

**The Effects of Weather Changes on Frog Calling
In the wetlands at Steele Creek and Weir Dam,
Sullivan County, Tennessee**

In completion of the proposed survey submitted to the
Tennessee Junior Academy of Science

In partial fulfillment of the requirements for
Special Projects and Research in Biology

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By
Laura Rayment
&
Caroline Dunn

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Abstract:

The study "Effects of Weather Changes on Frog Calling" was conducted from January 27 through March 3, 2000. Steele Creek Park wetlands and Weir Dam wetlands were the two sites researched. During this period, frog calls of *Pseudacris crucifer*, *Pseudacris triseriata*, and *Rana sylvatica*, and weather variables such as barometric pressure, temperature, and rainfall were documented. It was found at the Weir Dam that all three frogs called most frequently when temperature was at least 10 Celsius and a drop in barometric pressure, or when temperature was at least 10 Celsius and a minimum of 0.10 inches of rainfall was present. It was also found at the Steele Creek wetlands all three frogs called most frequently when temperature was at least 0 Celsius and a drop in barometric pressure occurred or the temperature was at least 0 Celsius and a minimum of 0.10 inches of rainfall was present. Stable populations of all three frogs were found to inhabit both sites.

Introduction:

The purpose of this study was to contribute to the knowledge of anurans inhabiting the Weir Dam wetland and Steele Creek Park wetland in Bristol Tennessee. No official research on anurans has been conducted at these two sites and there is scarce documentation on the effects of weather variables on anurans in the Northeast Tennessee region. This study was conducted to determine whether anurans, specifically the Spring peeper, Upland chorus frog, and Wood frog, are affected by changes in weather.

The wetland at Steele Creek Park has had documentation of these three frogs for the past two years. Therefore, any knowledge gained from this study is valuable to the continued success of the species in the park. Also, due to the insufficient information documented on the three anurans, information on behavior patterns and relative abundance of each species will be beneficial to both sites. This research concentrated mainly on the effects that barometric pressure and temperature had on frog calling.

Pseudacris crucifer, commonly named the spring peeper frog, inhabits both northern and southern United States (Badger, 1997). During hibernation in the winter months the spring peeper hibernates under leaves or logs in wooded areas (Behler, 1995, p.406). These frogs emerge from hibernation as early as February and are characterized by tan, reddish-brown, or olive gray colors (Martof, 1980, p.118). The scientific name *crucifer* is appropriate due to the large cross marking the frog's back.

Other characteristics include a dark bar-like marking located between the eyes, and a cream colored underside. Males, which are smaller and darker than females, have dark throats. Spring peepers breed in woodland ponds after the first warm rain (Badger, 1997). They are very small, ranging from 1.9 to 3.5 centimeters, yet they collectively can produce a deafening chorus of sharp, high pitched "peeps" (Behler, 1995, p.406).

The wood frog, *Rana sylvatica*, is a medium sized frog characterized by a dark "mask" extending back from each eye (Martof, 1980, p.118). This dark, copper-brown colored frog averages in size from 3.5 to 8.3 centimeters (Behler, 1995, p.415). The wood frog comes out of hibernation as early as February, travelling to it's habitat of moist woodland (Badger, 1997). Here the wood frog begins to call in a series of short, raspy quacks similar to the sound of fingers rubbed on a balloon (Ellicot, 1994).

Pseudacris triseriata feriarum, or the upland chorus frog, is greenish gray to brown in color with three constant characteristics: a white strip along the upper lip, a dark stripe through the eyes, and thin, vertical, dark stripes on the back. Generally 1.9 to 3.5 centimeters, the chorus frog lives in moist woodlands and calls in early February. The call is a regular repeated "crreeek" trill that lasts a few seconds (Conant, 1991).

Research conducted by Hoff and Hillyard in 1993 suggests that toads are able to detect changes in barometric pressure. The pattern of calling in toads changed according to changes in barometric pressure that provides evidence that other anurans, specifically spring peppers, upland chorus frogs, and wood frogs, can also detect changes in barometric pressure (p.89-98). In a study about palmetto bass, Jones and

Rogers found that the bass tended to move less in clearer, warmer, and stable conditions than during rising or falling barometric pressure (p.640-648). Several other studies have been performed that documented an increase in white crappie movement during periods of stable barometric pressure (Markham, 1991). Warden and Lorio (1975) found that there is no relationship between movement of largemouth bass, *Micropterus salmoides*, and barometric pressure fluctuations. In another study of black crappie, Guy (1992) documented a positive correlation between barometric pressure and their movement. Because each of these studies have different results, further studies need to be conducted to determine whether factors other than barometric pressure affects palmetto bass (p.640-648). In another study by Hoff, Hillyard, and Proper, they found that environmental factors such as barometric pressure clearly affected the water absorption response of terrestrial amphibians. Under conditions of rising or steady barometric, the dehydrated toads absorbed more water than when the barometric was falling (p.127-138).

Description of Study Areas:

Research was conducted at two sites, the Weir Dam wetland, and Steele Creek Park wetland, which have been proven to be inhabited by frogs for the last two years. Steele Creek Park is located in Bristol, Tennessee: Sullivan County, off highway 126. The park covers 2,200 acres and a 54 acre lake located within the park feeds the wetland. The Weir Dam wetland is also located in Bristol, Tennessee: Sullivan County off of 421.

Materials and Methods:

The materials used in this study consisted of two Weather Mate Electric Barometers, two headlamps, and two dip nets. We employed two techniques to compare their accuracy at each site. Barometric pressure, temperature, and rainfall were documented concurrently at each site with the use of the barometers. The same information was gained through the use of the WCYB internet website to determine a more accurate measurement of these weather variables. Due to the discrepancy of the two barometric pressure readouts, a constant difference was determined between the two sources. The research involved at least two people at each site between 6p.m. and 8p.m. A minimum of 20 minutes per night, 3 nights per week was spent walking along each wetland, spotting frogs with headlamps, counting and recording frog calls

and recording barometric pressure, wind, temperature, cloud cover, and rainfall. The advertisement calls of male anurans was recorded in order to identify which species of frogs were calling. A scale was created in order to document the relative abundance of each anuran species. This was based on a scale from 0-3: 0 reflected no frog calls, 1 reflected that individual frogs could be counted and there was time between each call, 2 reflected that calls of individual frogs could be distinguished but there was some overlapping of the frog calls, and 3 reflected a full chorus of frogs calling. In addition to recording spotting the species and hearing the frog calls, amplexus was recorded if seen. All frogs that were captured were released after examination and no frogs were taken from their habitats.

Results of Weir Dam Research:

Throughout the research period at the Weir Dam wetland, data was gathered and later analyzed corresponding with the rate of calls of the frog species: *Pseudacris crucifer*, *Pseudacris triseriata*, and *Rana sylvatica*. In an effort to determine a correlation between temperature, barometric pressure, rainfall, and rate of frog calling, the data was initially graphed to find a relationship between temperature and frog calls. Based on the data collected, there was very little correlation between temperature and frog calling (See Charts 1-3). Similarly, further analysis revealed that a fall in barometric pressure did not independently increase the rate of frog calls (See Figures 1-¹⁵). Therefore, the data was then graphed as a combination of weather variables and frog calls. It seemed that a minimum temperature of 15 Celsius and falling barometric pressure was detected by frogs, and an increase of frog calls would occur (See Figure ^{16, 19, 22} 2-?). Further analysis revealed the frogs called even more frequently if temperature was a minimum of 10 Celsius and barometric pressure was falling (See Figure ^{17, 18, 20, 21, 23, 24} ?). This supported the idea that frogs could detect a possible increase in rainfall due to the falling barometric pressure and the frogs responded by calling more frequently. An extra step was then taken to determine the relevance of rainfall in the study. The data proved the frogs called most frequently if temperature was a minimum of 10 Celsius and barometric pressure was falling, or if temperature was a minimum of 10 Celsius and rain was present, regardless of barometric pressure at the time. The latter condition determined that only if rainfall was present, would the barometric pressure trend not affect frog calling.

Results of Steele Creek Wetlands Research:

During the time of research, data was collected from the Steele Creek wetlands and later analyzed in corresponding with the rate of calls of the frog species:

Pseudacris crucifer, *Pseudacris triseriata*, and *Rana sylvatica*. Between the time period of January 27 and March 3, 2000, ten successful nights were recorded on our data sheets. In an effort to determine a correlation between temperature, barometric pressure, rainfall, and frog calls, the data was first graphed to find if any relationship appeared between temperature, barometric pressure, and frog calling. Our hypothesis was that when a drop in barometric pressure would occur it would cause the frogs to call but we later found that it was a combination of a couple weather factors. After comparing the data recorded of each night and the number of frogs calling, it was found that the combination of barometric pressure and temperature and rain and temperature is what effected the rate of frog calling. First, we looked at falling barometric pressure and a temperature of 10 Celsius and it was found that an increase in frog calls would occur. This supported the idea that frogs could detect a possible increase in rainfall due to the falling barometric pressure and the frogs would increase their rate of calling. Further analysis showed that the frogs called at higher rate than above when the temperature was above 0C and the barometric pressure was falling (See Figure 9). Then we looked at the possibility of rainfall being a factor of frog call rate. We found that when the temperature was above 0 Celsius and the barometric pressure was falling, or if the temperature was

above 0 Celsius and there was an accumulation of .10 inches of rainfall, regardless of barometric pressure the frogs were calling 100% (See Figure 25, 26, 27).

Frogs have been known to call more frequently if rain was present, however no research has been documented in this region to support the theory that frogs can detect future rainfall. The results from our study suggest that the three frog species involved can detect a future rainfall by the falling barometric pressure. Furthermore, this study was conducted in a relatively short period of time. In order to better understand the relationship between frogs and weather factors, it is essential for more research to be conducted in this area.

Appendix A-
Data Charts and Figures

Pseudacris crucifer Call Rate vs. Temperature

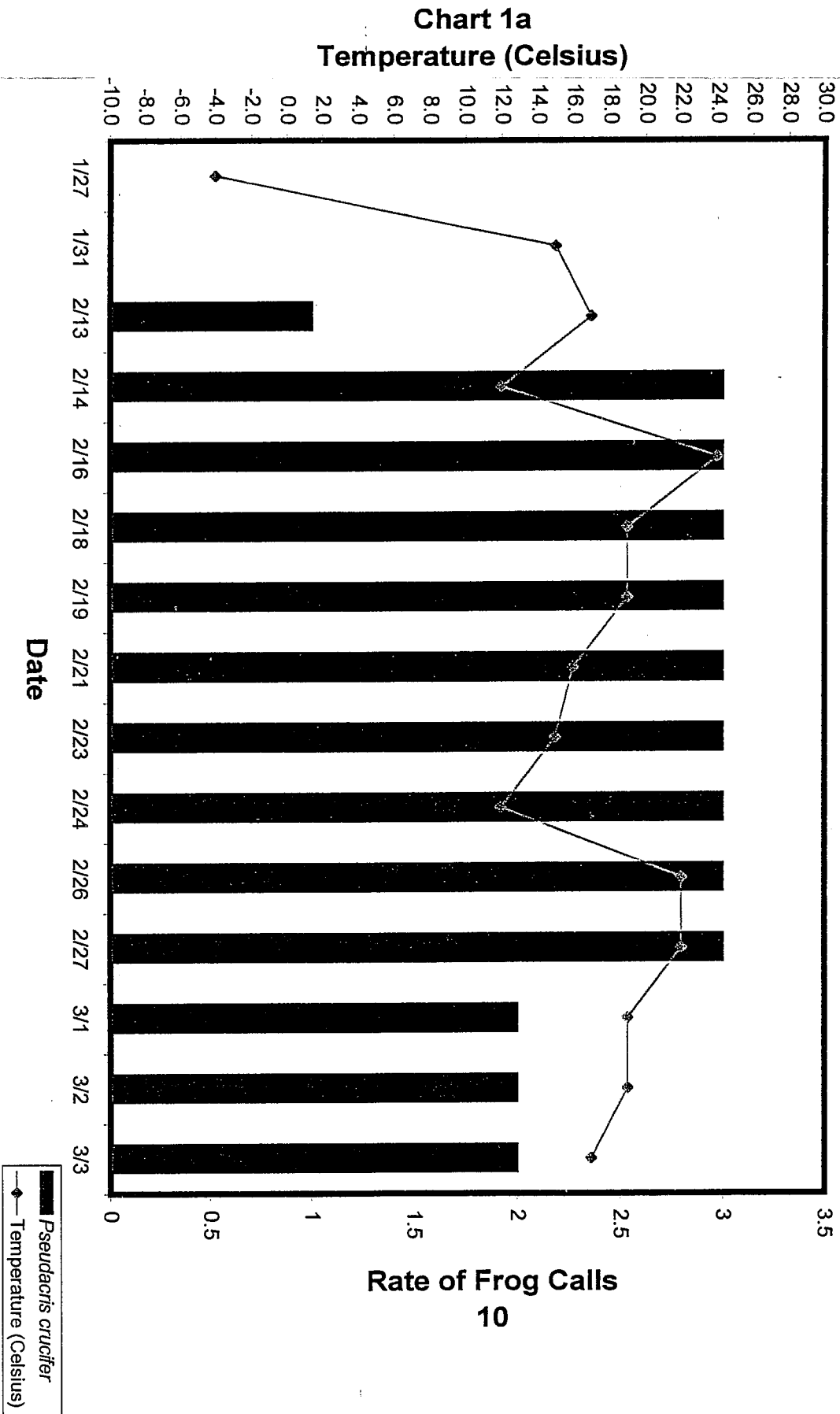
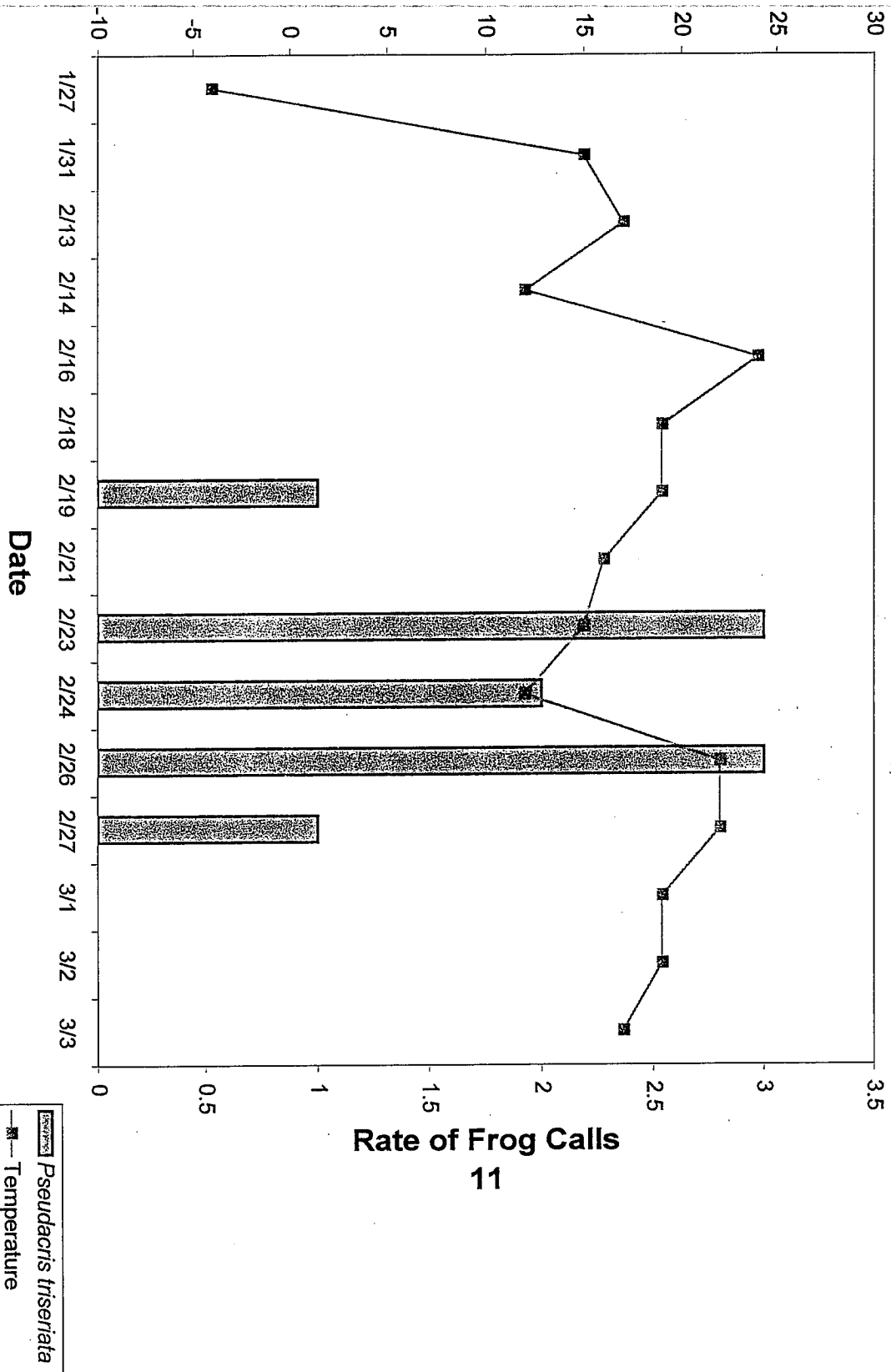
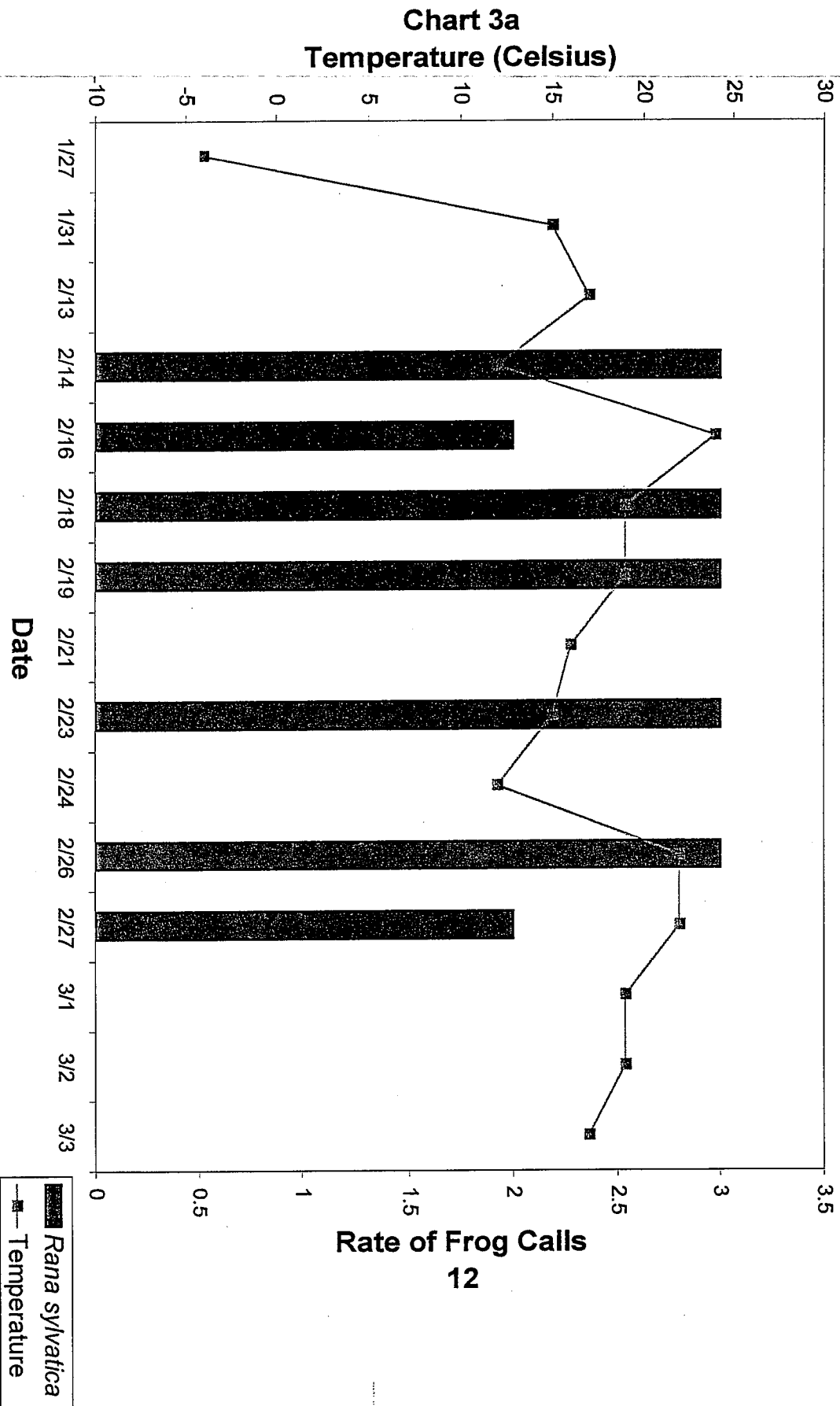


