

## Week 4

### (Preparing for) Tuesday's lecture:

**Budgeting homework time (50 min):** In Ch. 17, section 17.3 (the first half on **meerkats**) is 1547 words in length. At 200 words/min this would take less than 10 minutes if you just quickly read it. But when done properly, when you pause to watch the two short movies, and then review several figures, read and think about a few of the Integrating Questions, and take careful notes, this assignment should take you 50 minutes (but longer if you are distracted by texts, friends, email etc).

1. \_\_\_\_\_ **For Tuesday's lecture, slowly** read the first half of section 17.3 on meerkats that asks the question: "Does group living require more derived mechanisms of information transfer?". You can stop reading when you finishing reviewing Integrating Questions 25-27. Please carefully take written notes on this reading in your lecture notebook.
2. \_\_\_\_\_ **Try to answer some Integrating Question.** As you read the ICB textbook always attempt to test yourself a little, answer at least one of each set.
3. \_\_\_\_\_ (Trifecta): **Prepare to explain (aloud) Figures 17.9, 17.10, and 17.11 in class.**
4. \_\_\_\_\_ **Advanced:** Read on further, about Dr. Martha Manser's research on meerkats and check the Bibliography to look at one of her papers.



Reading 17.3 Meerkats Day 1 up to <sup>IQs</sup> 25-75

Q: Does group living require more 'derived mechanisms' of info transfer?

LGs - Explain how communication is used by animals that live in groups  
Demonstrate how the 'comparative approach' is used...

derived traits, what additional info might be exchanged?

ex. striped zebra vs horse

compare two species

Cape grey mongoose (solitary) vs. Meerkats (social group) mongoose

*Galerella pulverulenta*

year 2000

*suricata suricata*

Marta Manser et al - University of Cambridge <sup>Dept.</sup> (Zoology)

IQ: 19. What type of comm predict in solitary vs social mongoose?

20. Design an experiment to determine if comm differently?

(what variables hold constant?)

Cape grey mongoose - diurnal (day active), lives shrubby bush + eats small animals + insects. 90% sighting are of solo individual does not dig burrows, stays in thick vegetation (10% pairs) July/August

17.9 Figure - Cavallini + Nel 1990 (5 mongoose tracking) several weeks

Purpose - determine locations/range of mongooses <sup>South Africa</sup>

Methods - mongooses were trapped and fitted with radio collars. Followed locations over time.

Documented on map.

Findings - <sup>Prior Study 1</sup> 41 times (95.3%) of 43 sightings (alone).

2 times in pair.

<sup>Prior Study 2</sup> 89% solitary, 10% pairs, 10% three

Cavallini → 5 animals tracked

T6 21 1 2 1 7 22 also July/Aug vocalizations? 23. Why study solo species?

Meerkats

IQ: Predict behaviors Meerkats might use the Cape grey did <sup>not</sup>.

Manser et al <sup>Q</sup> wanted to know how group living influenced comm

→ observed meerkat behavior + recorded vocalizations <sup>South Africa</sup>

→ noted presence of potential predators (e.g. jackals, eagles, hawks, snakes)

Sentinel behavior - guard/watch - seen 55% time when foraging

- on duty vocalized 80% of time (8 of 10 min)

- used 1 of 6 different calls

Fig 17.10 A to D Sonograms of top 4 calls (single/double/triple/multi)

Manser 1999. Fig 1 a-d Methods - observe + record

Fig 17.11 Sonograms of alarm calls Aerial vs terrestrial

A predator type B generic

IQ 25: Design an experiment (w/ controls) - function of meerkat <sup>calls</sup>?

26: hypothe function of top four calls Fig 17.10, then 17.11? "on duty, I'm here"

Manser tested meaning/predictions via Play back exps.



## Section 17.3: Does group living require more derived mechanisms of information transfer?

### **Biology Learning Objective**

- Explain how communication is used by animals that live in groups.
- Demonstrate how the comparative approach is used to understand the evolution of sociality in animals.

- So let's try to remember what the stories and experiments were about....



