



Communication in Richardson's ground squirrels

I. Presentation of Richardson's ground squirrels

II. Communication in Rgs

III. Ultrasonic calls

IV. Semantic in alarm
calls : chirps and whistles

V. Conclusion



I. Presentation of Richardson's ground squirrels

- Order : Rodentia

Family : Sciuridae

Species : *Spermophilus richardsonii*

- Coat : Grey to Brown

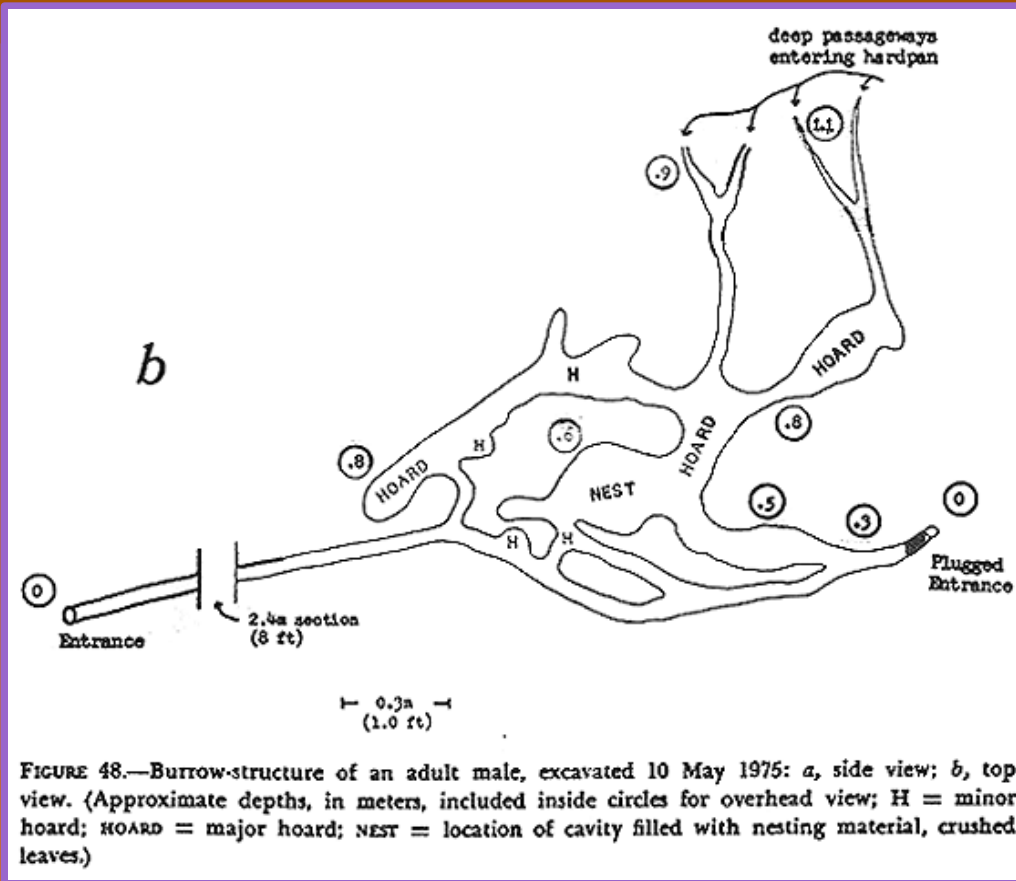
- Size : 30 cm + 7,4 cm for the tail; 250-500 g