Chart 2a
Temperature (Celsius)

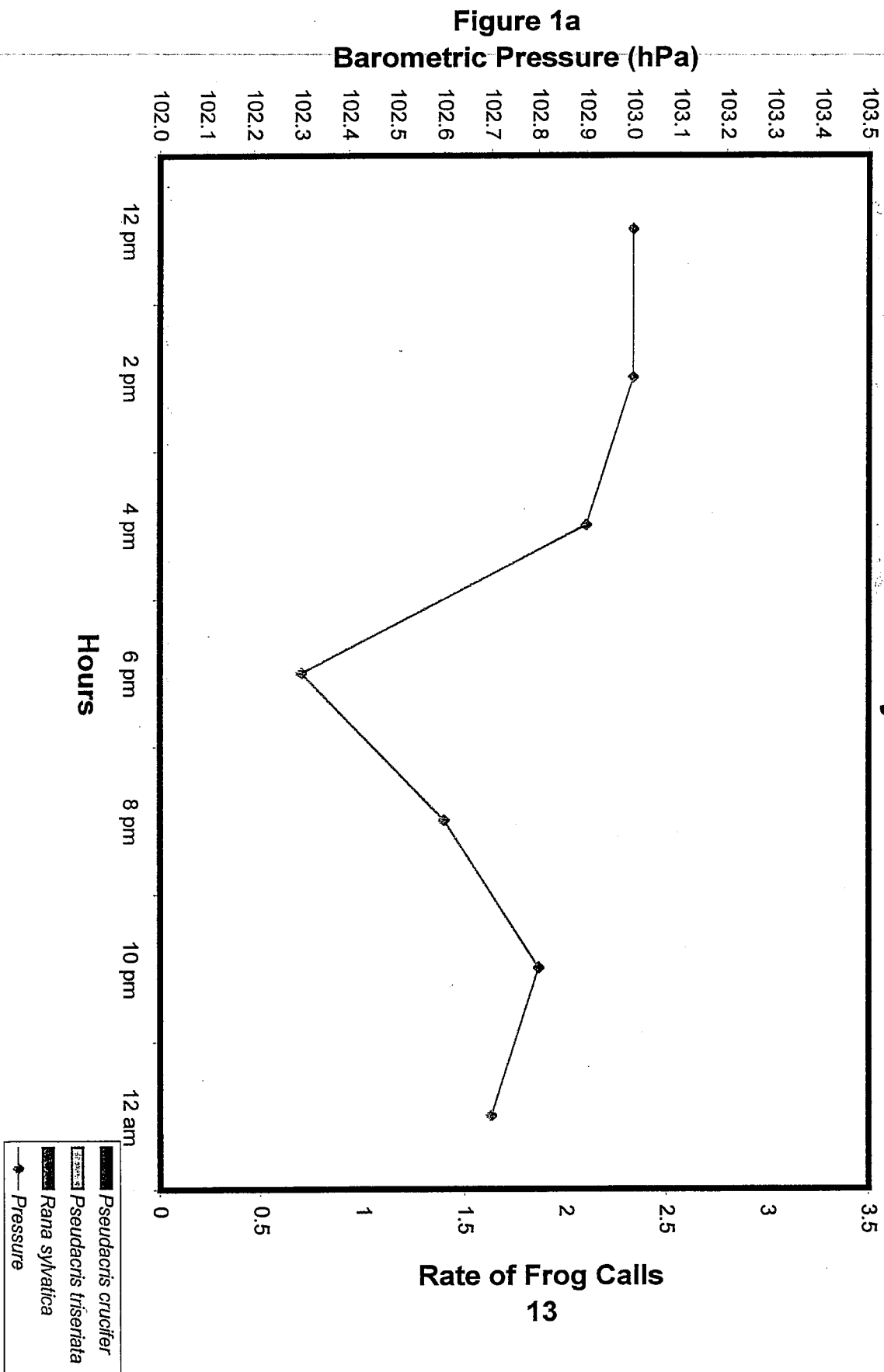
Pseudacris triseriata Call Rate vs. Temperature



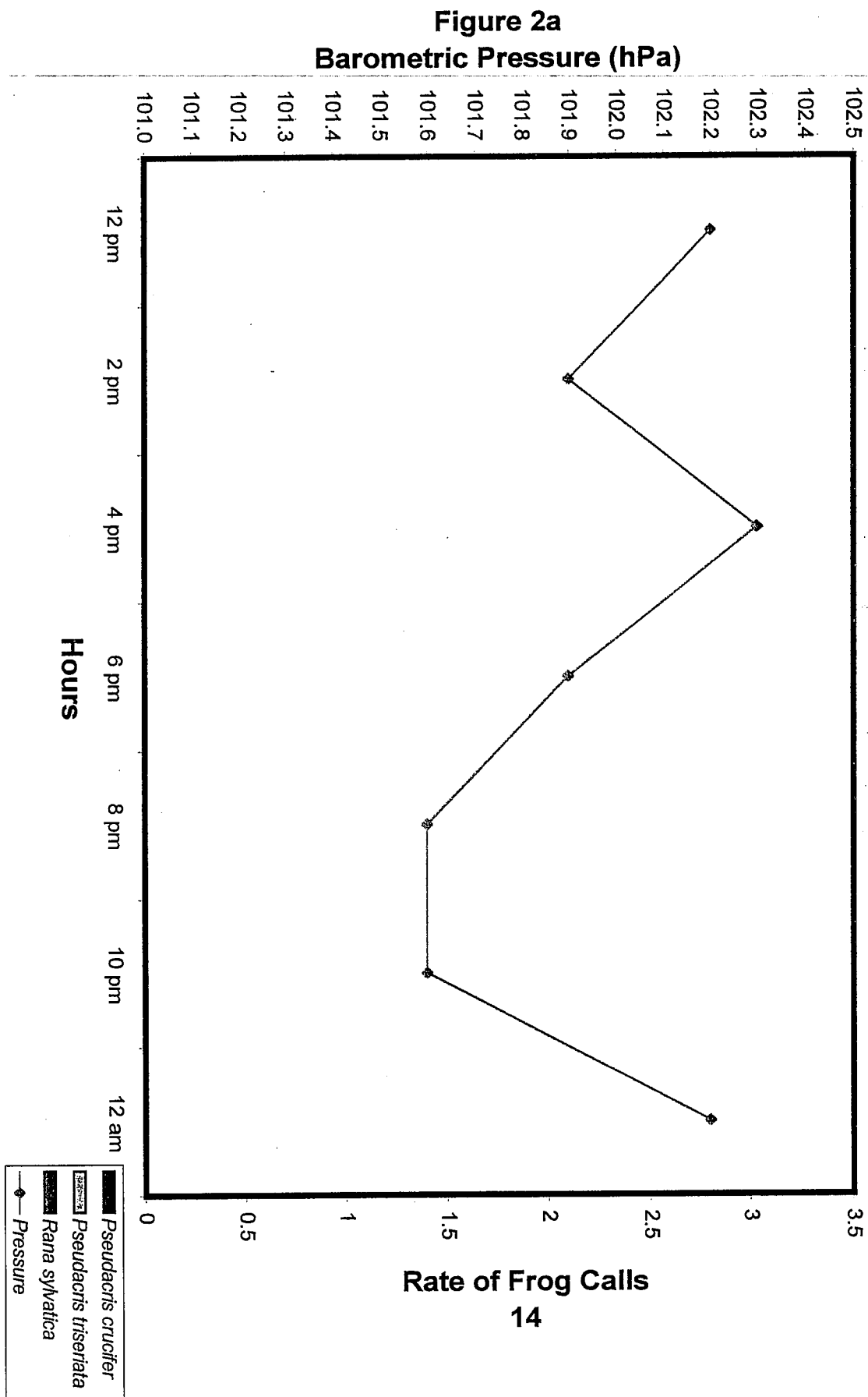
Rana sylvatica Call Rate vs. Temperature



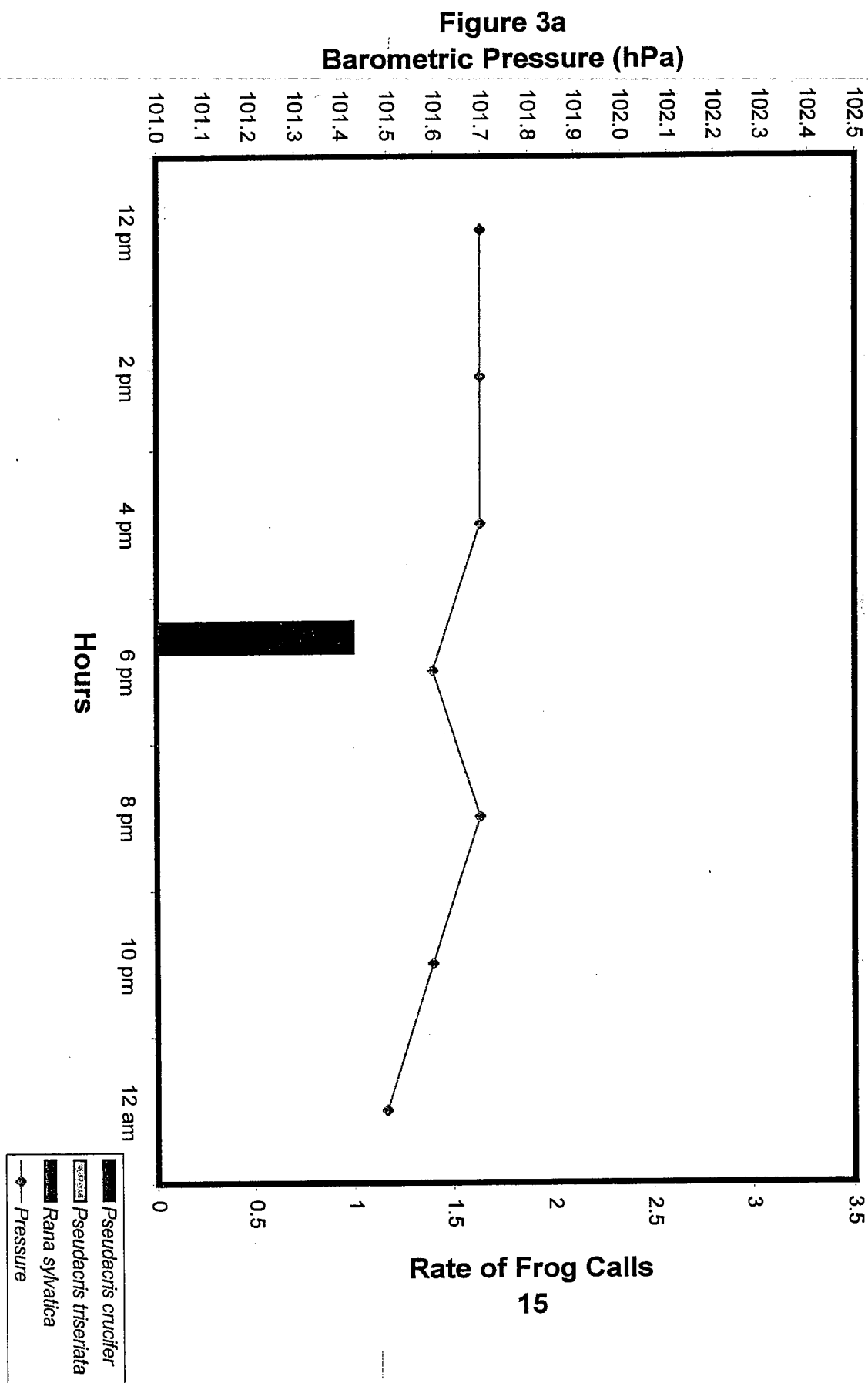
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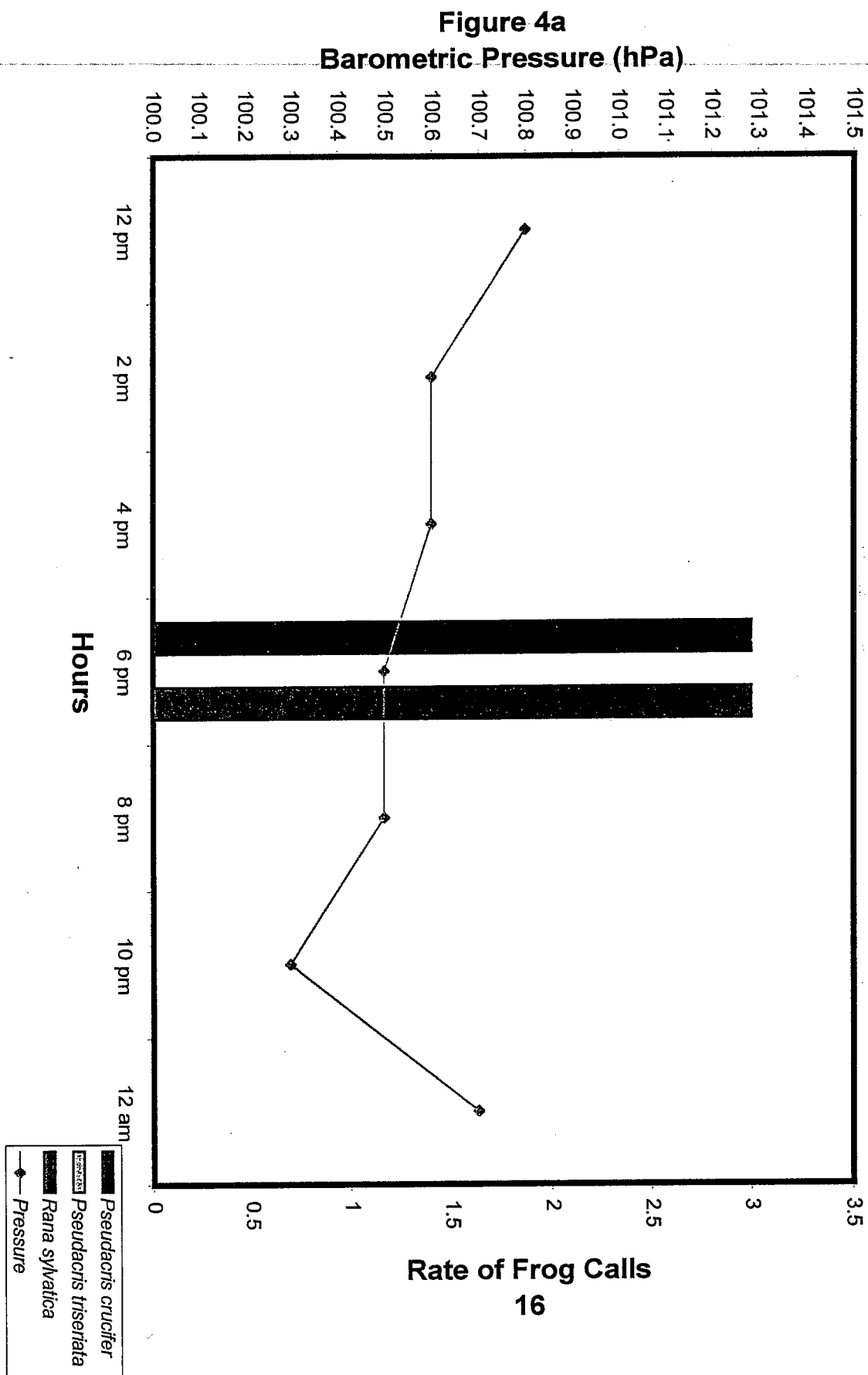
January 31