# Two species of mongoose



Figure 17.8

A, John Richfield, 2012, Creative Commons. B, Sara&Joachim, Creative Commons



# The Cape grey mongoose (*Galerella pulverulenta*)

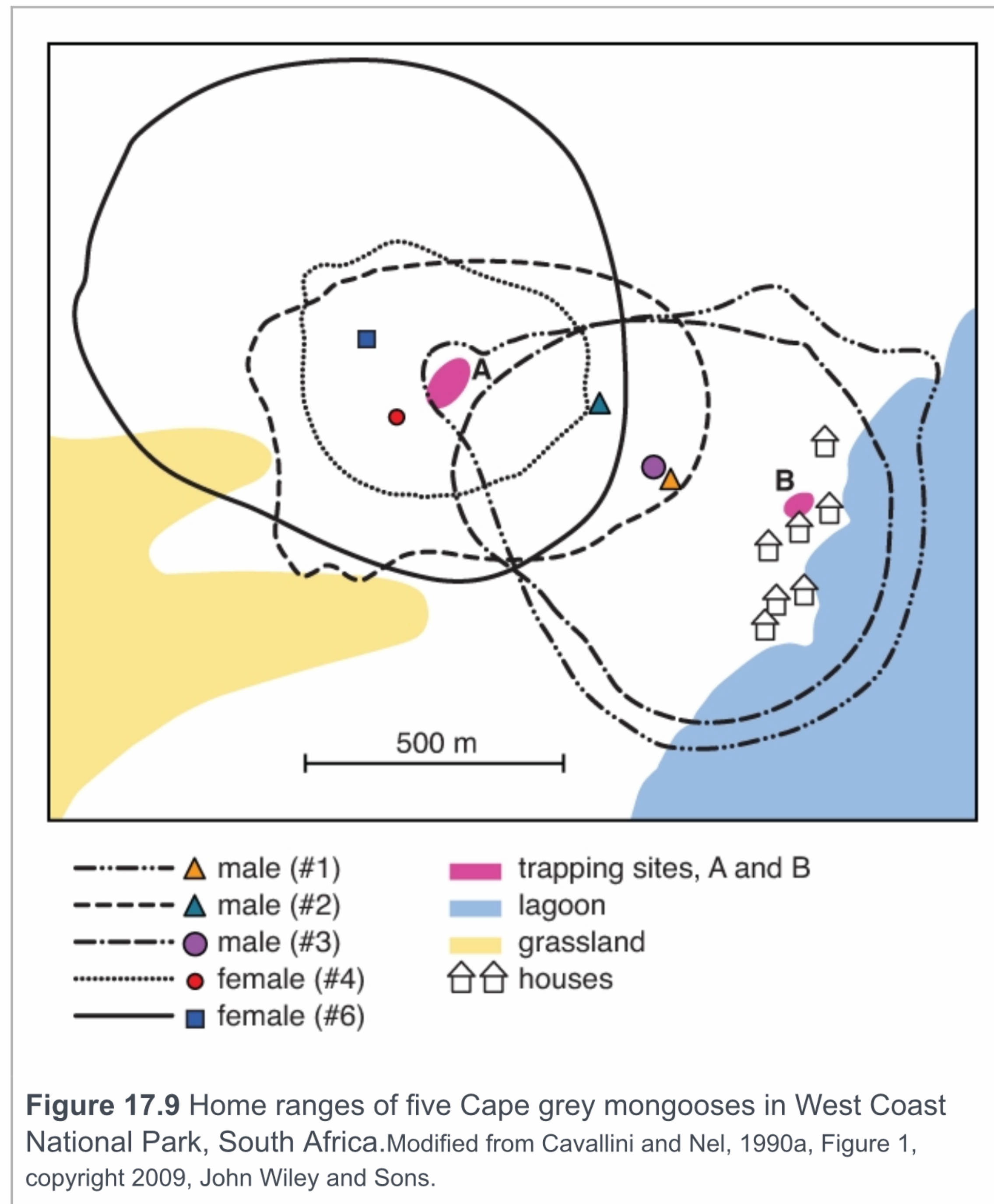


Figure 17.8

A, John Richfield, 2012, Creative Commons. B, Sara&Joachim, Creative Commons



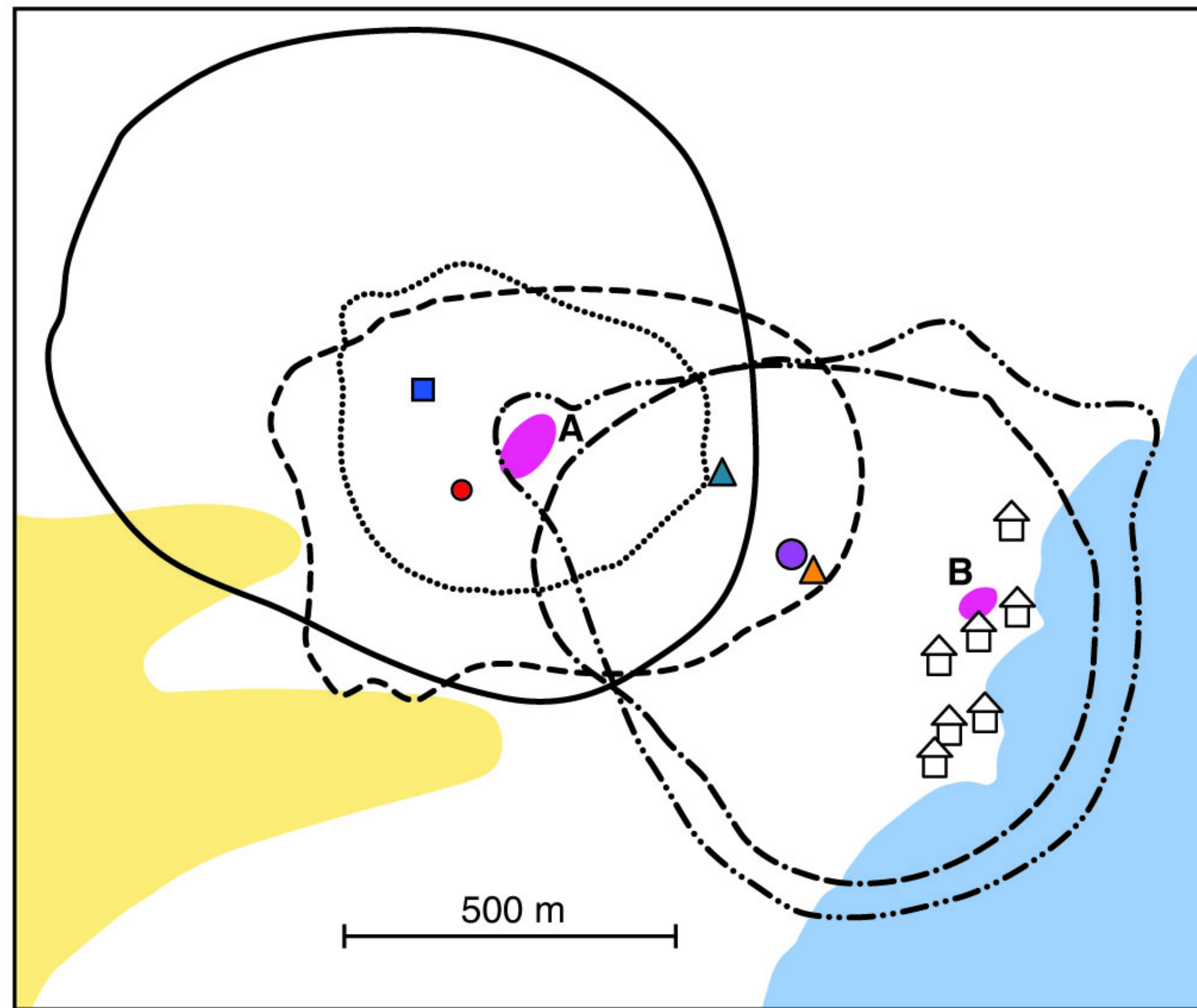
# Trifecta



**Figure 17.9** Home ranges of five Cape grey mongooses in West Coast National Park, South Africa. Modified from Cavallini and Nel, 1990a, Figure 1, copyright 2009, John Wiley and Sons.