- Longevity : until 5-6 years, dependent on the sex

- Considerated as pests for many farmers

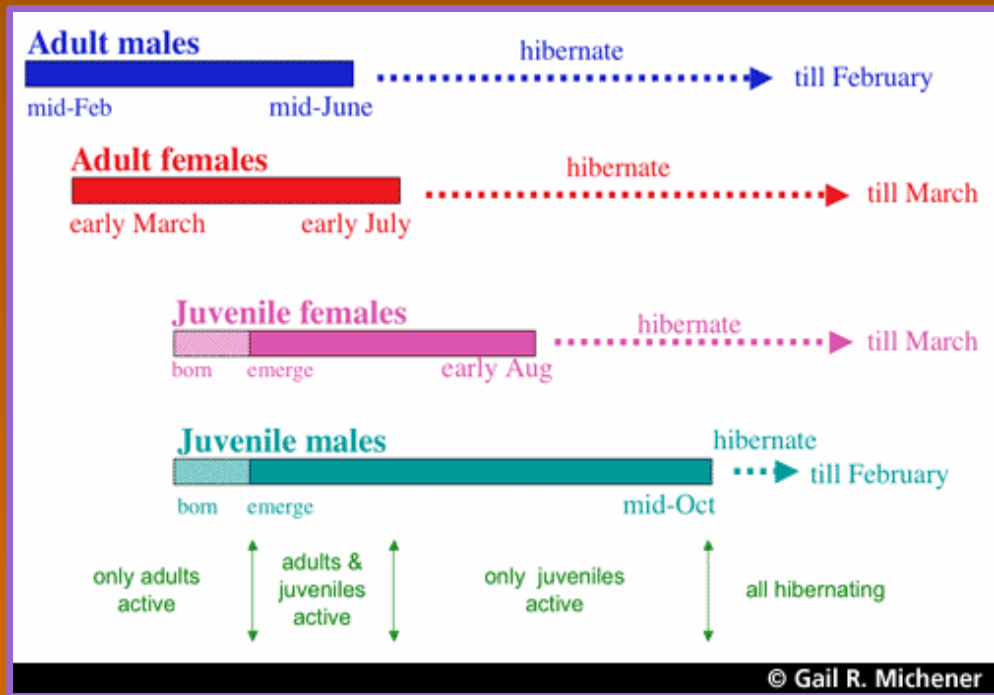


- Live in great community, within each animal has his own home range and burrow



Burrow : openings, tunnels, sleeping chambers, routes to surface; hibernaculum

- Model for studies in :
 - neurobiology of rhythms : hibernation and torpor



The hibernation lasts until 8 months, with a cycle for the reproduction

Period dependent on the sex and age



– Social organization : female kinship



Consequences on :

- male behaviours :
dispersion, fights,
energy expenditure and
longevity
- female behaviours :
tolerance, rounding up,
period of activities
- sex-ratio

II. Communication in ground squirrels



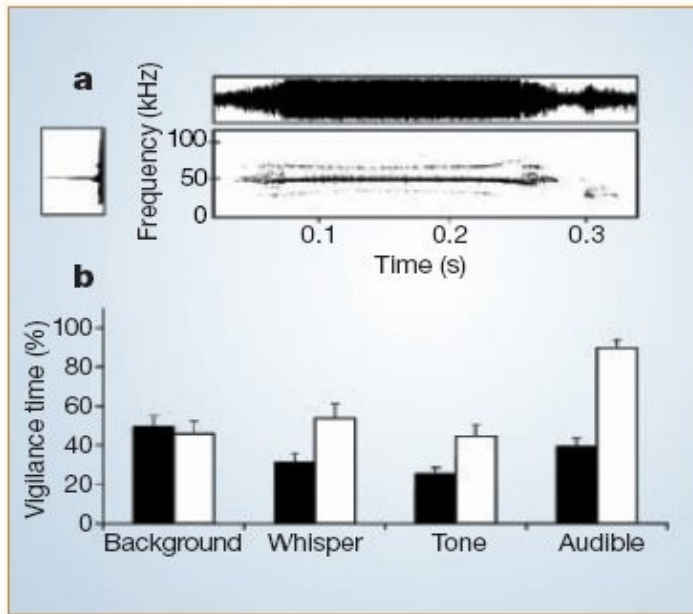
- Vocal communication : about 20 calls (alarms calls, mother-youngs calls, in fights...)



- Tactil communication : males sniff the genital region of females to assess the reproductive status; kisses to recognize oneself



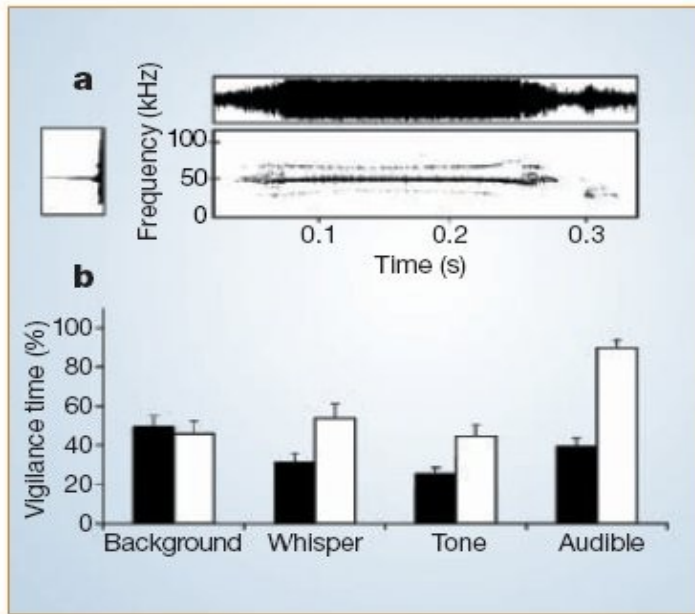
III. Ultrasonic calls



Ultrasonic 'whisper' calls by Richardson's ground squirrels and the response to them. **a**, Spectrogram (bottom) shows the call duration (238 ms) and dominant frequency (51.6 kHz) of the primary syllable; the signal intensity is represented along the time axis by the density of the grey scale. Inset left, power spectrum showing the intensity of individual frequencies (averaged across the signal). The time–amplitude window (top) shows the overall signal intensity relative to background noise. **b**, Proportion of time (\pm s.e.m.) that squirrels ($n=19$) devoted to vigilant behaviour before (black bars) and during (white bars) the playback of whisper calls and of the three control calls. All experiments complied with the guidelines of the Canadian Council on Animal Care.