February 13

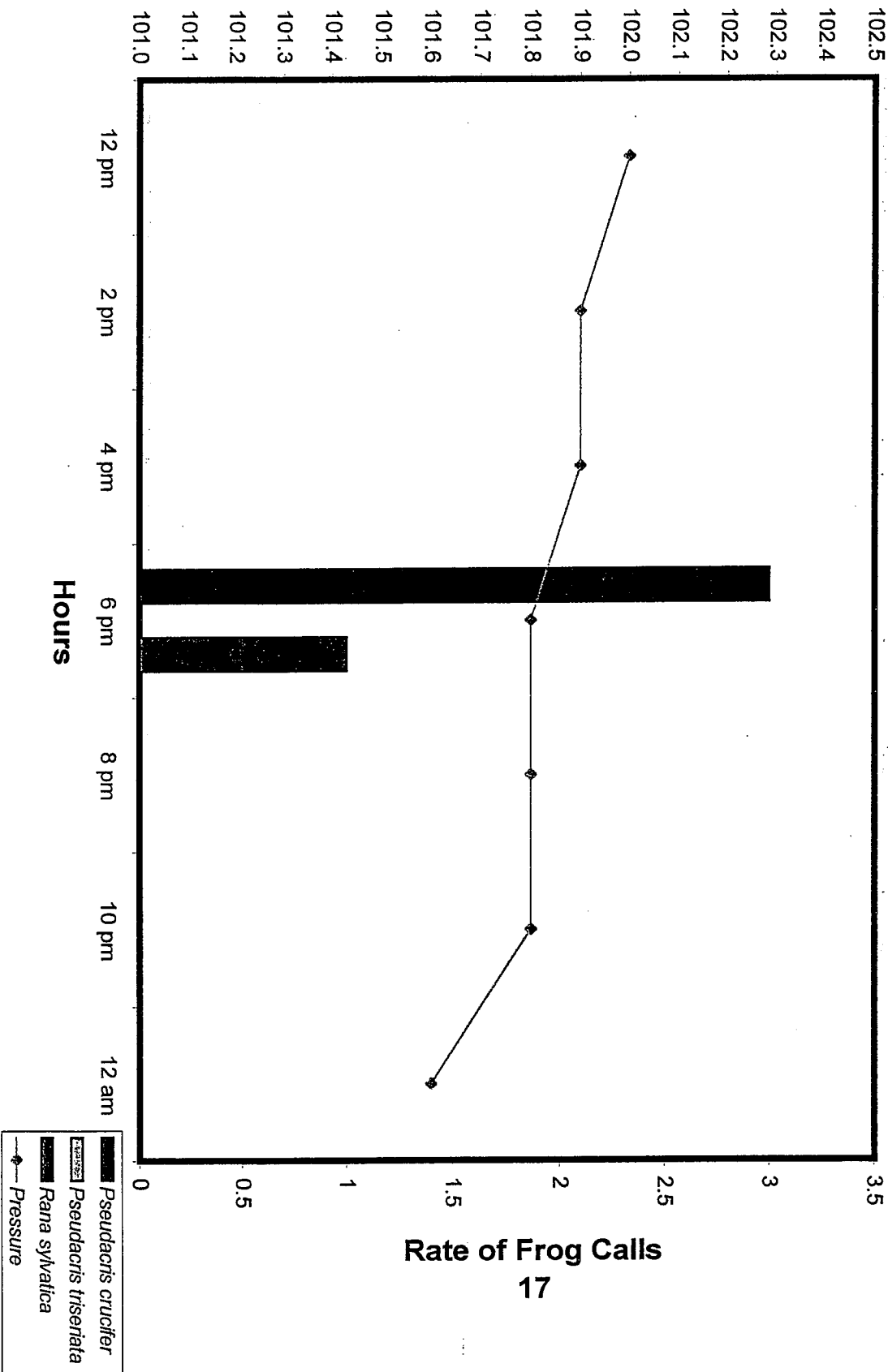


February 14

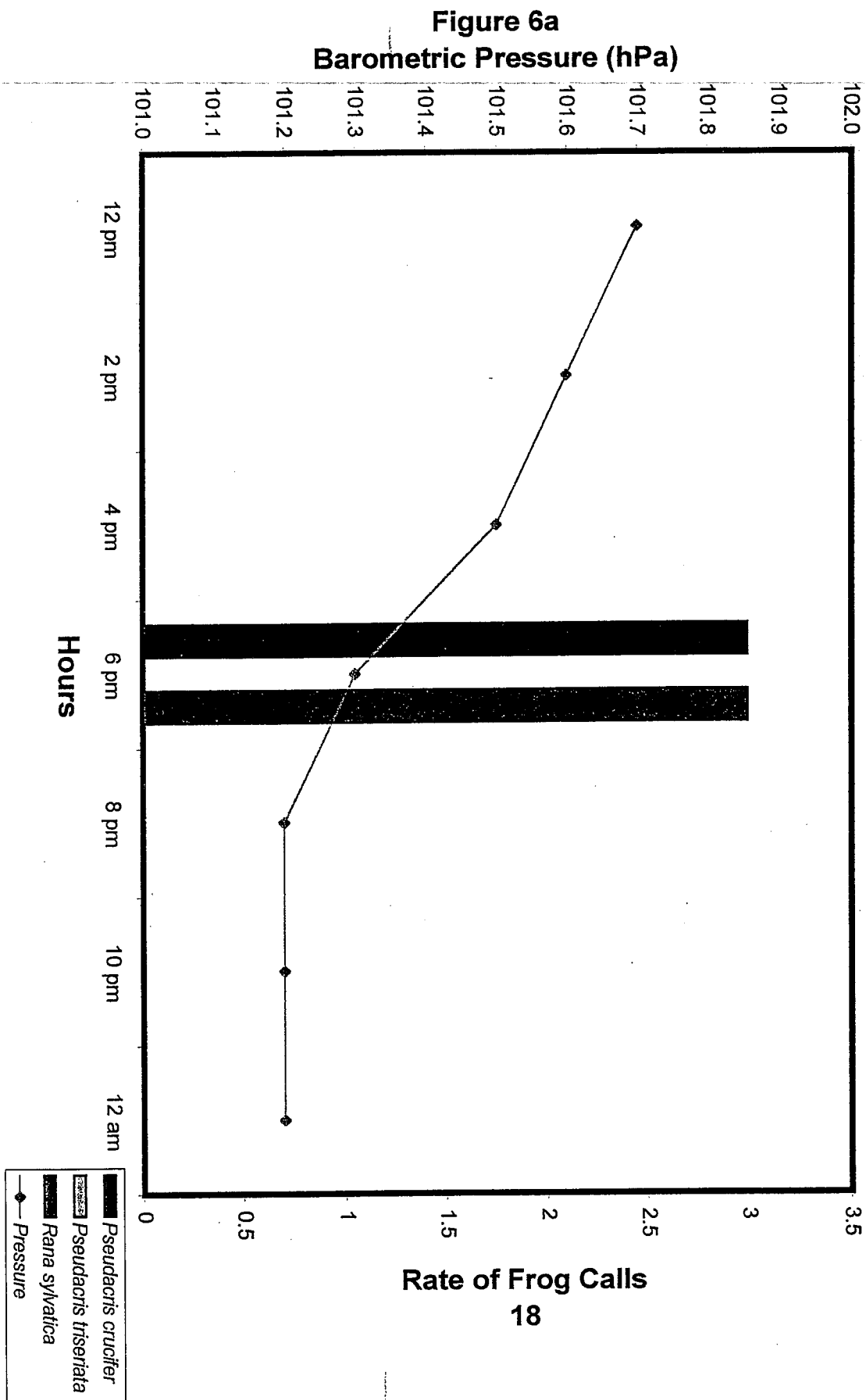


February 16

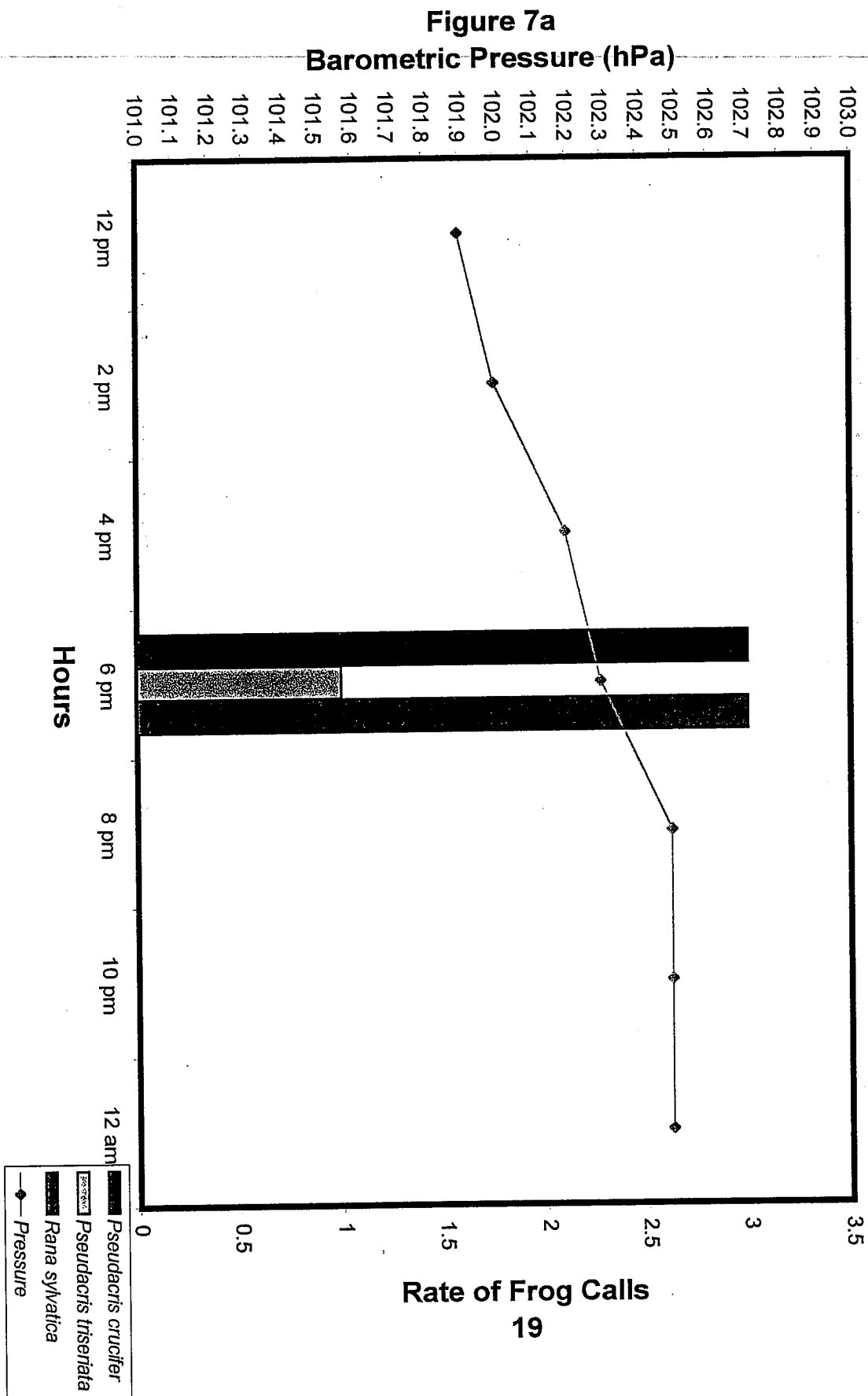
Figure 5a
Barometric Pressure (hPa)



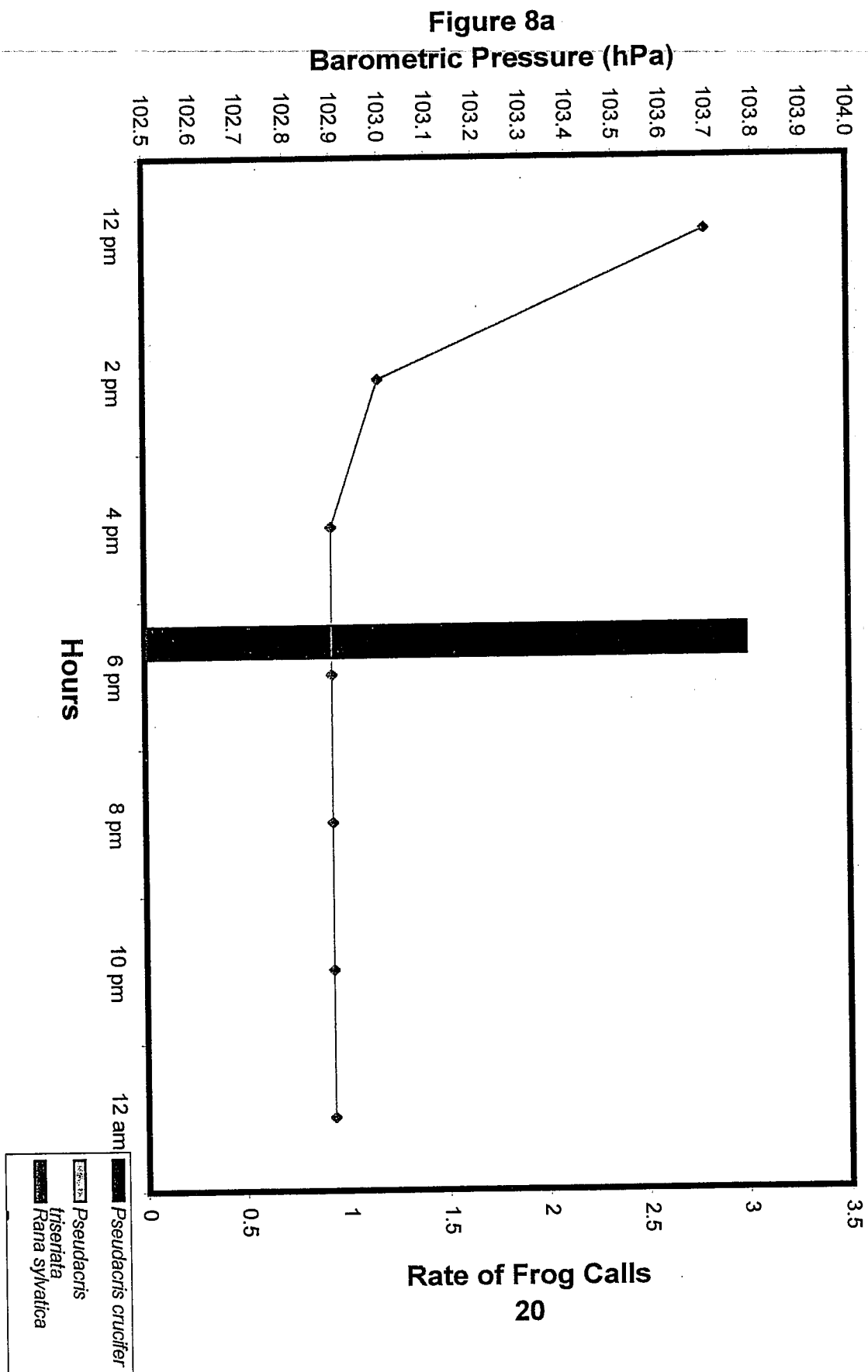
February 18



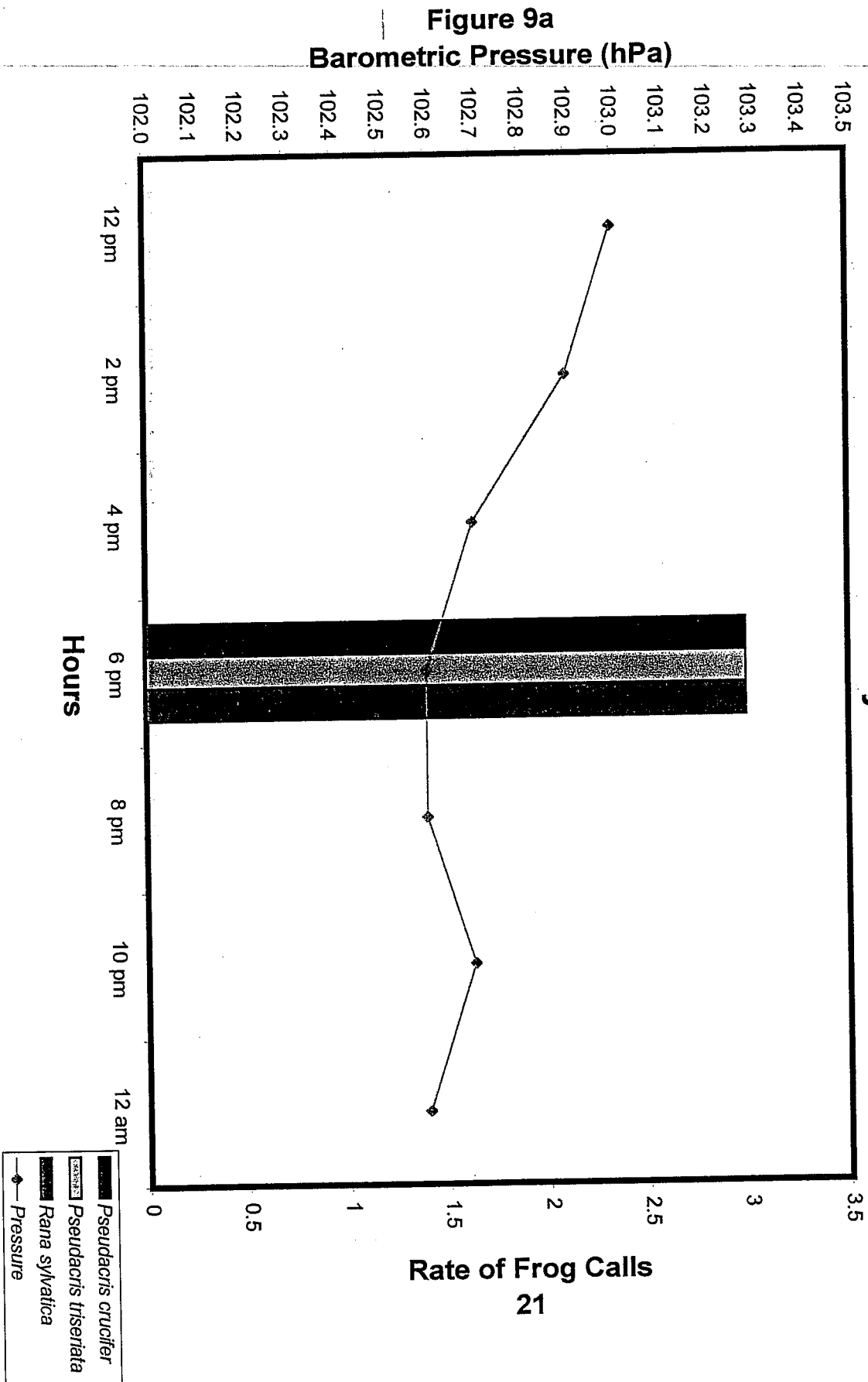
February 19



February 21

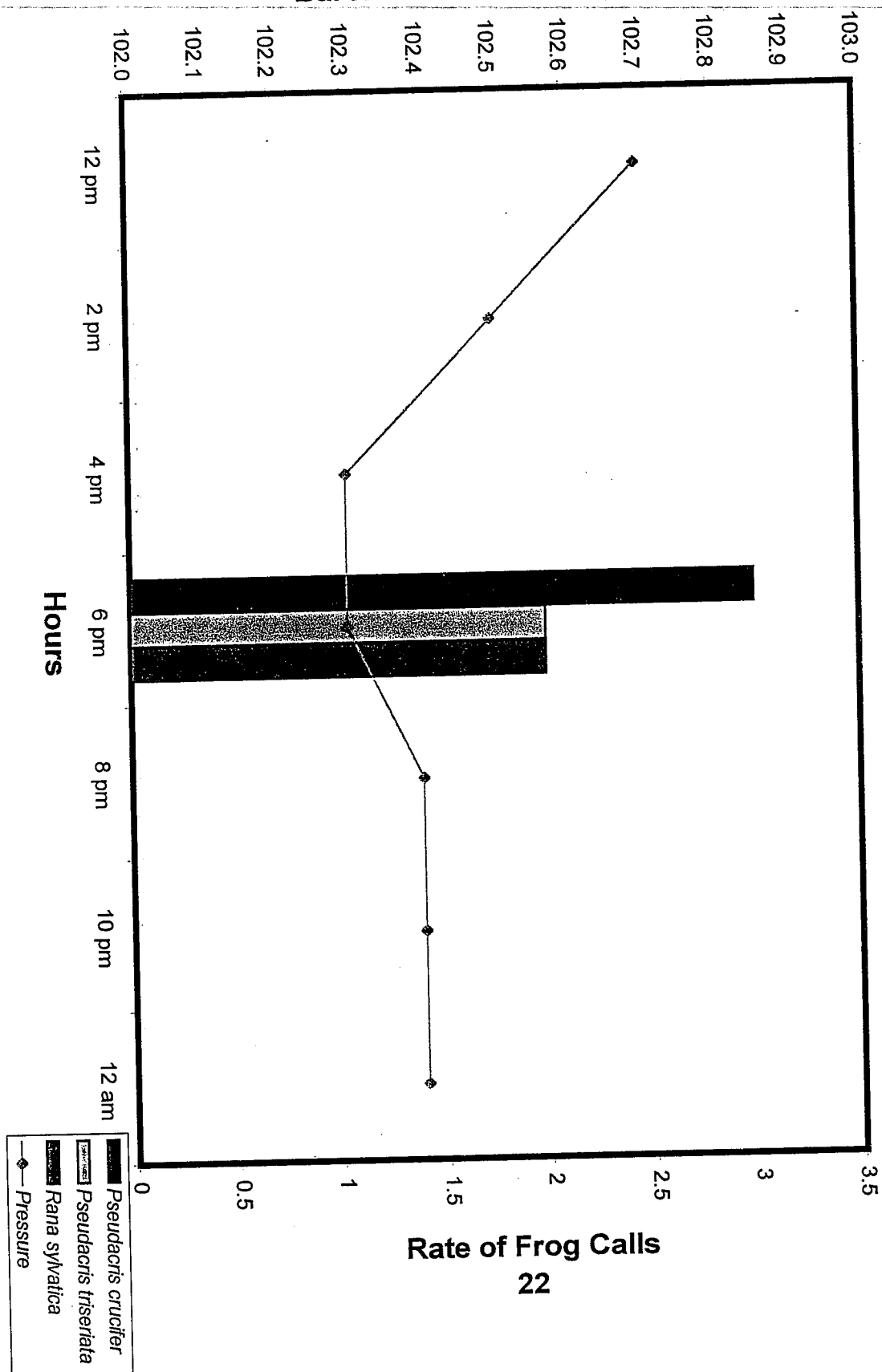


February 23



February 24

Figure 10a
Barometric Pressure (hPa)