# Home ranges of five Cape Gray mongooses



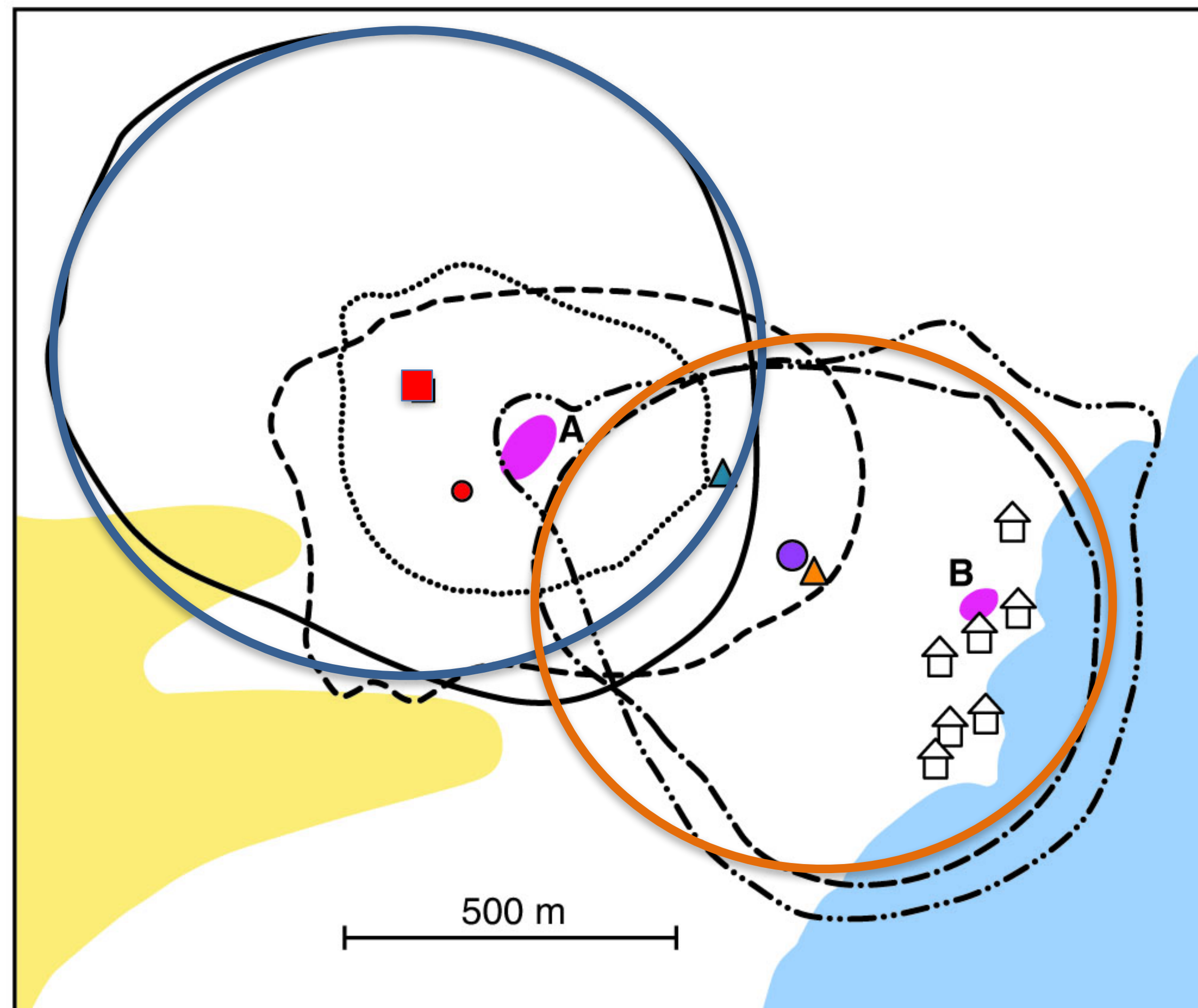
- |                         |                           |
|-------------------------|---------------------------|
| ..... ▲ male (#1)       | ■ trapping sites, A and B |
| --- ▲ male (#2)         | ■ lagoon                  |
| - · - · - · ● male (#3) | ■ grassland               |
| ..... ● female (#4)     | ☺☺ houses                 |
| — ■ female (#6)         |                           |

Figure 17.9



# Home ranges of five Cape Gray mongooses

Two home ranges are highlighted – what do you conclude about home ranges of the Cape Gray mongoose?



- |                    |                           |
|--------------------|---------------------------|
| -----▲ male (#1)   | ■ trapping sites, A and B |
| -----▲ male (#2)   | ■ lagoon                  |
| -----● male (#3)   | ■ grassland               |
| .....● female (#4) | ☺☺ houses                 |
| -----■ female (#6) |                           |

Figure 17.9



# What do we know about mongoose vocalizations and behavior?

- Diurnal
- Describe their habitat.
- Mostly solitary; when are they not?
- Do they vocalize? Where are the data?
- What are functions of vocalizations in solitary animals?

<http://www.youtube.com/watch?NR=1&v=vdg9gkmWsEA&feature=endscreen>

<http://video.nationalgeographic.com/video/player/animals/bugs-animals/spiders-and-scorpions/meerkat.html>



# Two species of mongoose

## Integrating Questions

24. Predict behaviors that meerkats might exhibit that the solitary Cape grey mongoose would not be expected to exhibit. Might the behavior exhibited by the meerkats in Figure 17.8B be such a behavior?



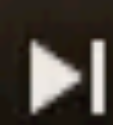
What are these meerkats doing?

Figure 17.8

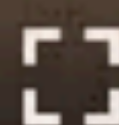
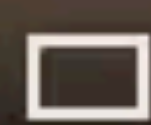
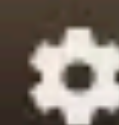




