

was able to elicit a distress call from this species with electric shock applied to the nasal region. Accordingly, several specimens were transported to the laboratory at Southeastern Massachusetts University and exposed to pulsed electric stimuli on the nasal region. We were unable to elicit a call of any kind.

Although it might appear that the call herein described is unique, we have reliable reports from observers in Massachusetts (Cook's Pond, Fall River and Cedar Dell Pond, Dartmouth) of *R. catesbeiana* uttering "cat-like screams" lasting several seconds.

Oscillograms were prepared from the tapes using a storage oscilloscope (Tektronix Type 549). Fig. 1 shows the intensities of the call are relatively uniform. Oscillograms were prepared two and five seconds into the second scream (Fig. 1 C, D). Although these calls are rich in harmonics, frequencies of approximately 3000 hz are evident. There is no indication of regular pulses. Bogert (1960) noted the dominant energy in the distress calls of three species of *Rana* was above 1000–1500 hz.

The vocal repertoire of the bullfrog has been extensively studied (Capranica, 1968; Weiwandt, 1969). This paper records an additional distress call of up to 9 seconds in duration with frequencies up to 3000 hz. This scream is uttered with the mouth closed.

We thank Mr. John E. Hart for his help in preparing the oscillograms.

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MATING CALL DIFFERENCES BETWEEN EASTERN AND WESTERN POPULATIONS OF THE TREEFROG *HYLA CHRYSOSCELIS*.—*Hyla chrysofelis* and *H. versicolor* are genetically incompatible and are most readily distinguished by differences in mating calls (Johnson, 1966). Although Johnson (1966) presents measurements of mating call pulse-repetition rates for many populations of the two species in the eastern one-half of the United States, he fails to adjust his measurements for temperature effects. Thus, his data cannot be used to assess geographic variation in this parameter. This report deals with geographic differences in mating calls of *H. chrysofelis*.

Using a Uher 4000L recorder and a Uher dynamic or Sony condenser microphone, I recorded at 19 cm/sec the mating calls of 46 male *H. chrysofelis* from populations within 70 km of Savannah, Georgia and of 3 males from Bastrop Co., Texas. Recordings of 42 additional males from Bastrop and Burleson Cos., Texas were made available by D. B. Ralin. Five calls per male were analyzed with a Kay 6061B sound spectrograph. Dominant frequencies were determined from narrow band (45 Hz) sonagrams, and pulse-repetition rates and call durations from wide band (300 Hz) sonagrams. The principal differences between calls of eastern and western populations were in the last two characteristics (Table 1).

Call discrimination tests were conducted in the field or in an auditorium at the Savannah Science Museum. Two Uher recorders were used to drive 2 Quam 8A4PA or Nagra DH speakers, placed 4 m apart. Each acoustic stimulus consisted of one call transcribed (19 cm/sec) on a tape loop long enough to contain the call and an average interval of silence. Characteristics of the three calls used are given in Table 2. Each call was recorded at air temperatures between 23.5 and 24 C. Eight females were tested at air temperatures between 24 and 25.2 C, and one female was tested at 21.5 C. Sound pressure levels of the two stimuli presented in each test were adjusted (General Radio 1551C sound level meter) to the same value (82 to 85 dB re 0.0002 microbar) at a point midway between the speakers. The nine females from within 50 km of Savannah were released, one (7 tests) or two (1 test) at a time, from a fingerbowl located midway between the speakers. A call of a Georgia male

TABLE 1. COMPARISON OF SOME PHYSICAL CHARACTERISTICS OF THE MATING CALLS OF EASTERN AND WESTERN POPULATIONS OF *Hyla chrysoscelis*. The means \pm 2 S.E. are followed by the ranges in parentheses.

	Number of males	Mean pulse-repetition rate (pulses/sec) ¹	Mean call duration (sec) ¹	Mean dominant frequency (kHz)
Eastern populations (Chatham, Bulloch, Bryan Cos., Ga.; Beaufort Co., S. C.)	46	44.6 \pm 0.6 (39.5–48.5)	0.75 \pm .05 (0.46–1.31)	2.45 \pm 0.05 (2.05–2.80)
Western populations (Bastrop and Burleson Cos., Texas)	45	55.1 \pm 1.3 (46.0–64.3)	0.45 \pm .02 (0.34–0.64)	2.57 \pm 0.07 (2.18–3.10)

¹ Corrected to 24 C, by linear least-square regression coefficients.

was played from one speaker and a call of a Texas male was played simultaneously from the opposite speaker. A Type *A* response was defined as one or more physical contacts with a speaker. After a type *A* response, the calls were exchanged between the speakers. The experimental female would then be within 1 m of the speaker broadcasting an alternative stimulus. If the female responded to the same call to which she made the initial Type *A* response, but now coming from the distant speaker, this was defined as a Type *B* response. A response to the closer stimulus was designated a secondary response (Littlejohn et al., 1960). The results of these tests indicate that females from eastern populations discriminate in favor of mating calls of males from the same region (Table 3). The call of the Texas male was not entirely unattractive to eastern females; however, since each of five made one or more secondary responses to this stimulus.