February 26

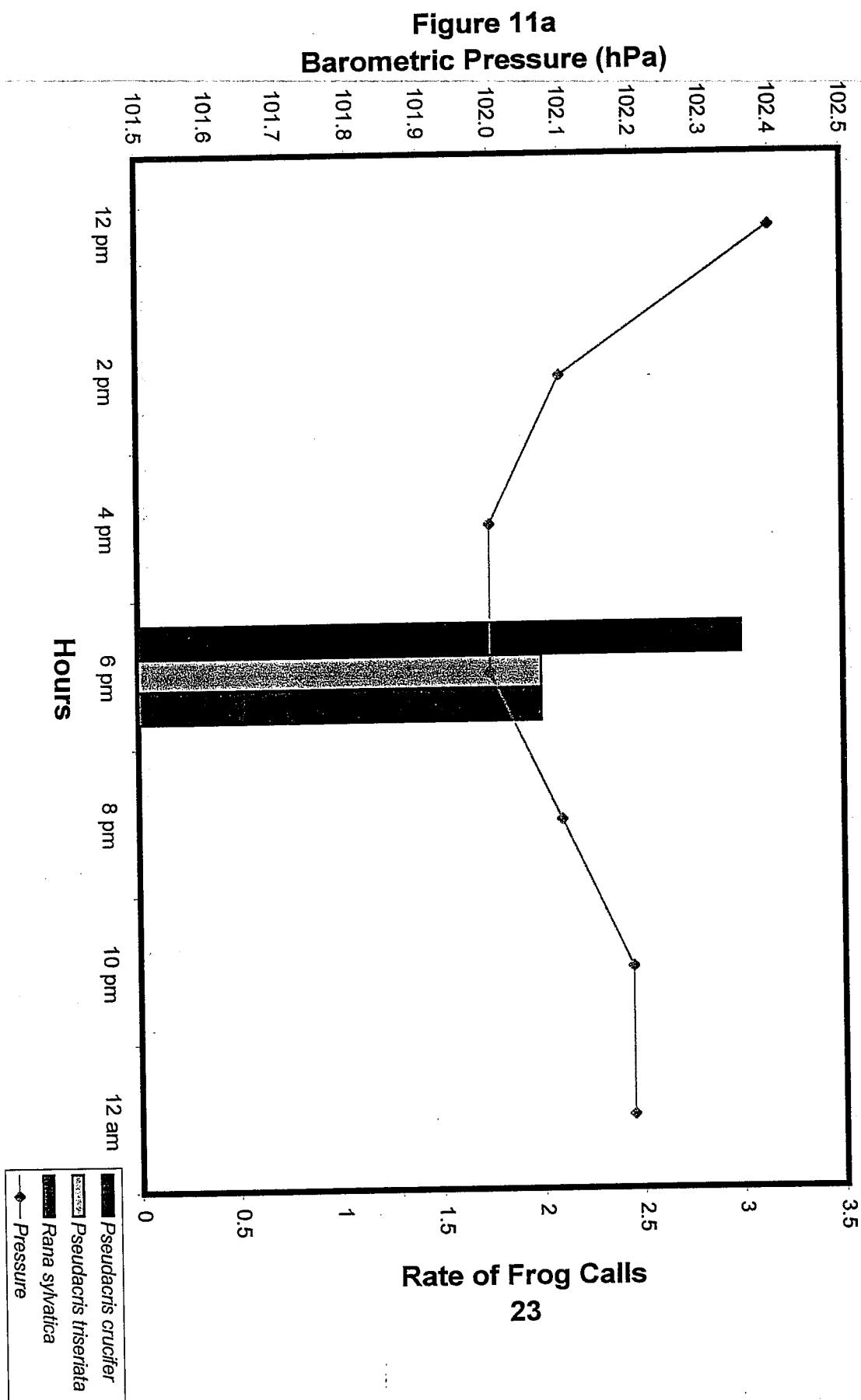


Figure 12a
Barometric Pressure (hPa)

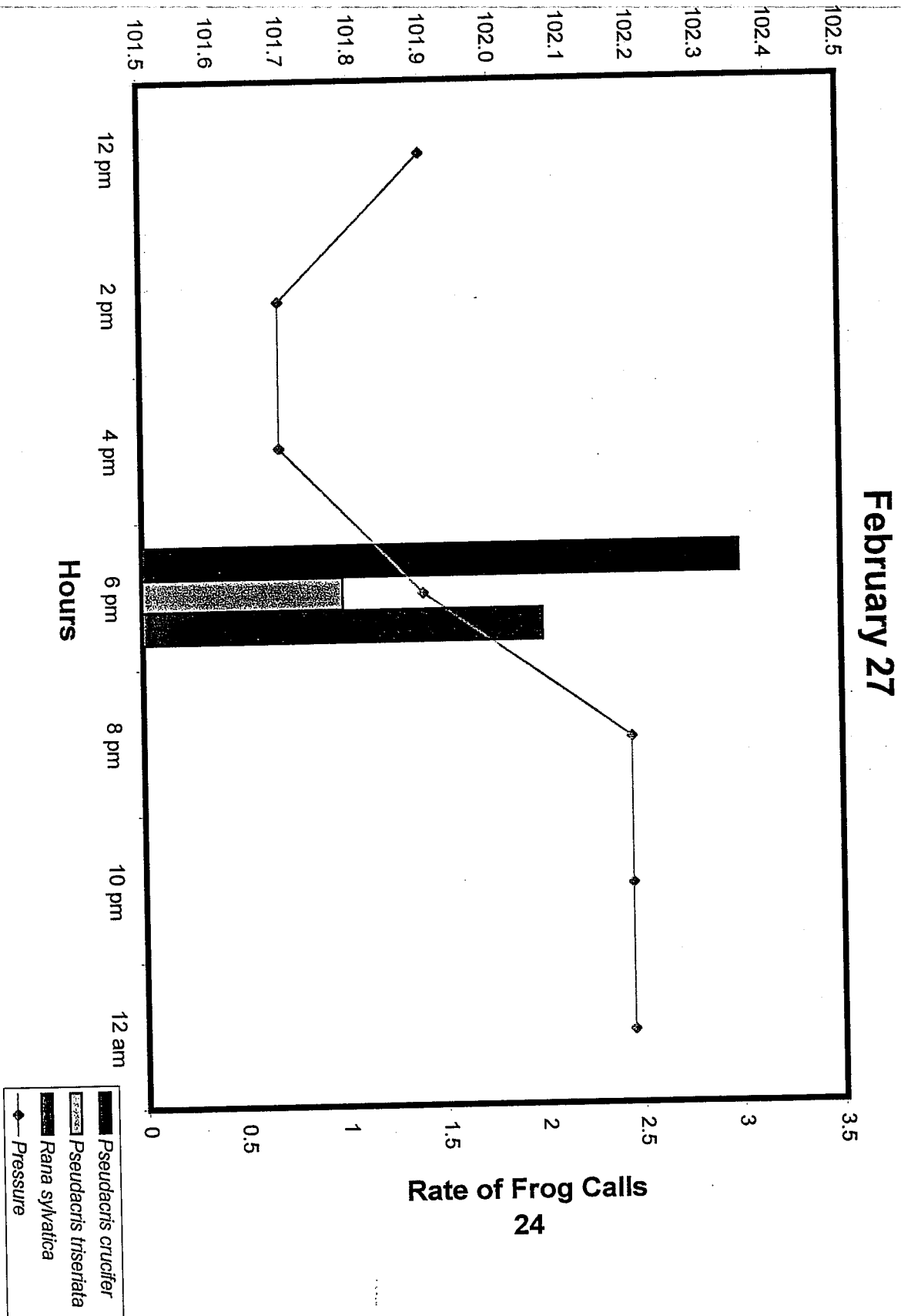
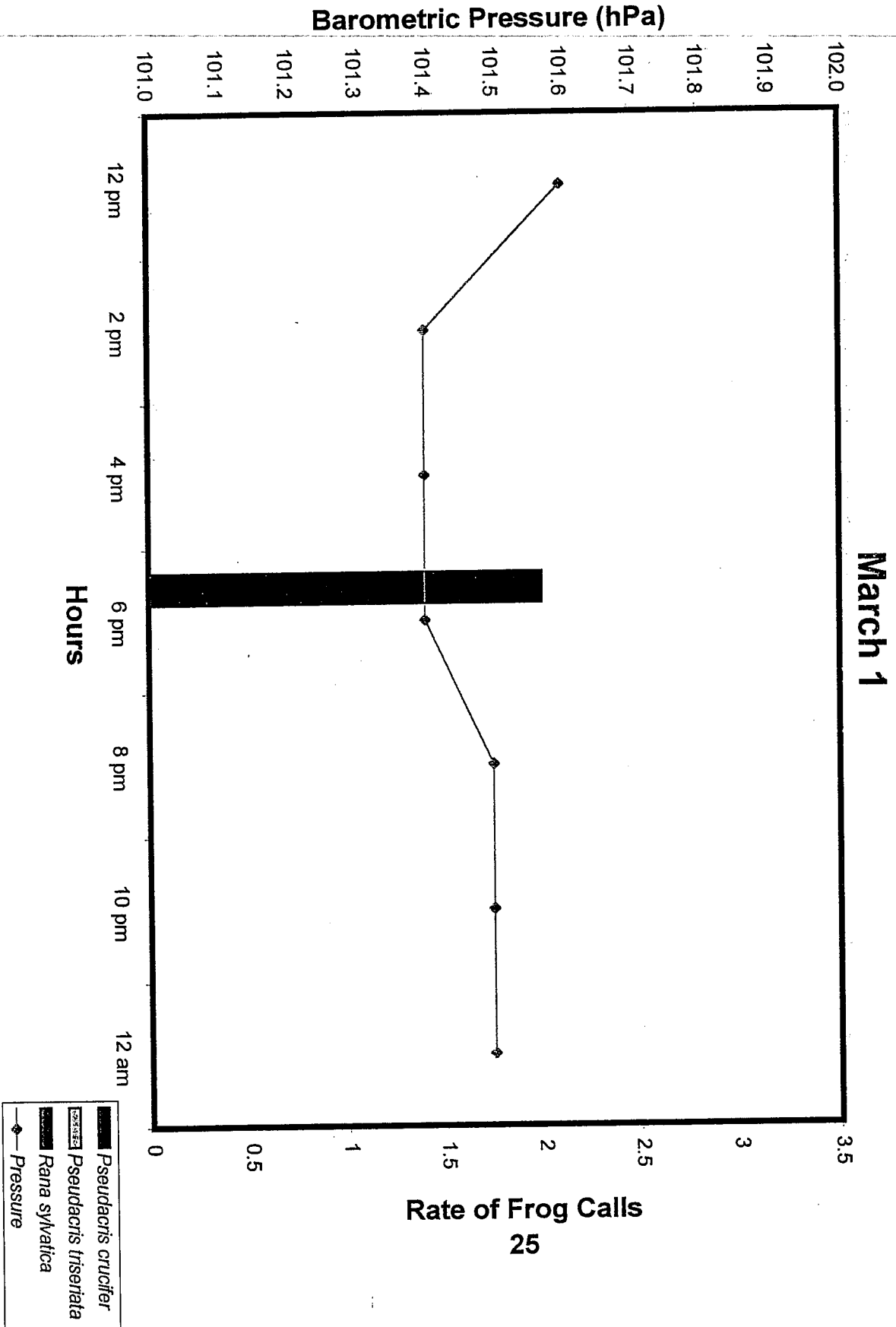
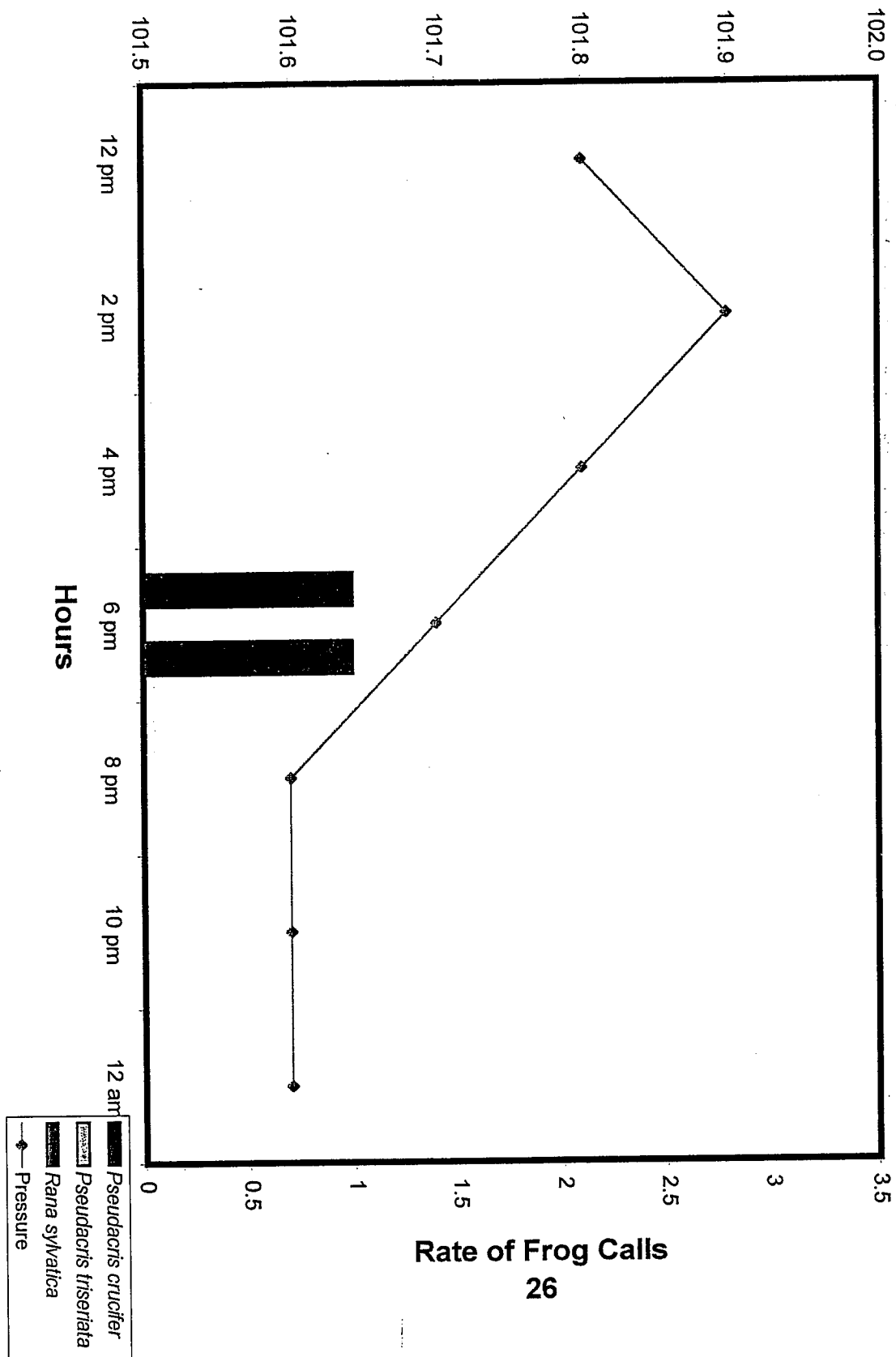