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# Integrating Questions



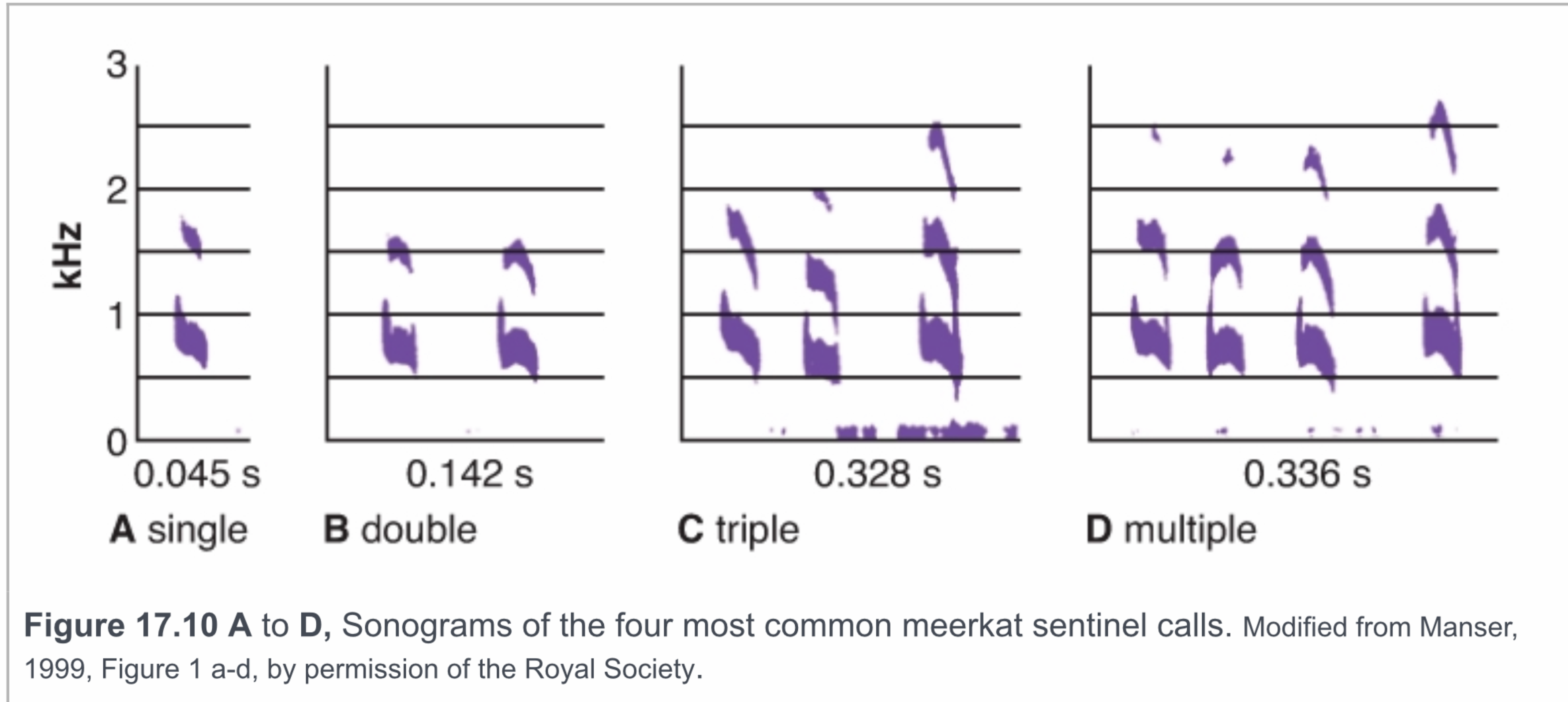
## Integrating Questions

19. What types of communication would you expect to find in solitary versus social mongooses?
20. Based on what you know about animal communication, design an experiment to determine whether social species of mongoose communicate in ways that solitary species do not. What variables would you want to hold constant in your study?

