frog Supply

The northern leopard frog *Rana pipiens* has been for many years the principal amphibian used for biomedical research and teaching. Unfortunately, such frogs of northern origin are no longer available in significant quantities and biological supply houses have turned to other regions, notably northwestern Mexico, as a source of frogs. The biology of these Mexican frogs is clearly different from that of the northern *R. pipiens*, a matter that was extensively discussed at a symposium on the laboratory frog (*1*), which was attended by major commercial frog suppliers. Recently it has been shown that, in the region of northern Sinaloa, Mexico, where most of these leopard frogs are collected, no *R. pipiens* are to be found. Instead, there exist two sympatric species of leopard frogs, *R. berlandieri forreri* and *R. magnaocularis* (*2*). Commercial collections made in this area from October through March contain about 80 percent *R. berlandieri forreri* and 20 percent *R. magnaocularis*. During other times of the year even fewer *R. magnaocularis* are found in these collections. Northeastern Mexico has now become an additional source of leopard frogs, and collections from this region are composed of *R. berlandieri berlandieri*.

For reasons unclear to us, commercial houses are now supplying Mexican leopard frogs designated as "*Rana pipiens berlandieri*." This is an unsatisfactory circumstance, not only because of the erroneous nomenclature, but because articles are beginning to appear about research, the meaning of which will be questionable, since the actual species on which the work was done is not known. Of more serious consequence is the fact that some investigators may think that they are working on *R. pipiens* when actually they are not. If there were no significant physiological differences among the various species of leopard frogs, the error in nomenclature would present no major problem; however, this is not the case. It has been pointed out in one demonstration of such physiological differences that melanophores of frogs of southern origin (*R. berlandieri forreri*) contain a preponderance of β-adrenergic receptors, while those from northern frogs (*R. pipiens*) contain mostly α-adrenergic receptors (*3*). Other physiological differences among leopard frog species include variations in reproductive cycles, in temperature tolerance, and in enzyme composition. The last is well mani-

fested in the heterogeneity of isozyme patterns among leopard frog species (*4*).

We wish to emphasize that the various leopard frog species possess different biological characteristics that must be considered when they are used for experimentation.

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References

1. A symposium, "The Laboratory Frog: Aquisition, Nurture, and Health," was held at the annual meeting of the American Society of Zoologists in Minneapolis, Minn., in August 1972. The papers presented were published in *Am. Zool.* **13**, 79 (1973).
2. J. S. Frost and J. T. Bagnara, *Copeia* (No. 2), 332 (1976).
3. M. E. Hadley and J. E. Goldman, *Am. J. Physiol.* **219**, 72 (1970).
4. J. E. Platz, *Copeia* (No. 4), 660 (1976).

Engineering Ph.D.'s

A statement is made in John Walsh's article "The state of academic science: Concern about the vital signs" (News and Comment, 10 June, p. 1184) which I feel requires correction. Walsh says, "Engineering is in the midst of one of its cyclical booms in undergraduate enrollment but finds the opposite effect in its doctoral programs, apparently as a result of industry's current coolness to engineering Ph.D.'s."

It is true that engineering doctoral enrollment has been declining in recent years, but the evidence does not support the reason suggested by Walsh. Certainly there are some employers who are critical of Ph.D.'s, but surveys conducted by the Engineering Manpower Commission since 1970 show that 92 to 97 percent of engineering Ph.D.'s have been employed (or had other personal plans) by the time of graduation. This employment record is even better than that for B.S. holders in engineering, who in recent years have been 86 to 96 percent employed (or had other personal plans) by commencement time. Since only a third of engineering Ph.D.'s go to educational institutions and only 3 percent into postdoctoral positions, it is difficult to find in this fine employment record any evidence of industrial coolness.

A more likely explanation for the numerical decrease in engineering Ph.D.'s is to be found in the federal government's restrictive attitude toward training grants and a very negative report of the National Science Foundation (NSF) in 1971 (*1*). In that report NSF predicted that there would be a 40 percent surplus of engineering Ph.D.'s by 1980. However, the prediction was partially based on the assumption that the production of engineering Ph.D.'s would continue to increase during the 1970's. Overlooked was the fact that engineering doctoral enrollment had already begun to decline 3 years earlier, in 1968. Doctoral enrollment declined even further after publication of the NSF report. No surplus has yet developed, but it could not realistically be argued that there is a shortage, either. Perhaps the adverse prediction of the report, even though erroneous, prevented the occurrence of the very event it warned against.

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References

1. *1969 and 1980 Science and Engineering Doctorate Supply and Utilization* (NSF 71-20, National Science Foundation, Washington, D.C., 1971).

"Kerfuffle" Identified

The word "kerfuffle" questioned by Frank M. McMillan (Letters, 3 June, p. 1041) is recognized as a noun in volume 2 of the supplement to the *Oxford English Dictionary*.

"Kerfuffle" is also "curfuffle" (1813) and "gerfuffle" (1943). Kerfuffle was first spotted in 1959.

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McMillan appears to suffer from a deficiency of dictionaries. If he looked, he would find "kerfuffle" in the supplement portion of Eric Partridge's *A Dictionary of Slang and Unconventional English* (Macmillan, New York, ed. 7, 1970).

McMillan's brilliant analysis is merely another example of an unnecessary hypothesis based on a faulty premise.

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McMillan discusses the word "kerfuffle" as if it had been invented by Nicholas Wade. While I cannot give any definitive origin of the word, its meaning, to me at least, is perfectly clear and very expressive. I first heard it while visiting a friend in Uganda over a quarter of a century ago. The friend was British, an official in the Uganda Survey. He was de-