- Signal : to warn conspecifics of danger
- Advantage : highly directional and inaudible to predators
- Whisper call : 225 ms and 48 kHz

III. Ultrasonic calls

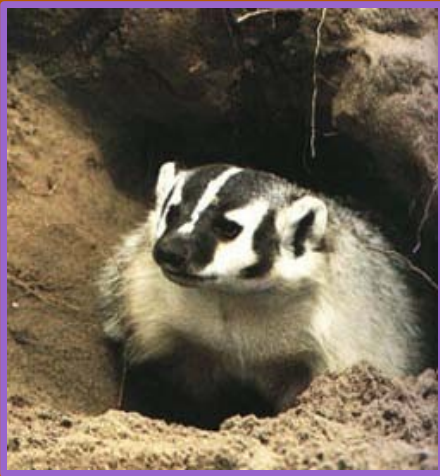


Ultrasonic 'whisper' calls by Richardson's ground squirrels and the response to them. **a**, Spectrogram (bottom) shows the call duration (238 ms) and dominant frequency (51.6 kHz) of the primary syllable; the signal intensity is represented along the time axis by the density of the grey scale. Inset left, power spectrum showing the intensity of individual frequencies (averaged across the signal). The time–amplitude window (top) shows the overall signal intensity relative to background noise. **b**, Proportion of time (\pm s.e.m.) that squirrels ($n=19$) devoted to vigilant behaviour before (black bars) and during (white bars) the playback of whisper calls and of the three control calls. All experiments complied with the guidelines of the Canadian Council on Animal Care.

- Experiences of playback :
 - increase vigilance of recipients
 - whisper : fewer responses than audible calls = less urgency
 - ultrasonic calls : attenuate rapidly : to warn philopatric kin

IV. Semantic in alarm calls

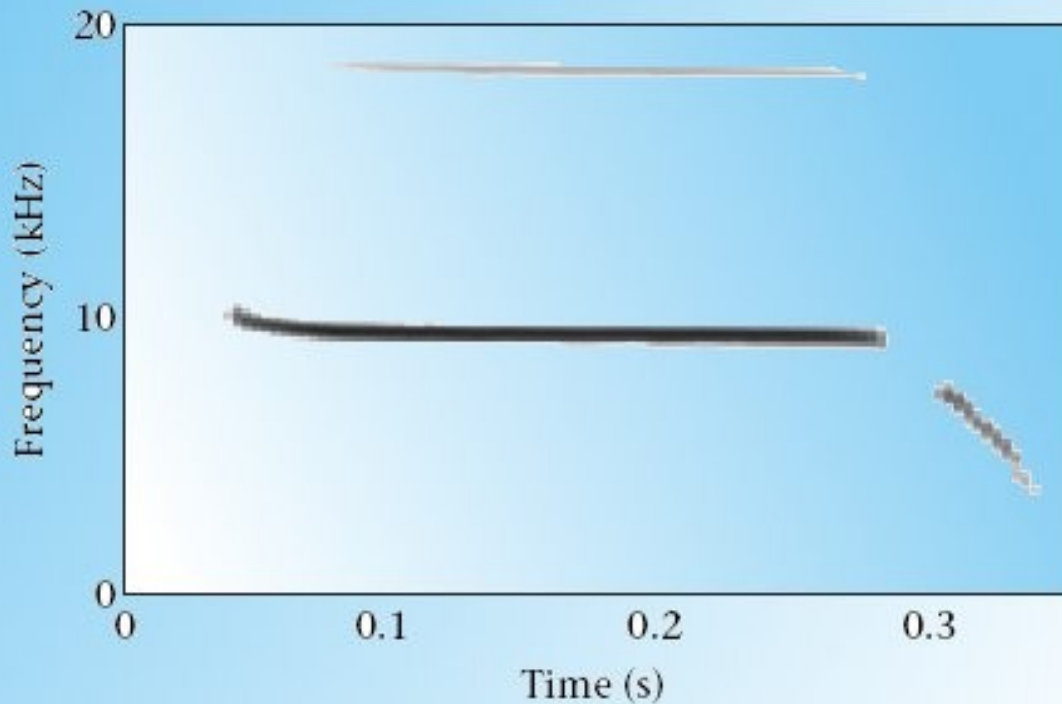
- Alarm calls : code for specific attributes of predators -> chirps : aerial predators



-> whistles : terrestrial predators

- Playback : antipredator calling behaviour

- Calls : presence or absence of chucks (acoustic element after a brief silence)



Spectrographic representation of the frequency versus time domain of a Richardson's ground squirrel 'whistle' (sensu Davis 1984) with a 'chuck' trailing the primary syllable.

J.L. Sloan, D.R. Wilson,
J.F. Hare, **2005**

- Chucks : increase of vigilance duration : greater attention
- Chirps : more attention than whistles



V. Conclusion



- Richardson's ground squirrels : complex animals with many specific behaviours
- Model for studies in neurobiology and social organization
- Developed communication : several specific calls, use of ultrasonic sounds, semantic in alarm calls
- As interesting as primates, so should be protected, too!

Thank you
for your
attention!



References

- J.L. Sloan, D.R. Wilson, J.F. Hare, **2005**. *Functional morphology of Richardson's ground squirrel alarm calls : the meaning of chirps, whistles and chucks*. *Animal Behaviour*, 937-344
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