# Design an experiment

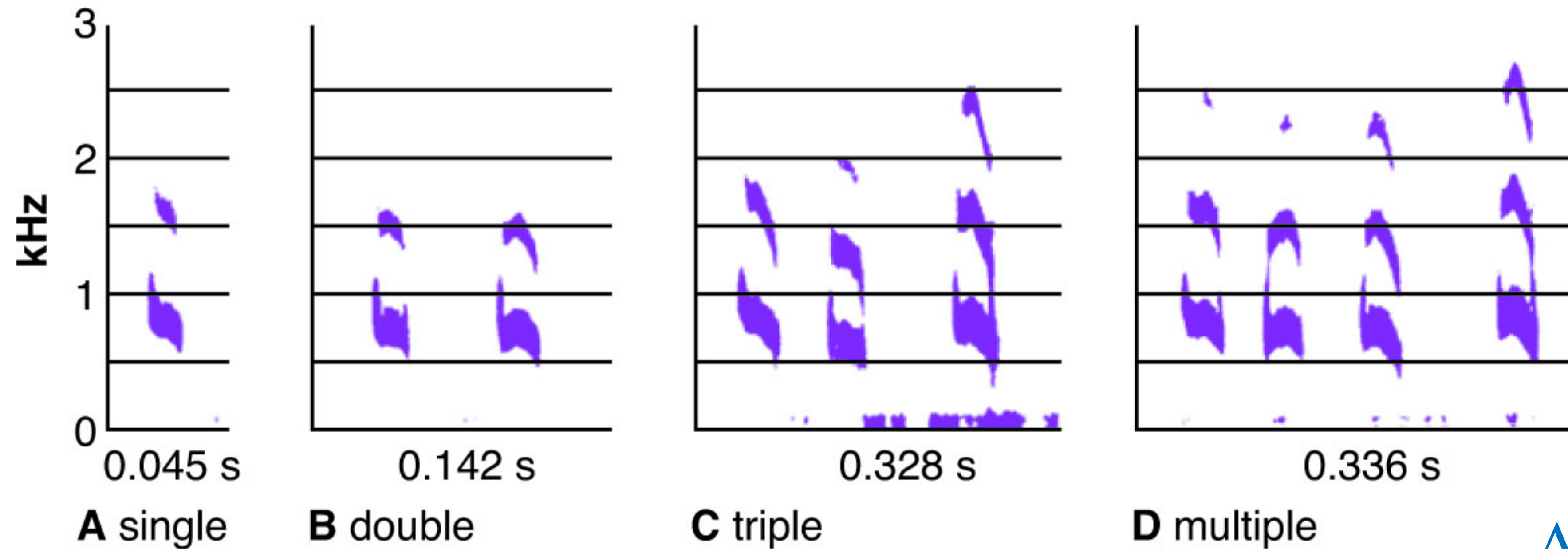


# Trifecta





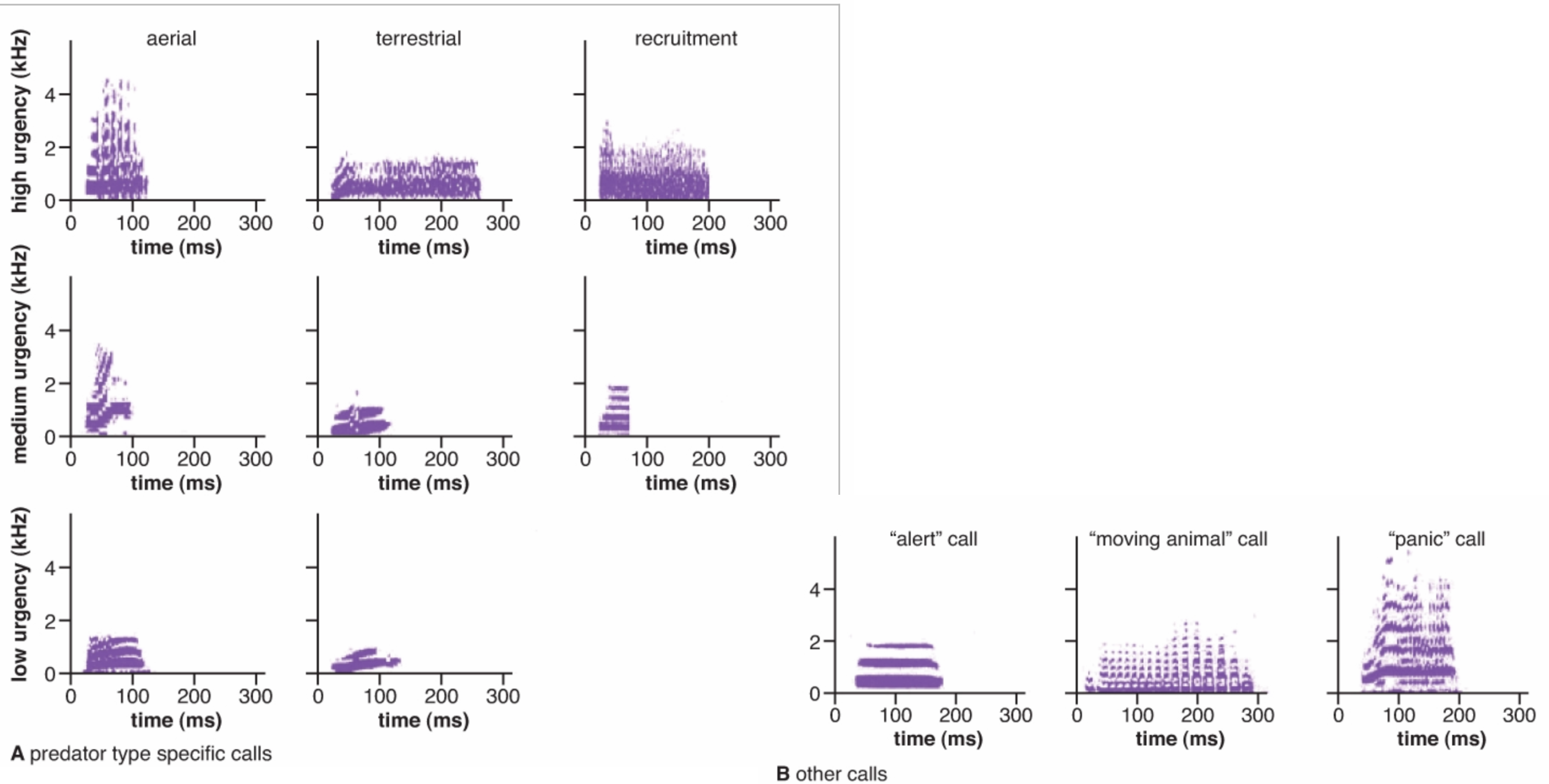
# Sonograms of the four most common meerkat sentinel calls



Are there similarities in the call characteristics?