There are other wide-ranging species in which populations at the extremes of their distributions are so well-differentiated as to be potentially isolated from one another (Mayr, 1963). Littlejohn (1960) reports that eastern and western populations of *Pseudacris triseriata* are potentially isolated by re-

productive behavior, and the same is true for *Acris crepitans* (Capranica and Nevo, pers. comm.). In *H. chrysoscelis* it will be important to determine whether there is clinal variation in mating calls, with intermediate types in intermediate populations.

Although *H. chrysoscelis* and *H. versicolor* are sympatric over a wide area in central Texas, not all breeding sites in this region support both species. Ralin (1968) suggests that reinforcement of mating call differences occurs in this area and reports that the mean pulse-repetition rate of *H. chrysoscelis* from Elgin, Bastrop Co., Texas, where *H. versicolor* was absent, was slower than in males from breeding sites in which *H. versicolor* was present. The latter localities were within 80 km of Elgin. In my sample of calls from central Texas I found no significant differences when comparing the pulse-repetition rates of males from mixed breeding sites with those from localities where only *H. chrysoscelis* called. Call reinforcement in central Texas needs further study. Indeed, more populations in other parts of the range should be analyzed before concluding that the differences between eastern and western populations documented herein are the result of call reinforcement.

This paper is based on part of a Ph.D.

TABLE 2. CHARACTERISTICS OF *Hyla chrysoscelis* CALLS USED IN DISCRIMINATION EXPERIMENTS.

	Pulse-repetition rate (pulses/sec)	Call duration (sec)	Dominant frequency (kHz)
Savannah, Chatham ¹ County, Georgia	43.1	.90	2.50
Savannah, Chatham ² County, Georgia	42.5	.82	1.25
Bastrop County, Texas (25 km E Austin)	51.5	.41	2.50

¹ Used in 6 experiments.

² Used in 2 experiments.

TABLE 3. RESPONSES OF FEMALE *Hyla chrysoscelis* FROM EASTERN GEORGIA AND SOUTH CAROLINA IN CALL DISCRIMINATION EXPERIMENTS.

Number of females	FR ¹	Responses to calls of <i>H. chrysoscelis</i> from Chatham Co., Ga.			Total	FR	Responses to calls of <i>H. chrysoscelis</i> from Bastrop Co., Tex.			Probability (two tailed binomial)
		A ²	B ³				A	B	Total	
9	9	13	7	20	0	1	0	1	0.004 (9-0)	

¹ FR = first response

² A = Type A response

³ B = Type B response

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THE STATUS OF *TRACHEMYS JARMANI* HAY WITH CLARIFICATION OF THE FOSSIL RECORD OF *DEIROCHELYS*.—Our knowledge of late Cenozoic turtles is far from complete. However, in striving to complete gaps in this knowledge, it occasionally becomes necessary to examine and re-evaluate previously described material. Weaver and Robertson (1967) in studying fossil turtles previously assigned to the genus *Trachemys* (= *Chrysemys scripta* complex) erroneously re-assigned *Trachemys jarmani*

Hay to the genus *Deirochelys*, regarding it as conspecific with Recent *D. reticularia*.

I have examined a cast of the holotype of *T. jarmani* (FSM 10000) and find its referral to *Deirochelys* unwarranted. Although the type is a nuchal bone that is incomplete posteriorly (measurements in millimeters: total length—61, midline length—47, anterior border width—37, maximum width—80), enough bone is present to show clearly the massively thickened central region of the element, and the extensive lateral areas occupied by the costal (lateral) scutes. Neither of these characteristics is developed in Recent or fossil *Deirochelys*, but both characteristics are encountered in Recent and extinct species of the genus *Chrysemys* (sensu McDowell, 1964). In view of the foregoing remarks and the fragmentary nature of the type specimen, I refer *Trachemys jarmani* Hay to *Chrysemys* sp. indet.

A further confusion regarding the status of Pleistocene *Deirochelys* has arisen from the work of Weaver and Robertson (1967) and requires clarification. Jackson (1964) examined *Deirochelys floridana* Hay and found it definitely referable to the genus *Pseudemys* Gray (now *Chrysemys*), not *Deirochelys*. Jackson (1964) diagnosed a partial nuchal element from a Pleistocene deposit in Marion County, Florida as being conspecific with Recent *Deirochelys reticularia*. Weaver and Robertson (1967) in citing Jackson's (1964) work, incorrectly stated that he "... showed Hay's (1908) *D. floridana* was actually *D. reticularia*."

Additionally, in their account of Pleistocene *Deirochelys* (Fig. 2, p. 55), they overlooked the Marion County specimen (a true *Deirochelys*), but gave the erroneous impression that *Deirochelys* is known in the Pleistocene from two specimens, the respective types