Jones, 1973). However, Zweifel (1968) has shown that the distinct gap in variation between the species in one mating call component, pulse repetition rate, allows recognition of intermediate calls and presumed F_1 hybrids. Although Blair (1941) claims to have heard some intermediate mating calls in his study population near Bloomington, it is not possible to estimate actual numbers of hybrids from his data. Hence, it is difficult to accept the validity of the percentages of hybrids (8.6% hybrid individuals and 9.4% interspecific matings) determined by Jones from Blair's morphological data.

On the other hand, the evidence that hybrids were absent from Jones' study population of 1970–71 is not convincing. Indeed, the graphical presentation of the morphological analysis (Fig. 3, p. 439) could be interpreted as comprising both pure species types and F_1 hybrids. Lack of intermediate pulse rates of the mating call is the strongest evidence for the absence of hybrids. But Jones does not indicate the number of recordings made when both species were breeding together, since this is the time we would most expect hybrid males to be calling. If this number were small, then the probability of recording hybrids would be correspondingly small. So we are left not really knowing how many hybrids there were in 1938–40 or whether they were really absent in 1970–71.

The use of such evidence can be criticized in general because of the possibility that a run of years with appropriate temperature conditions and subsequent lack of overlap in the breeding seasons of the two species (Cory and Manion, 1955; Jones, 1973) would temporarily remove the possibility of hybridization. For example, in 1970 at Bloomington, there was no overlap in breeding seasons (Jones, 1973). Thus, there may be an oscillation in the frequency of hybrids over a period of many years.

Jones' second argument concerns the supposedly reduced variance in pulse rate for males which breed during the period in interspecific temporal overlap. Presumably, Jones' contention that the pulse rate variance is reduced in this way is based on his data in Fig. 5, p. 442 where pulse rate is plotted against time through the breeding season. Pulse rate is known to vary with temperature in these species (Zweifel, 1968). Comparison of data of Jones with that of Zweifel (1968, Fig. 8, p. 281) indicates that Jones' recordings were made across a range of temperatures sufficient to double the pulse rate of any individual. The pulse rates must be corrected to a common body temperature before any conclusions about differences in variance can be made.

An additional comment should be made about the analysis of pulse rate. Jones observed a correlation between day of recording and pulse rate. He suggested that the relationship is a causal one; that is, pulse rate increases due to length of time after emergence from hibernation. I suggest that a simpler explanation would be that temperatures at Bloomington increased steadily during the months of his study (April, May and June) and if pulse rate were standardized to a common temperature, no change with time would be evident.

Literature Cited

Blair, A. P. 1941. Variation, isolating mechanisms and hybridization in certain toads. Genetics 26:398–417.

Cody, M. L. 1973. Character convergence. Ann. Rev. Ecol. Syst. 4:189–211.

Cory, L., and J. J. Manion. 1955. Ecology and hybridization in the genus *Bufo* in the Michigan-Indiana region. Evolution 9:42–51.

Grant, P. R. 1972. Convergent and divergent character displacement. Biol. J. Linn. Soc. 4: 39–68.

Jones, J. M. 1973. Effects of thirty years hybridization on the toads *Bufo americanus* and *Bufo woodhousii fowleri* at Bloomington, Indiana. Evolution 27:435–448.

Levin, D. A. 1969. The challenge from a related species: a stimulus for saltational speciation. Amer. Nat. 103:316–322.

Littlejohn, M. J. 1965. Premating isolation in the *Hyla ewingi* complex (Anura:Hylidae). Evolution 19:234–243.

Thielke, G. 1969. Geographic variation in bird vocalizations. *In* R. A. Hinde, (ed.) Bird vocalizations. Cambridge Univ. Press, Cambridge.

Zweifel, R. G. 1968. Effects of temperature, body size, and hybridization on mating calls of toads, *Bufo americanus* and *Bufo woodhousii fowleri*. Copeia 1968:269–285.