Figure 17.10

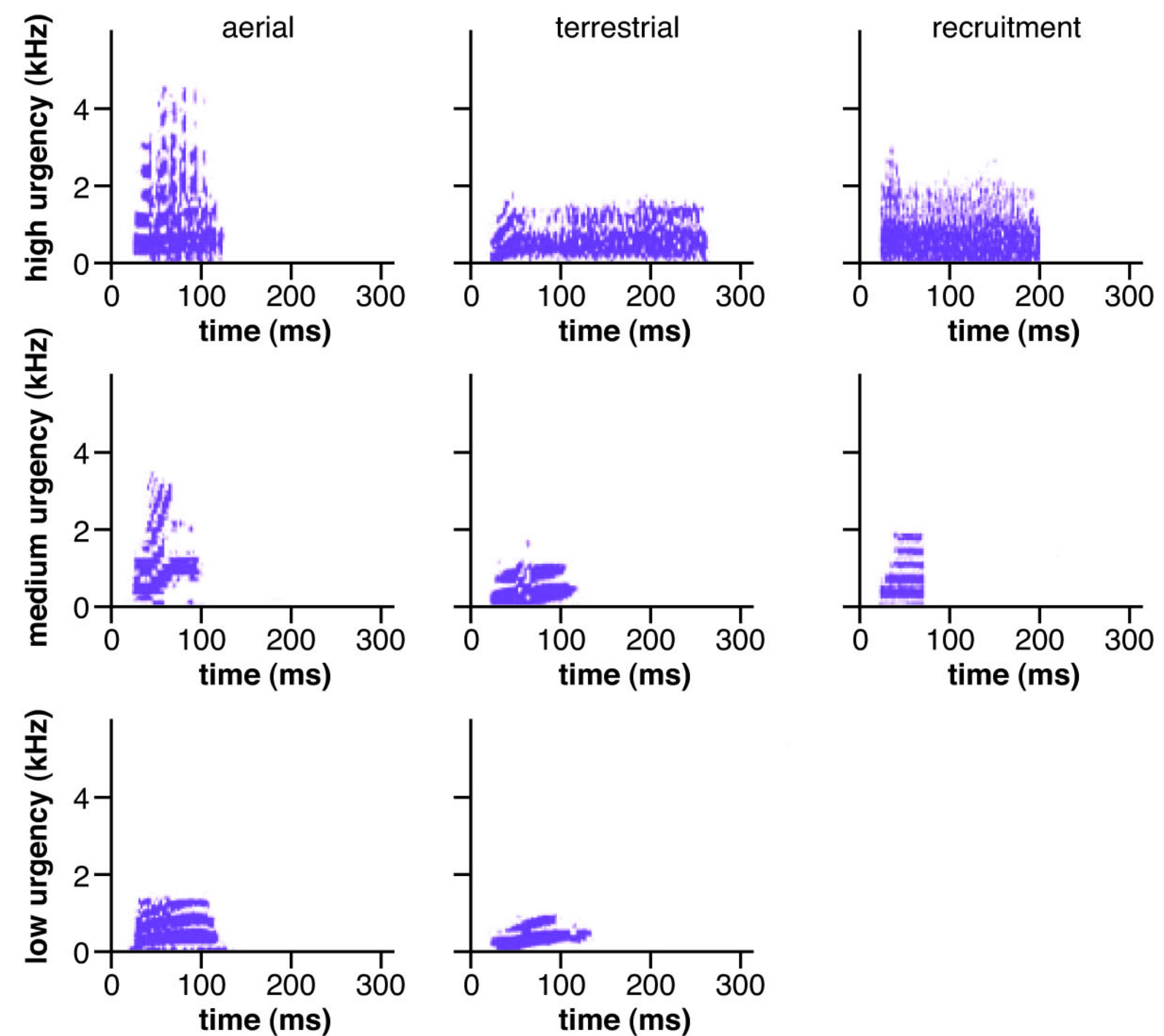




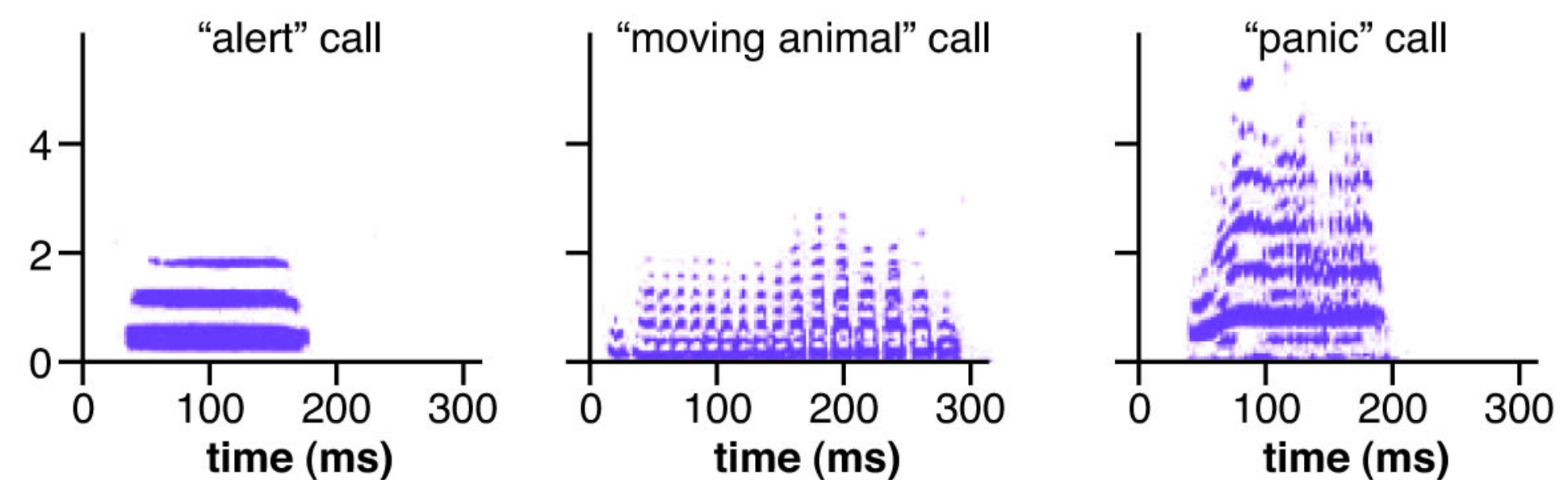
**Figure 17.11** Sonograms of meerkat alarm calls. **A**, *Aerial* refers to calls given when an aerial predator was sighted, and *terrestrial* refers to calls given when a terrestrial predator was sighted. Recruitment calls prompted feeding meerkats to mob together. **B**, Generic alarm calls. Modified from Manser, 2001, Figure 1, by permission of the Royal Society.



# Sonograms of meerkat alarm calls



**A** predator type specific calls



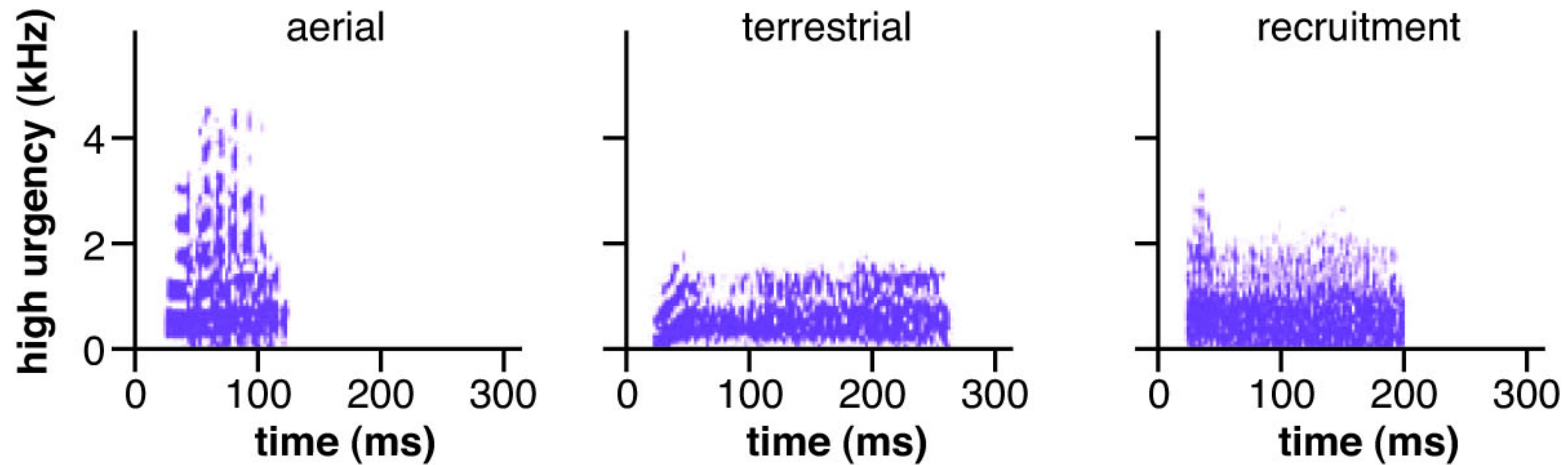
**B** other calls

Figure 17.11

Modified from Manser, 1999, Figure 1 by permission of the Royal Society.



# Analyze three types of high urgency calls



What differences in high urgency calls do you observe?



# Analyze three aerial calls of different urgency levels

How do aerial calls of different urgency vary?