Figure 13a

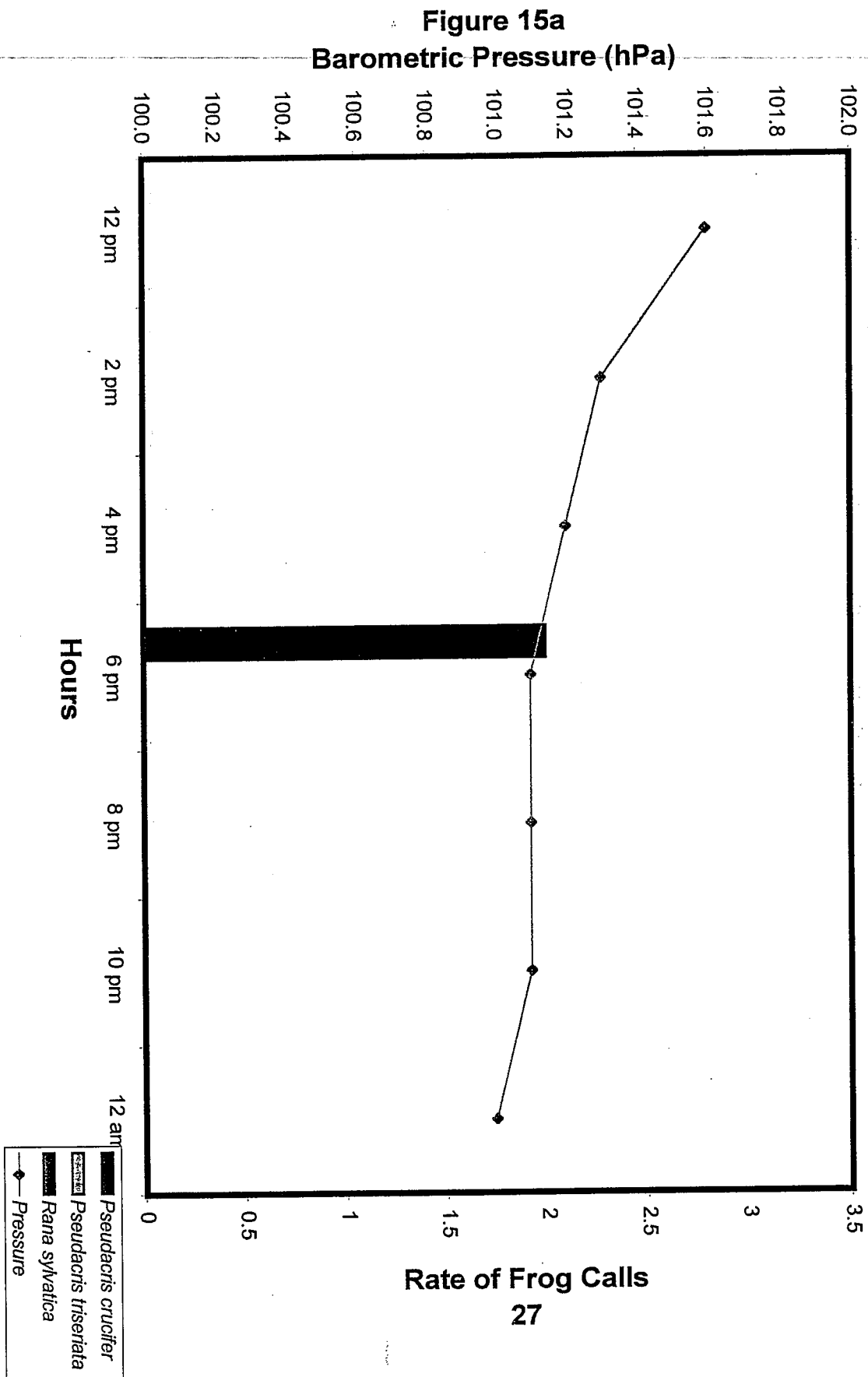


March 2

Figure 14a
Barometric Pressure (hPa)

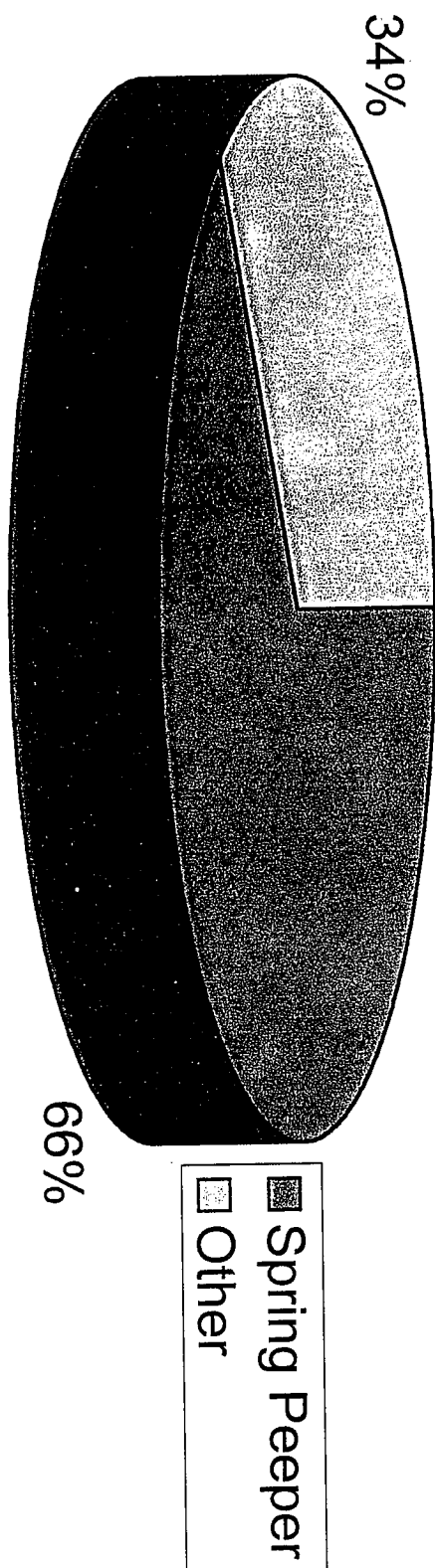


March 3



15C or above & Falling Barometric Pressure

Figure 16a



10C or above & Falling Barometric Pressure

Figure 17a

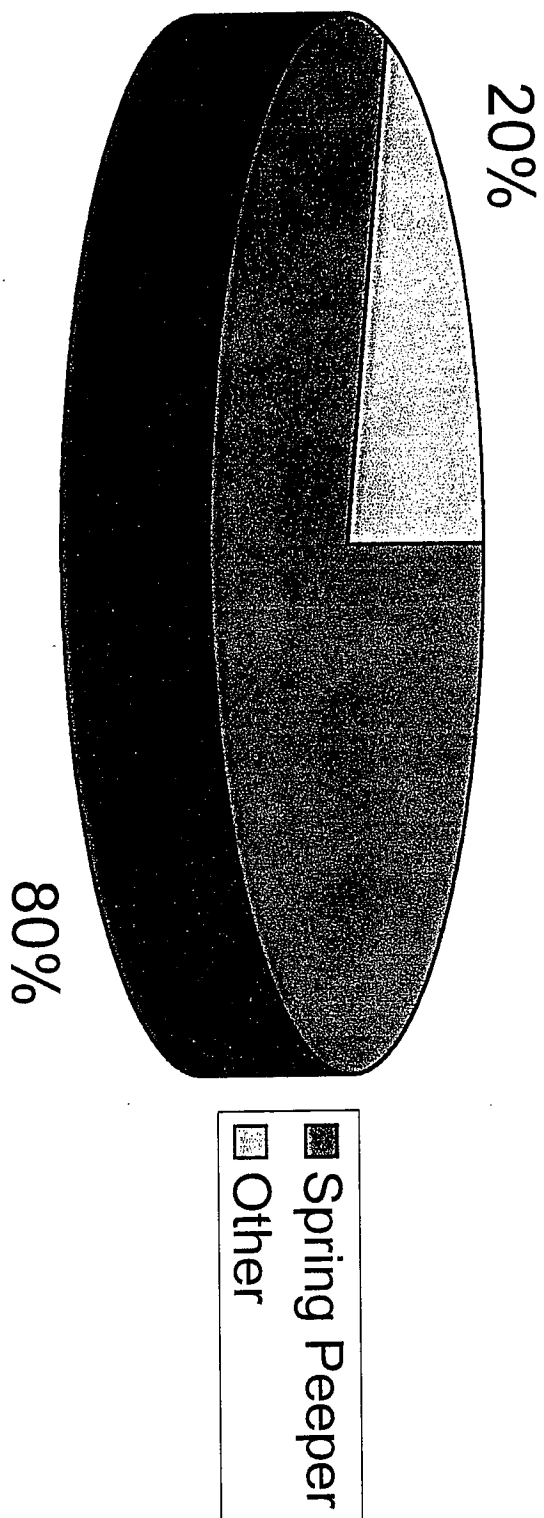
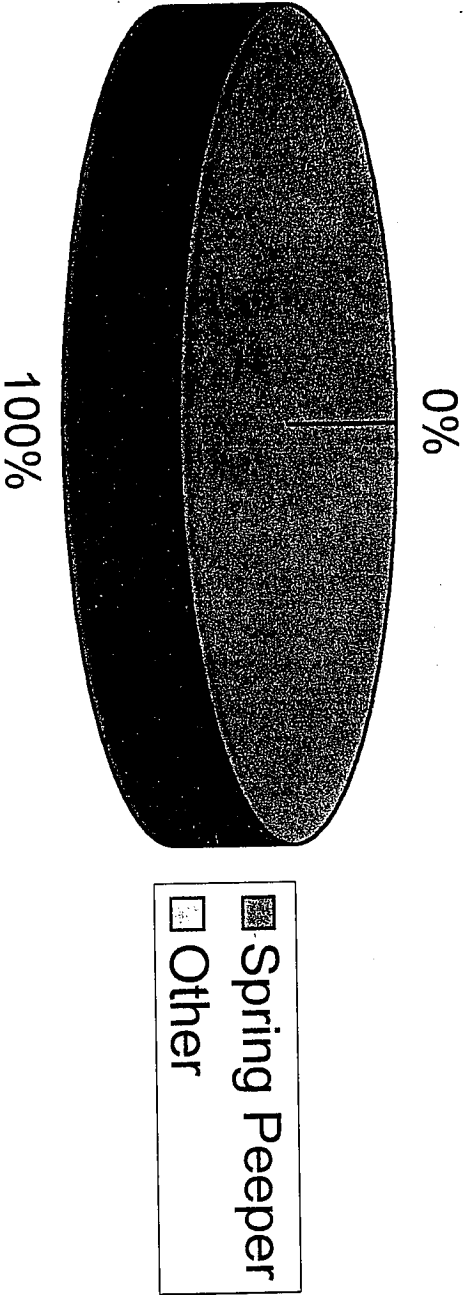
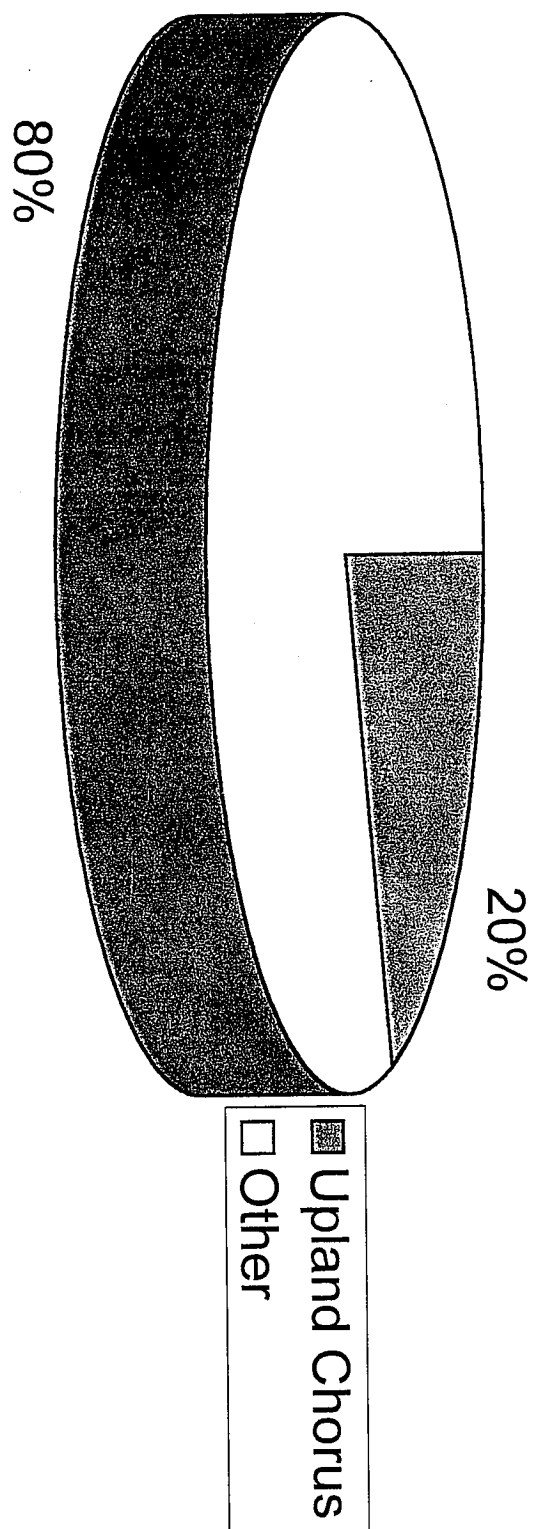


Figure 18a

**10C or above and Falling Barometric Pressure
or
10C or above and .10 Inches or More of Rainfall**



15C or above & Falling Barometric Pressure



10C or above & Falling Barometric Pressure

Figure 20a

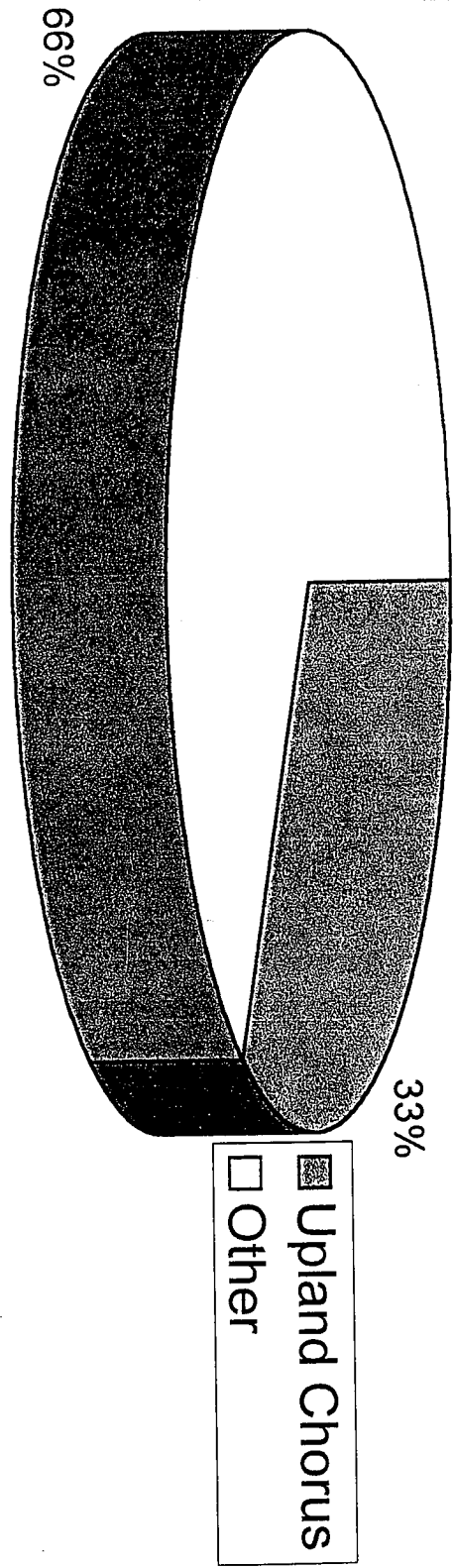


Figure 21a

**10C or above and Falling Barometric Pressure
or
.10 Inches or More of Rainfall**

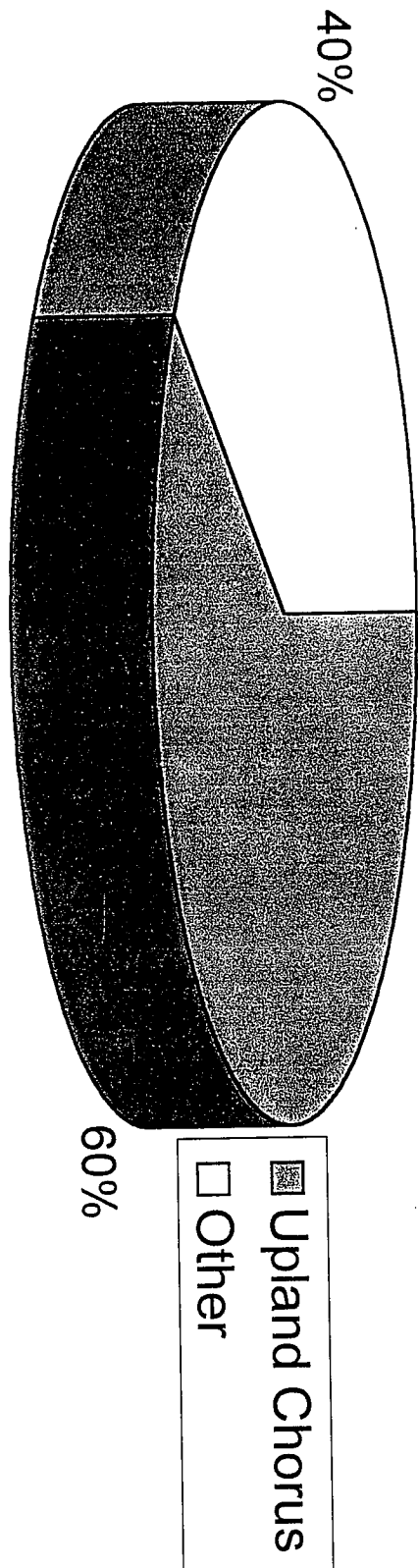
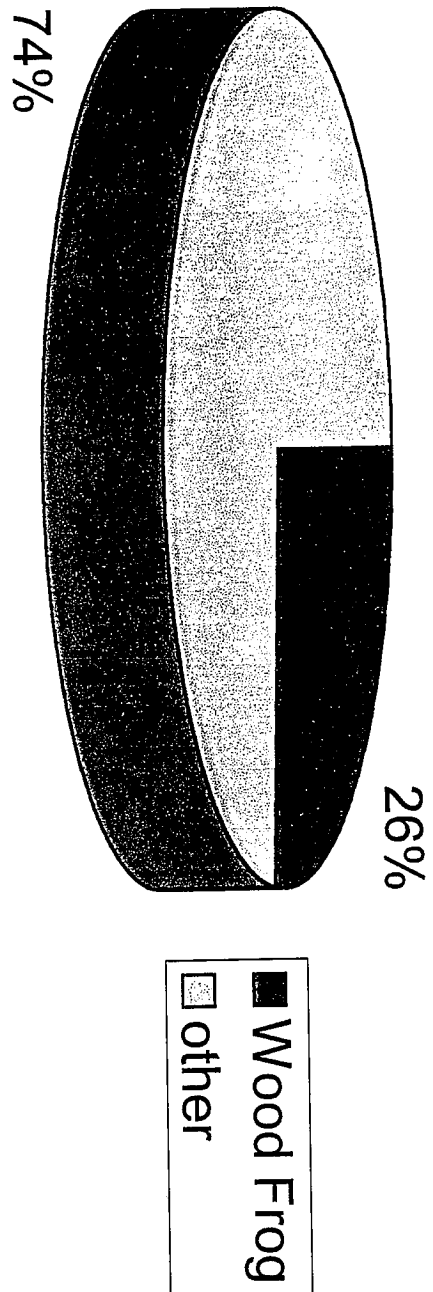


Figure 22a

15C or above & Falling Barometric Pressure



10C or above & Falling Barometric Pressure

Figure 23a

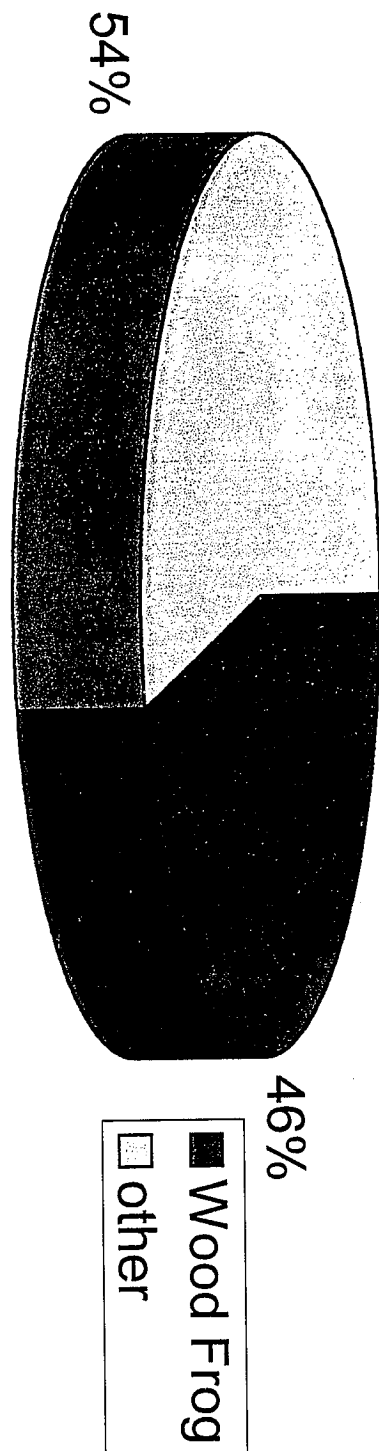


Figure 24a

**10C or above and Falling Barometric Pressure
or
.10 Inches or More of Rainfall**

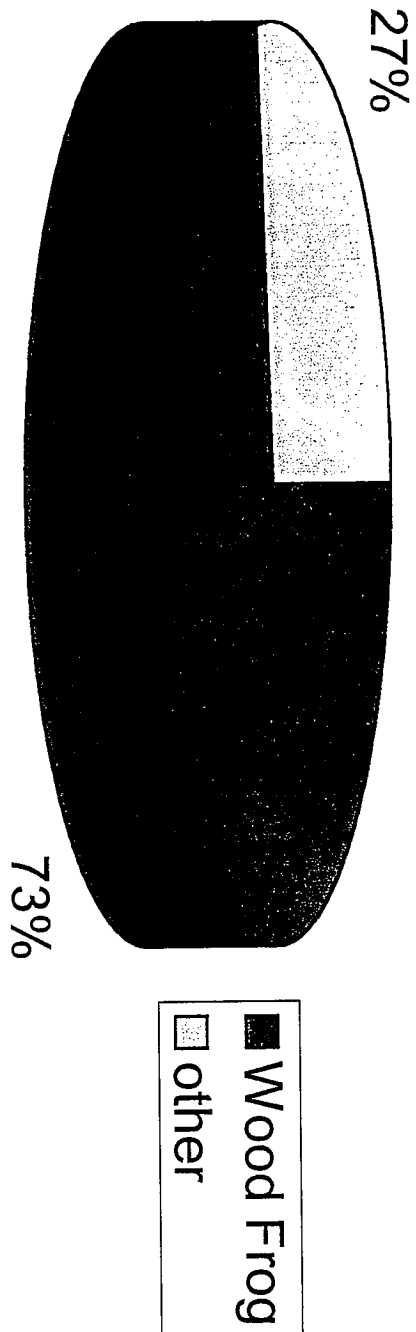
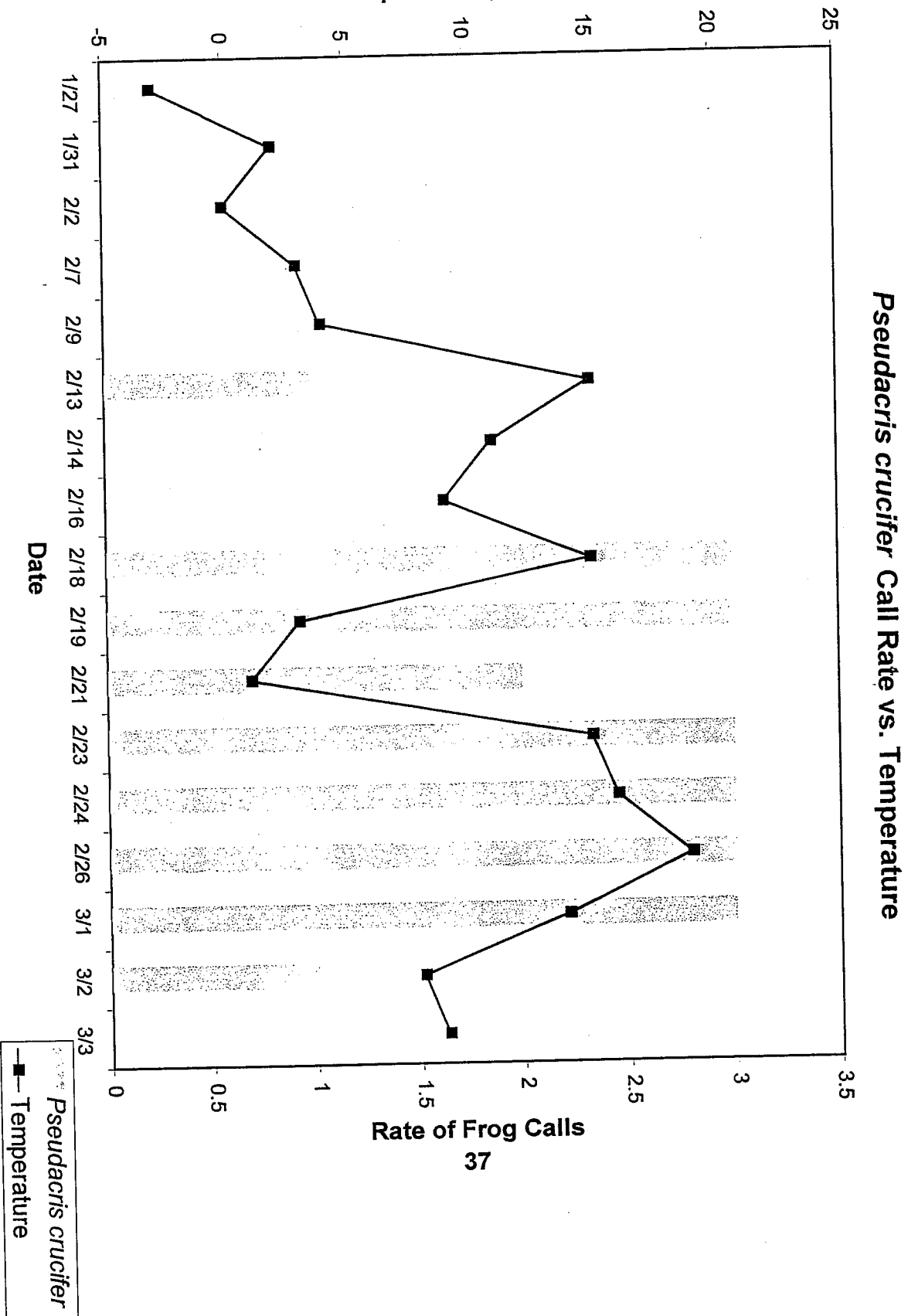
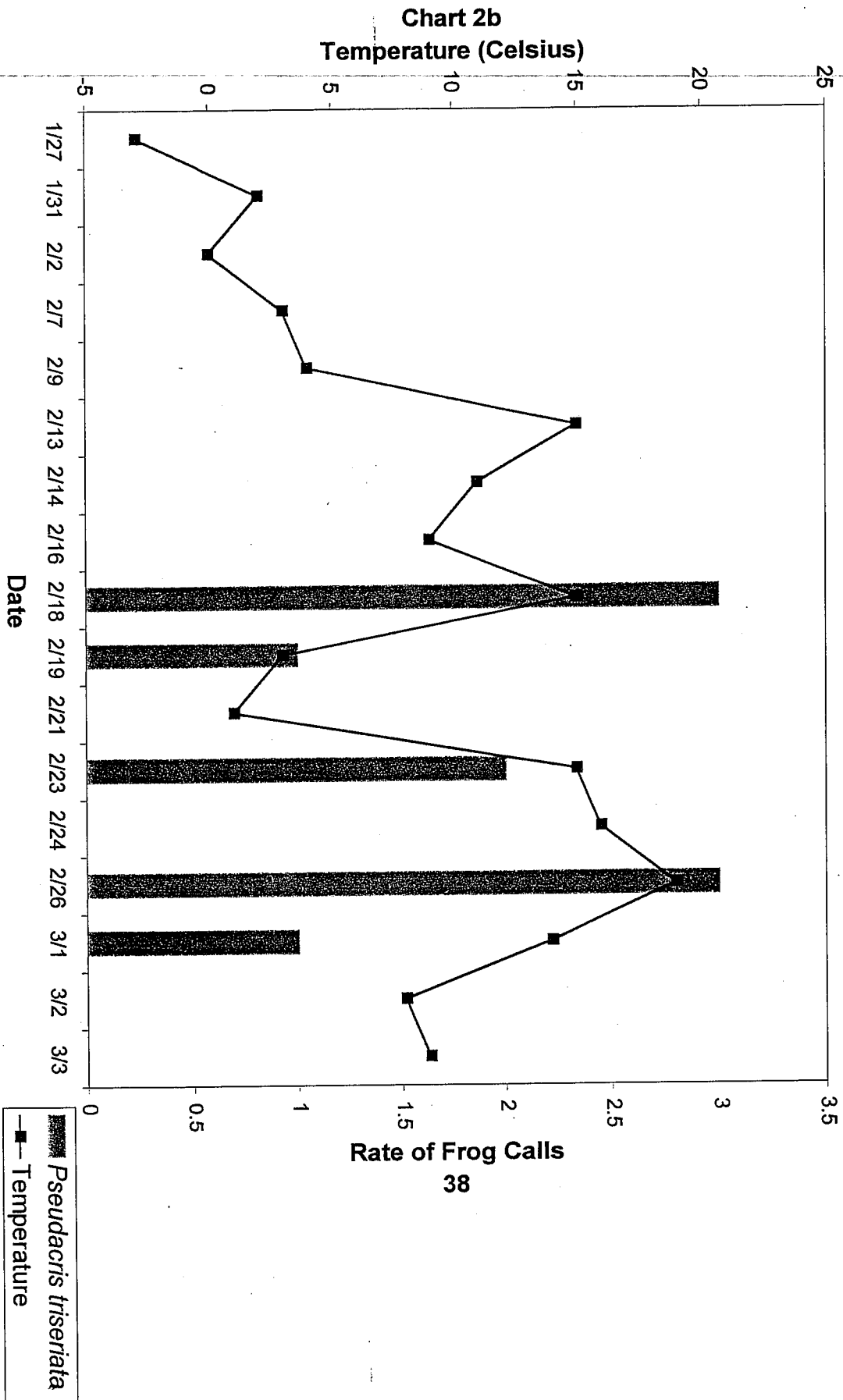


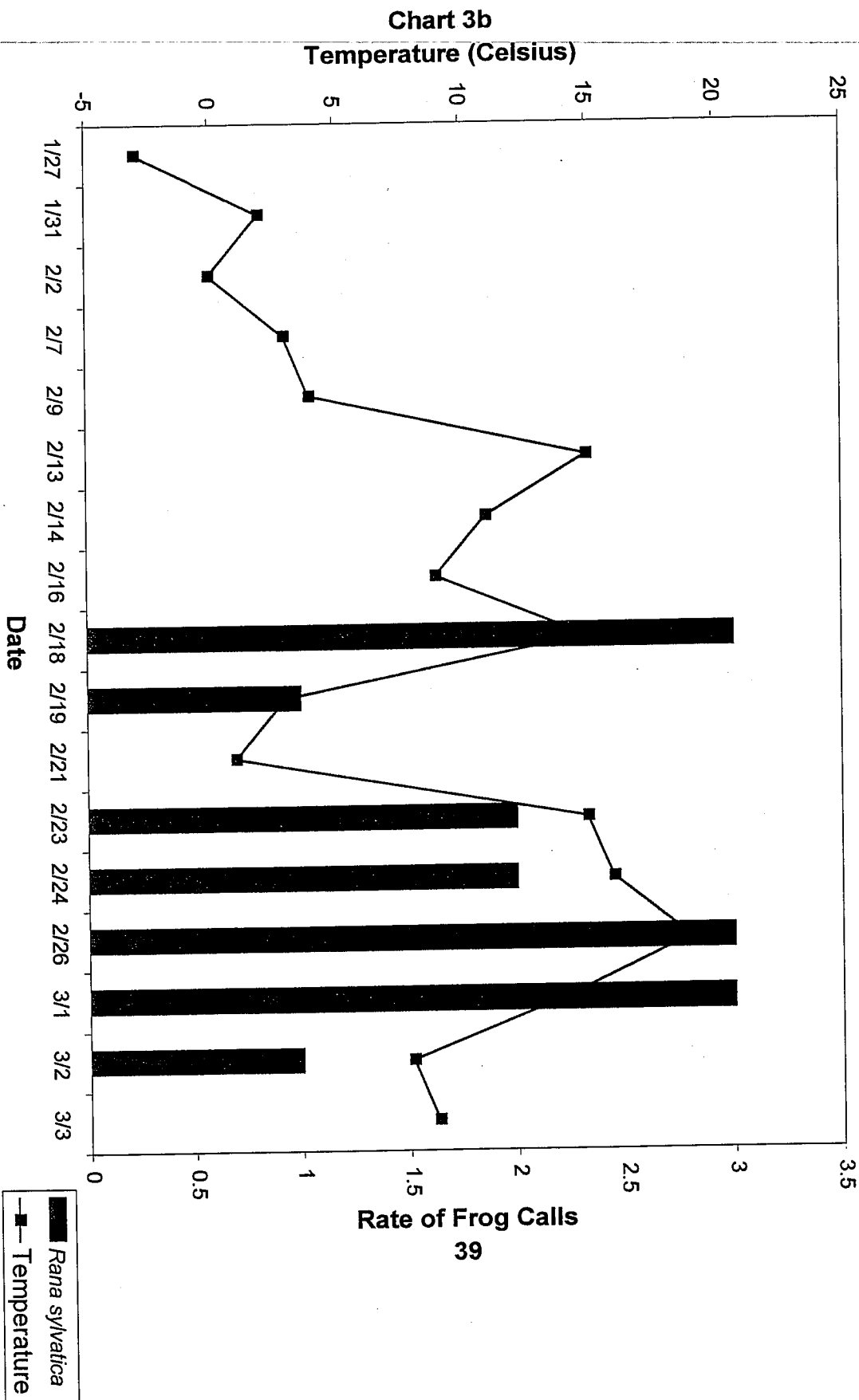
Chart 1b
Temperature (Celsius)