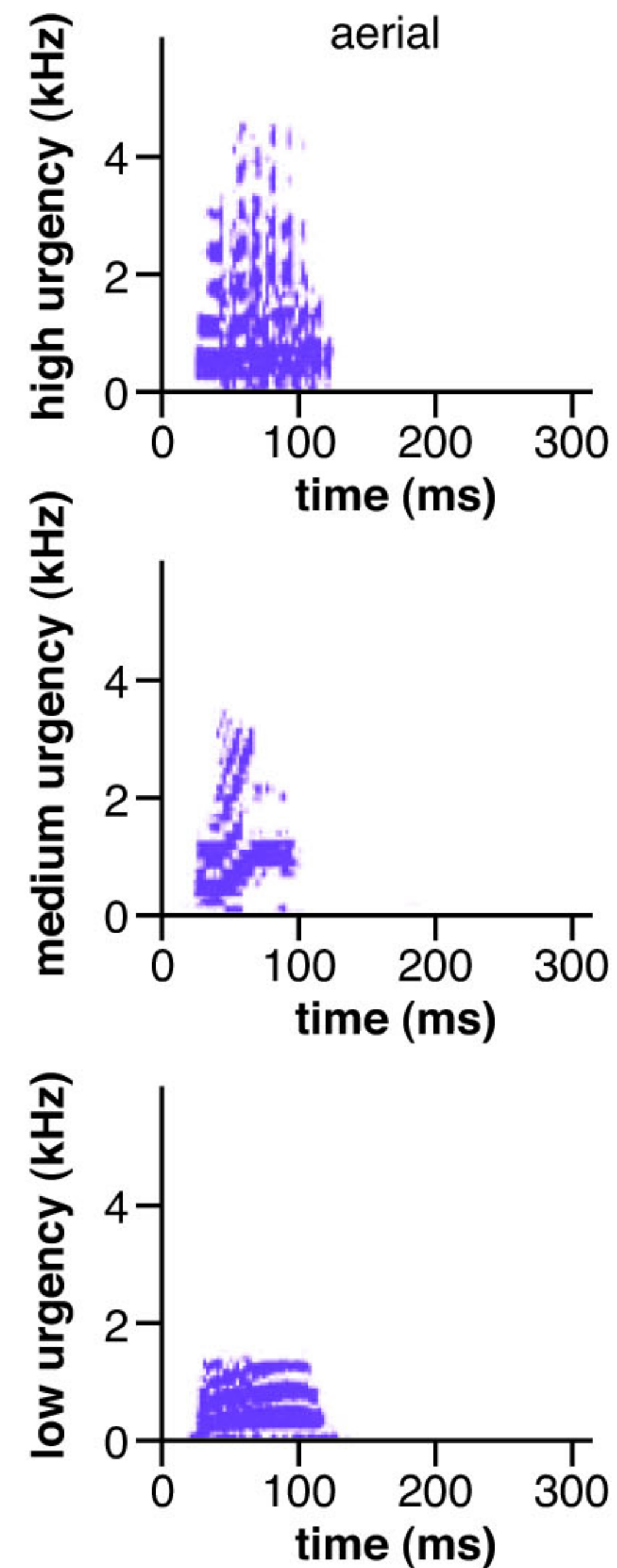


Figure 17.11



# Analyze three terrestrial calls of different urgency levels

How do terrestrial calls of different urgency vary?

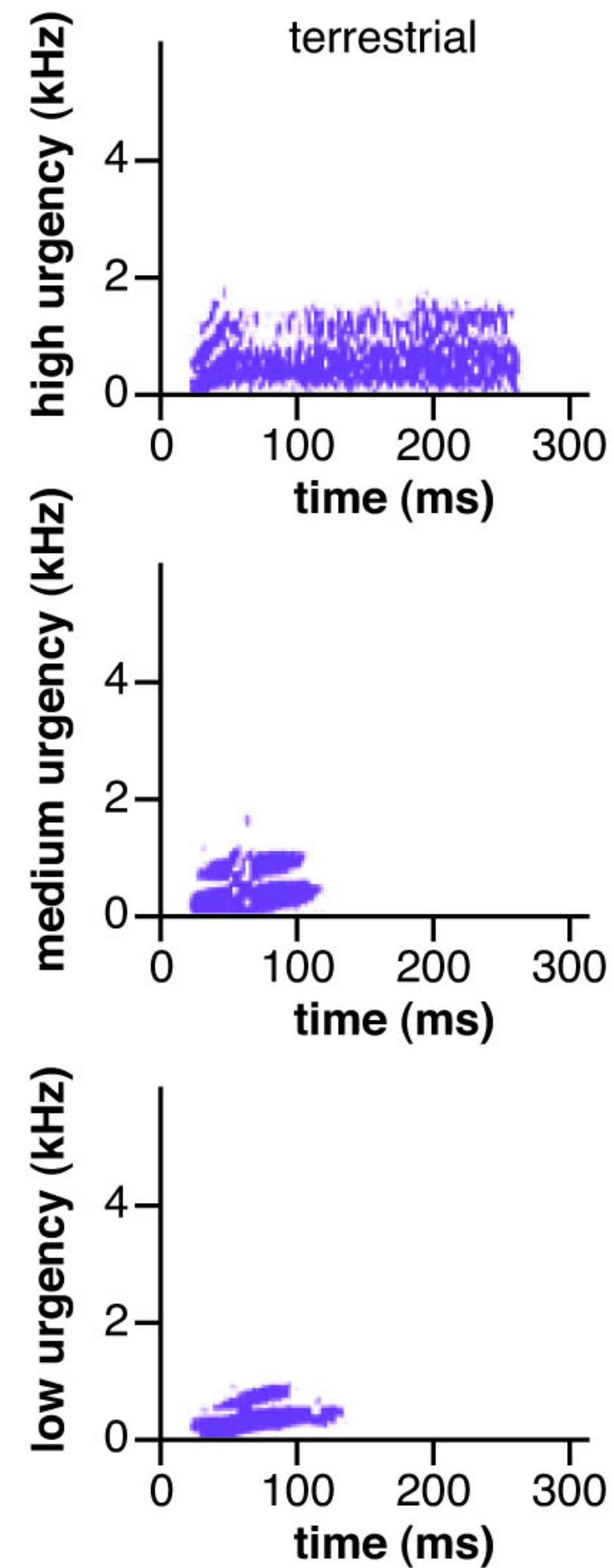
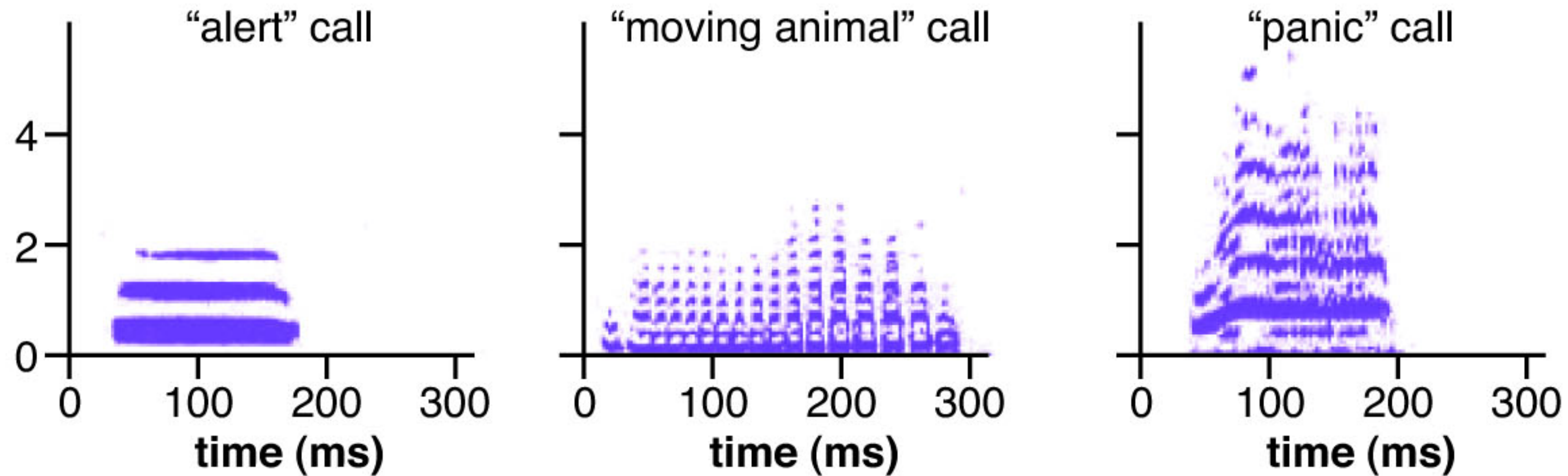