Pseudacris triseriata Call Rate vs. Temperature

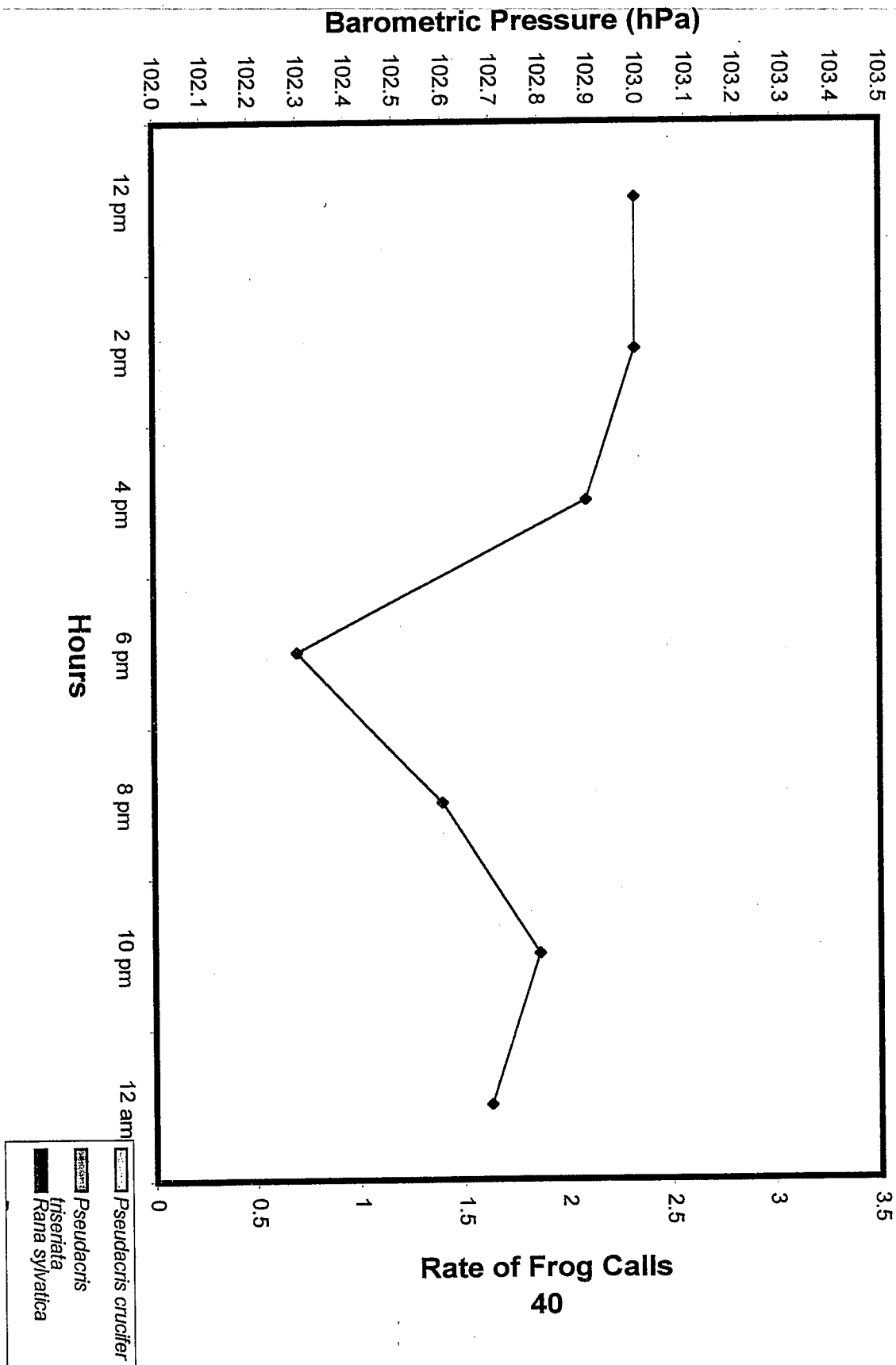


Rana sylvatica Call Rate vs. Temperature

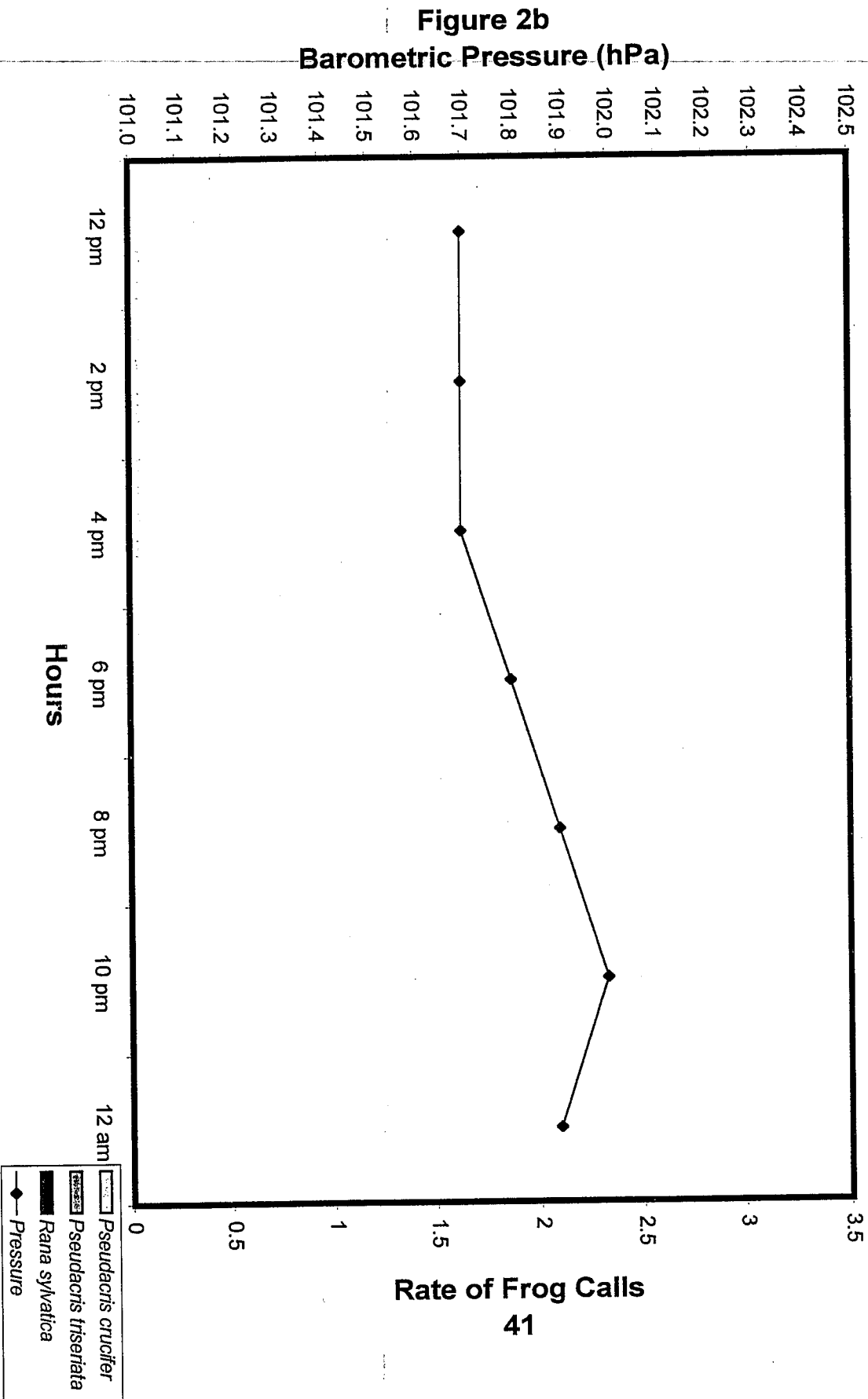


January 27

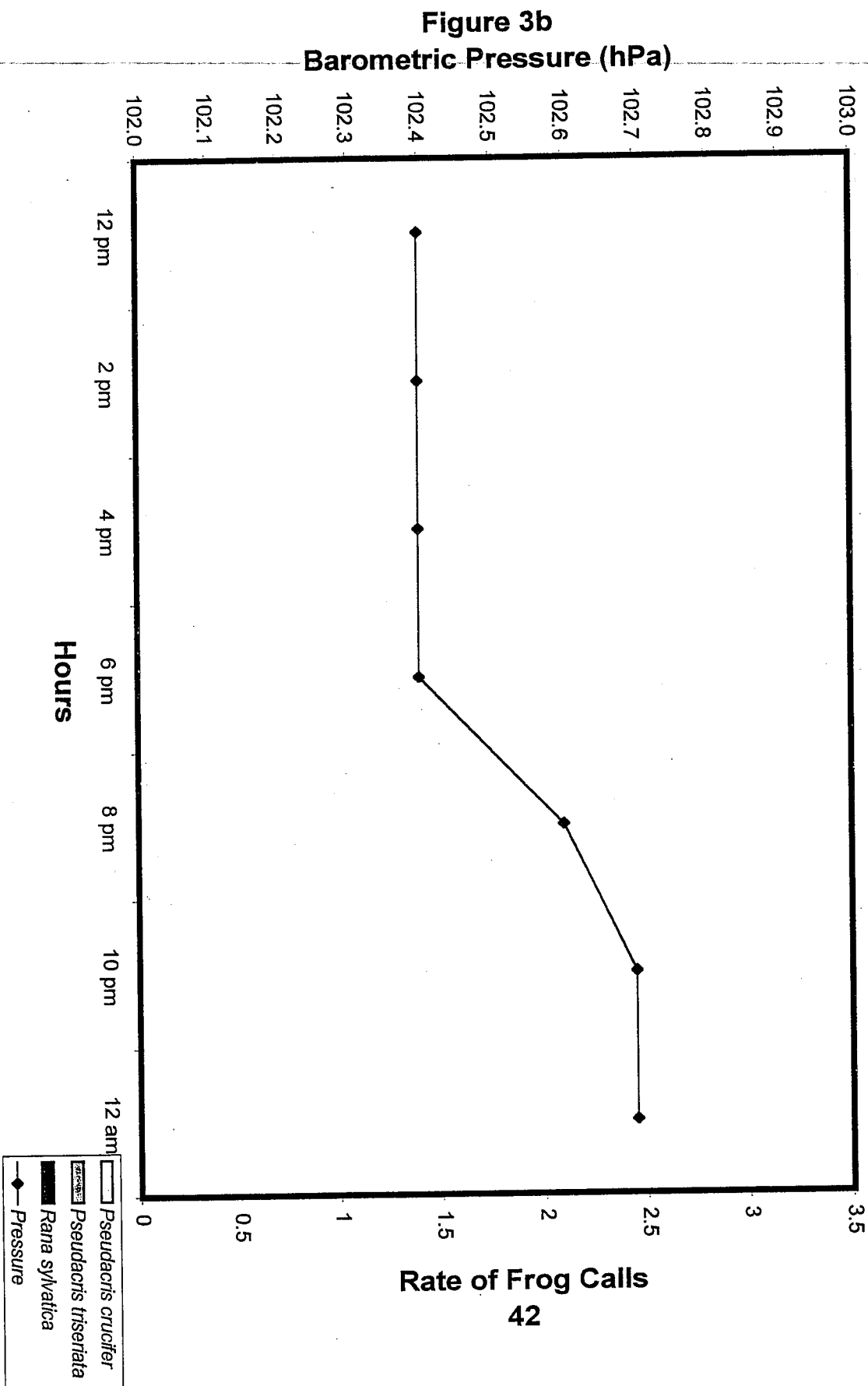
Figure 1b



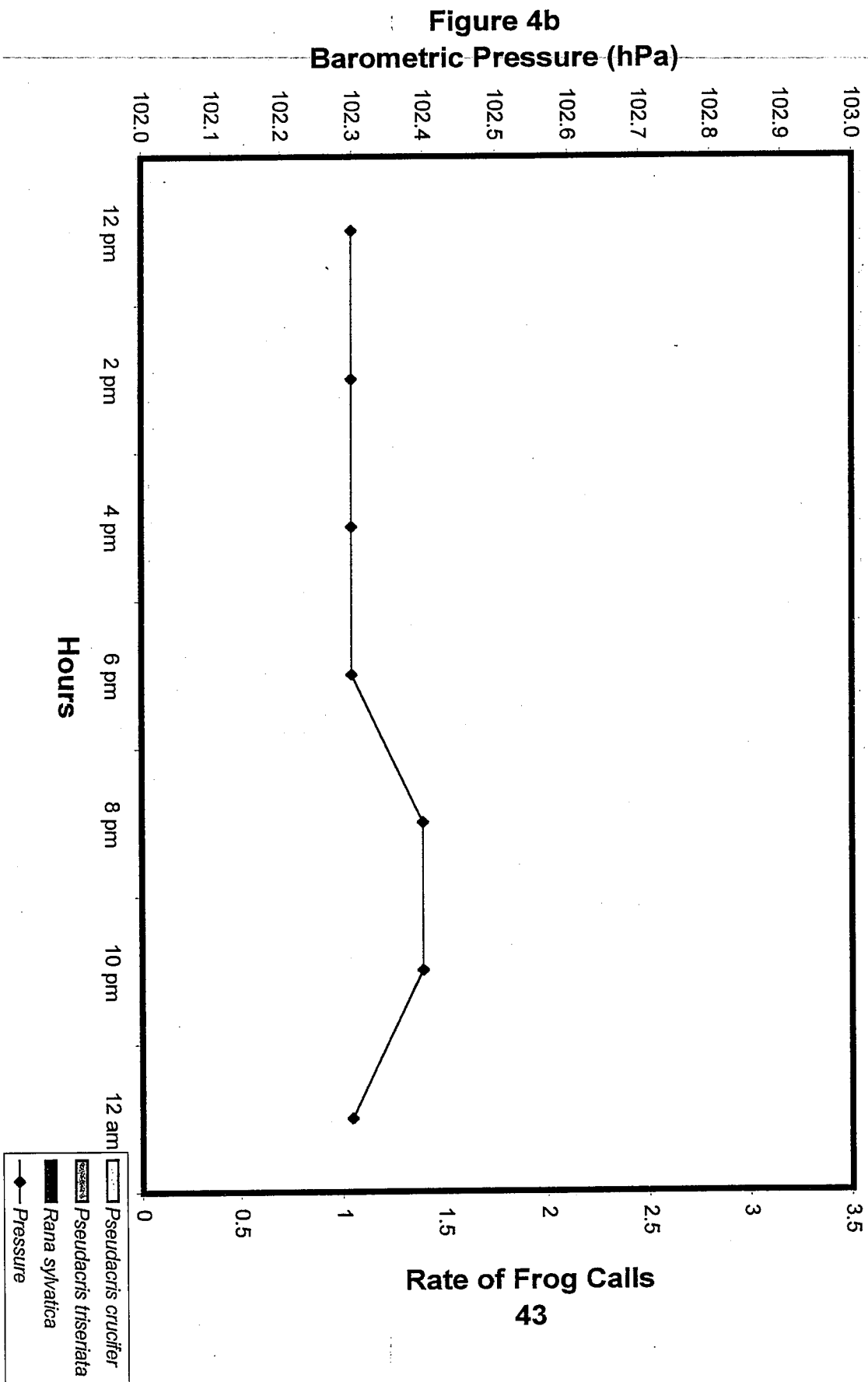
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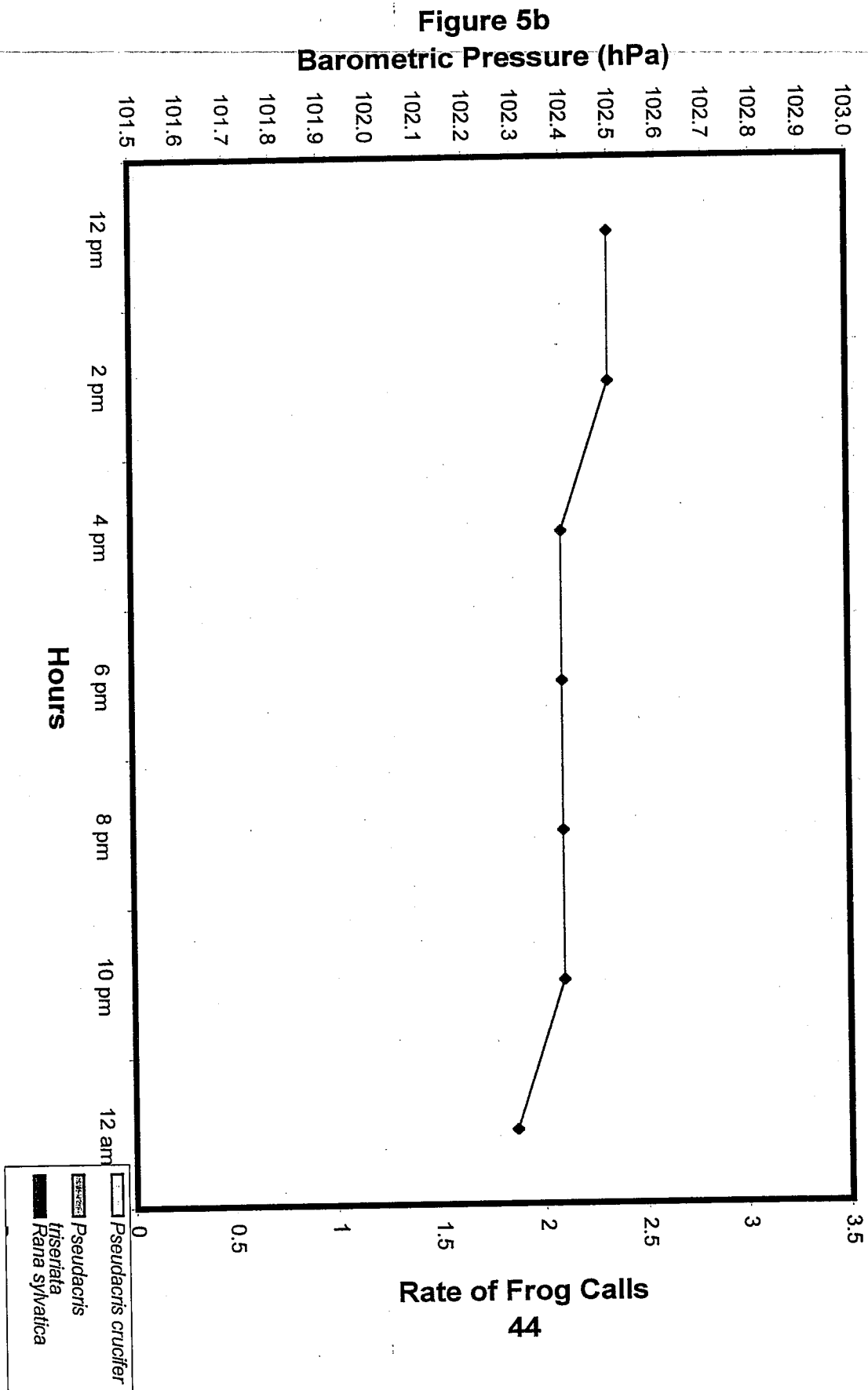
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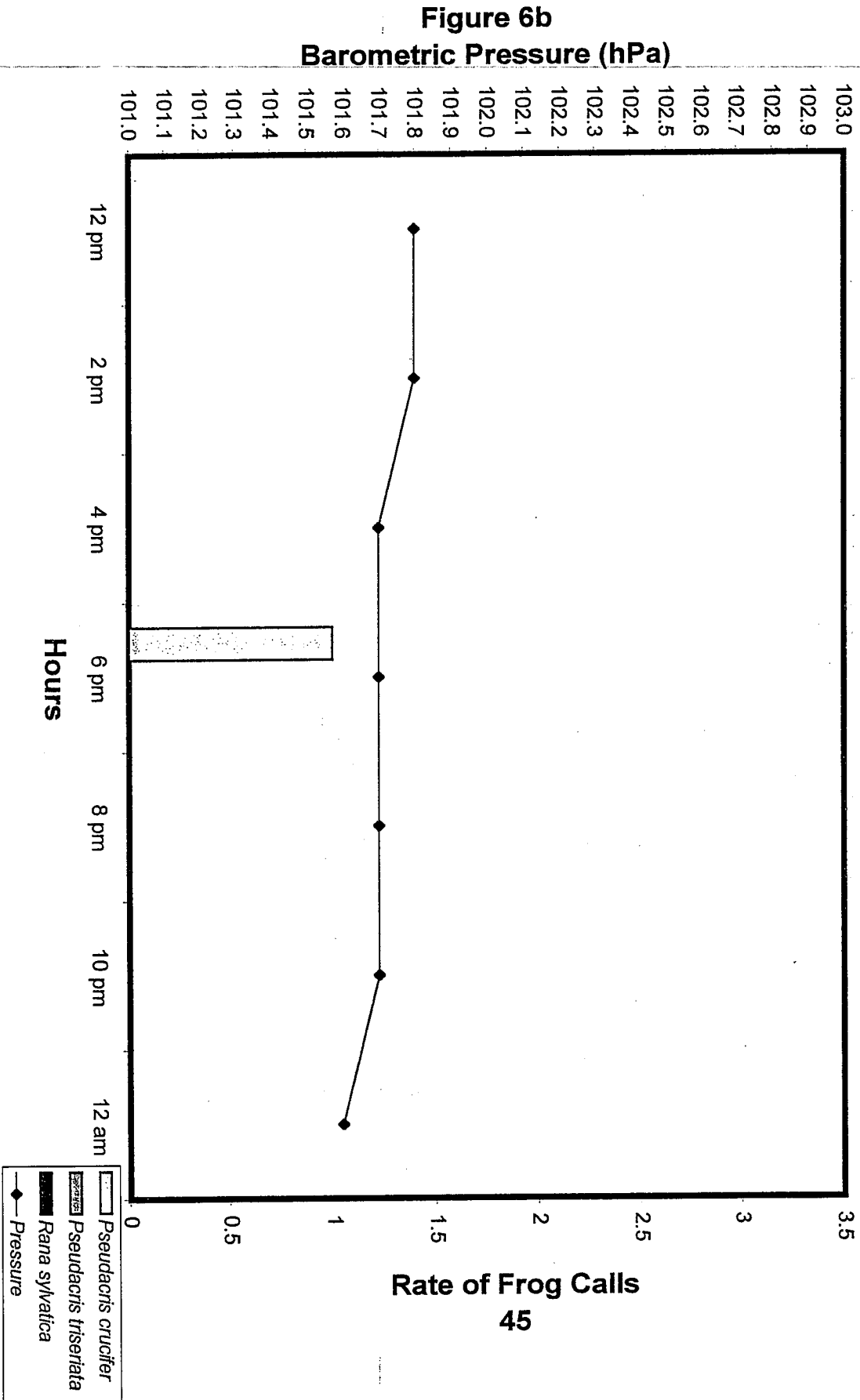