Figure 17.11



# Analyze differences among other types of meerkat alarm calls



**B** other calls

General panic calls also differ -  
how?



# Sonograms of meerkat alarm calls

Compare and contrast them all

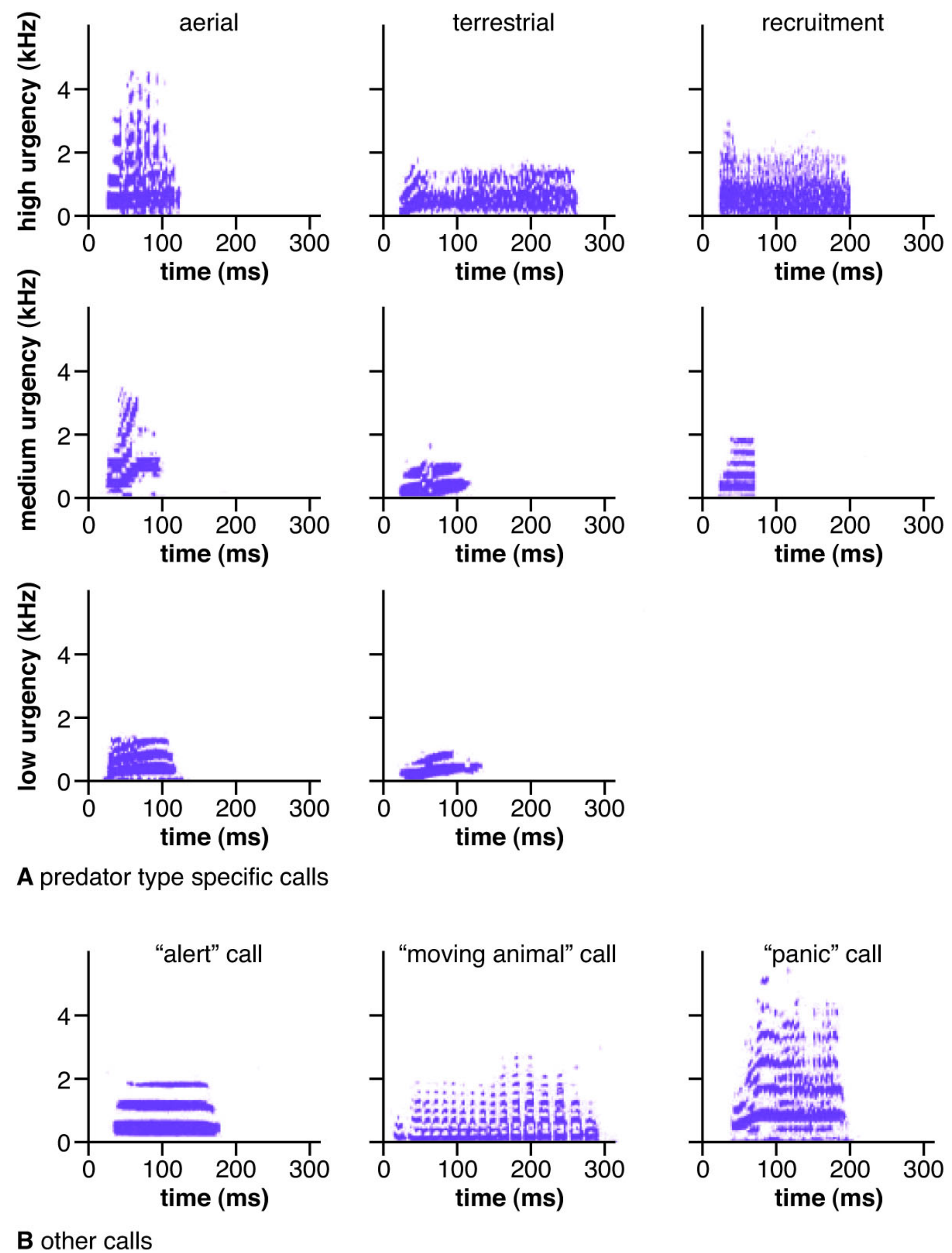


Figure 17.11

Modified from Manser, 1999, Figure 1 by permission of the Royal Society.