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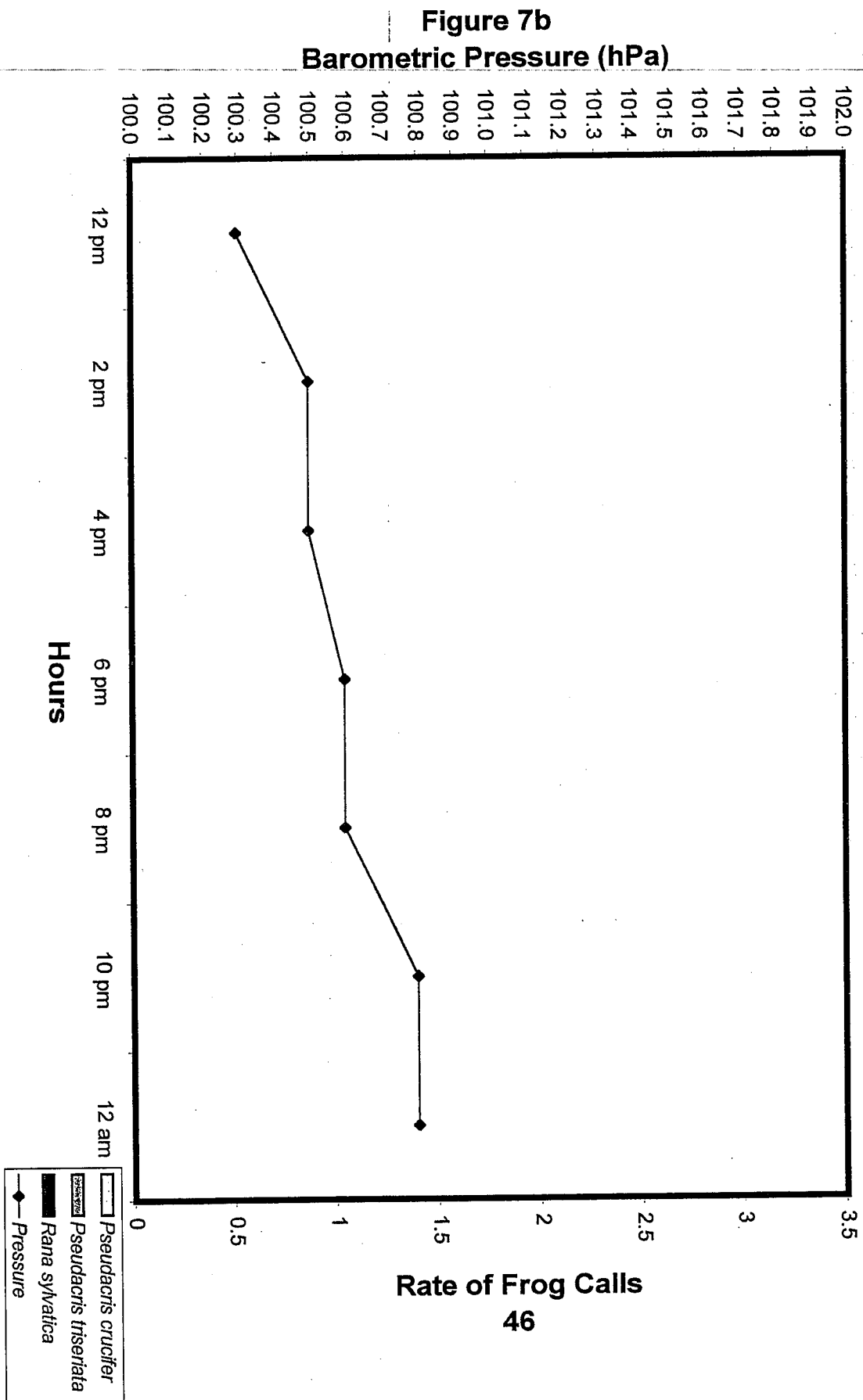
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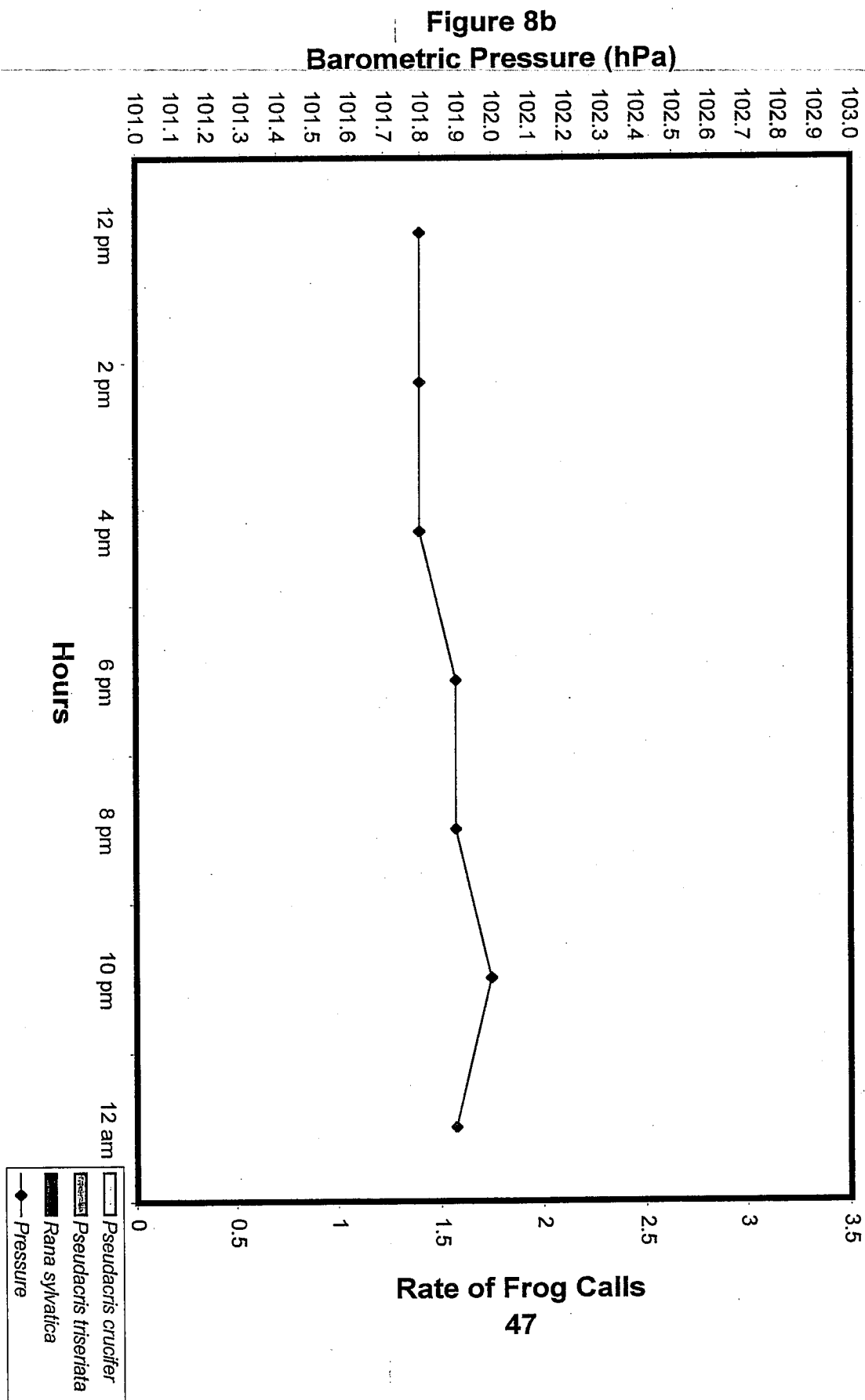
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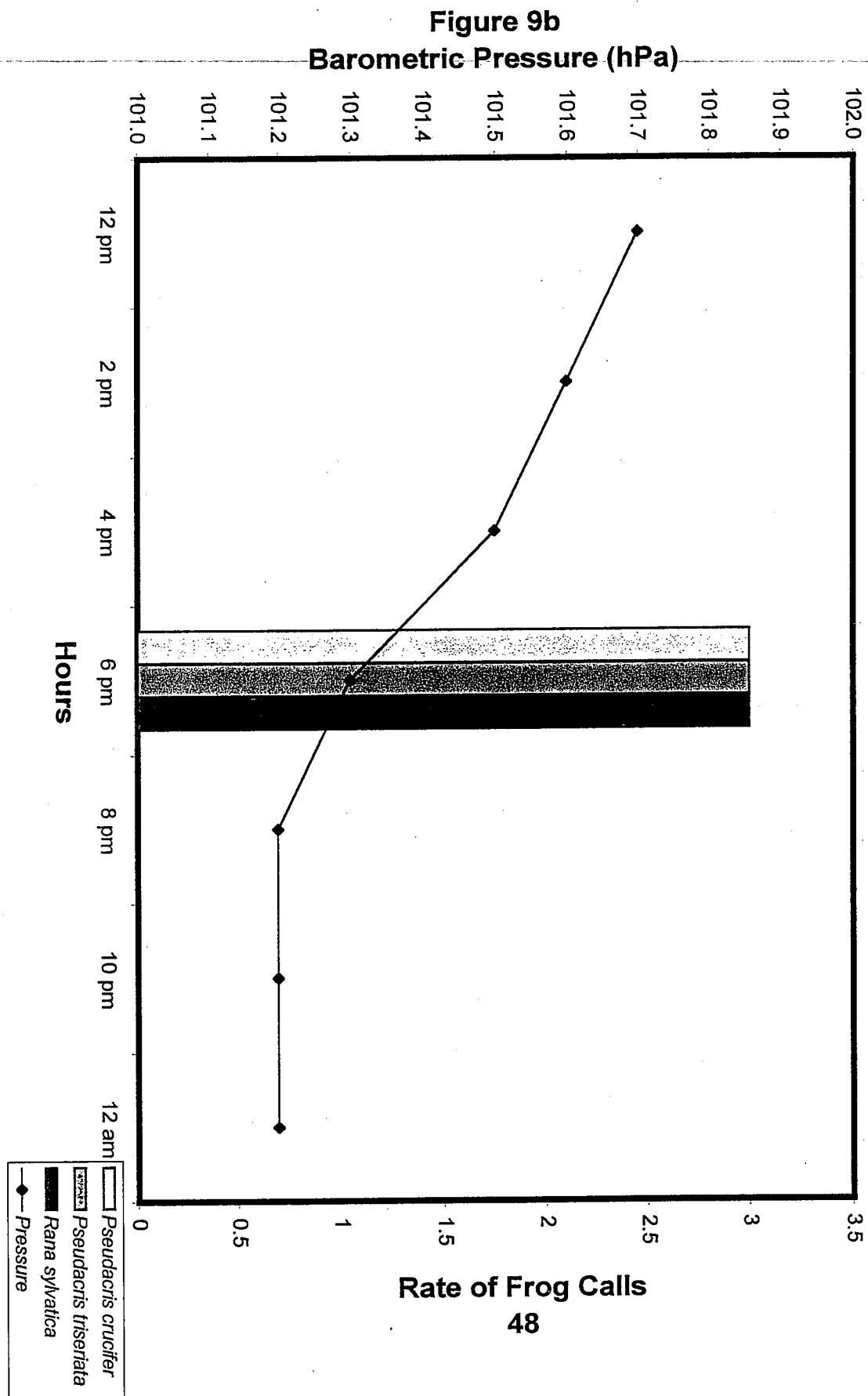
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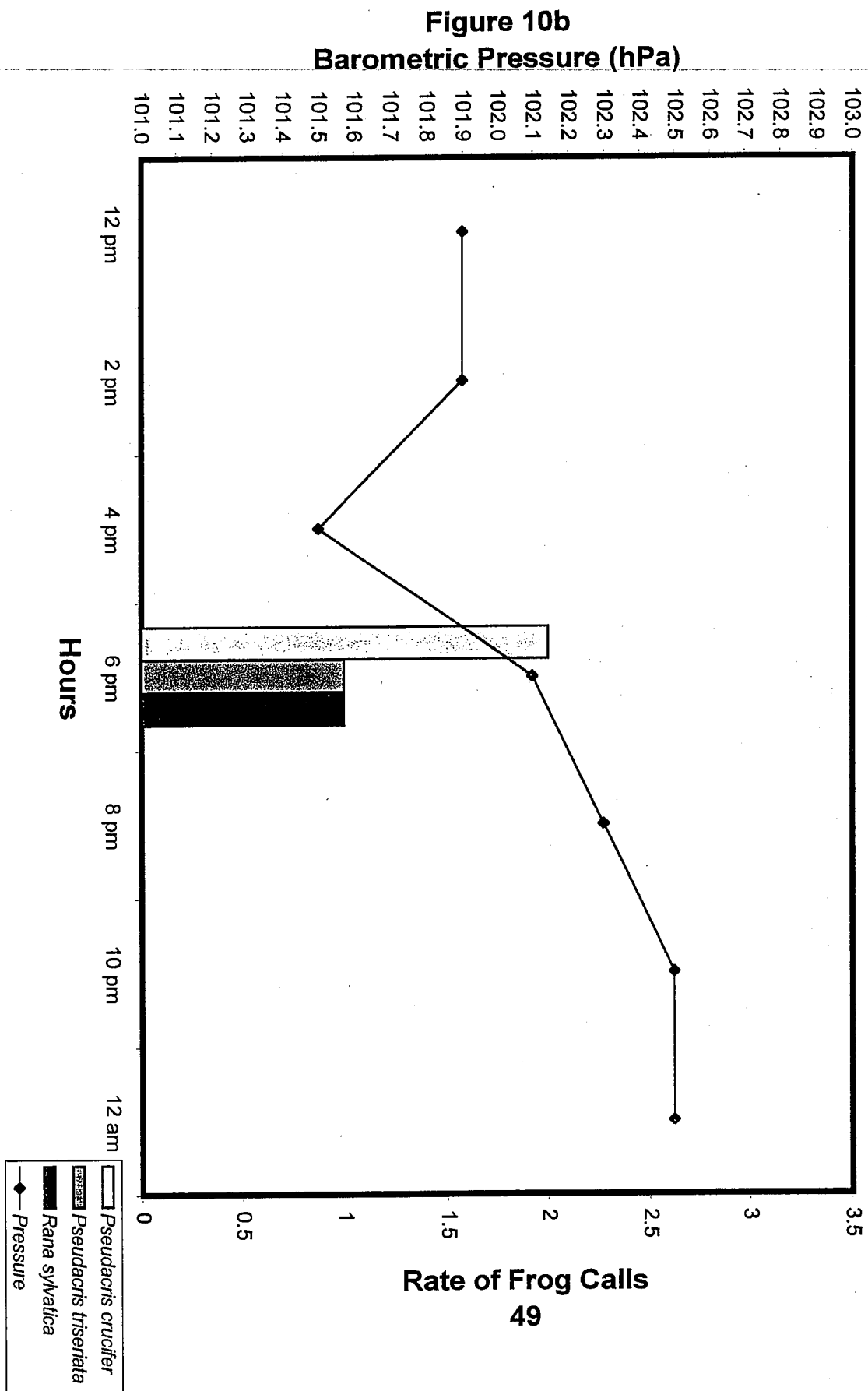
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February 18

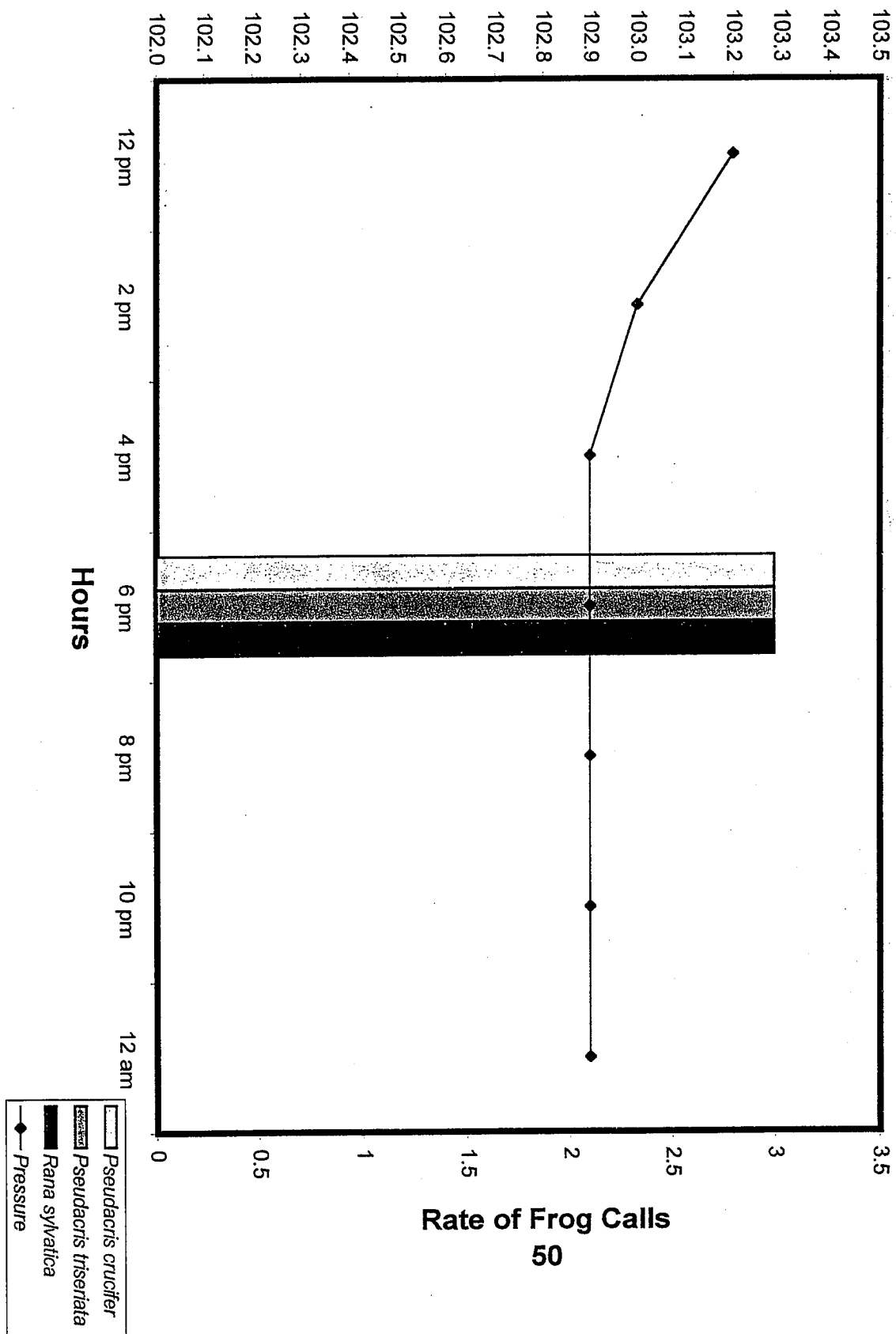


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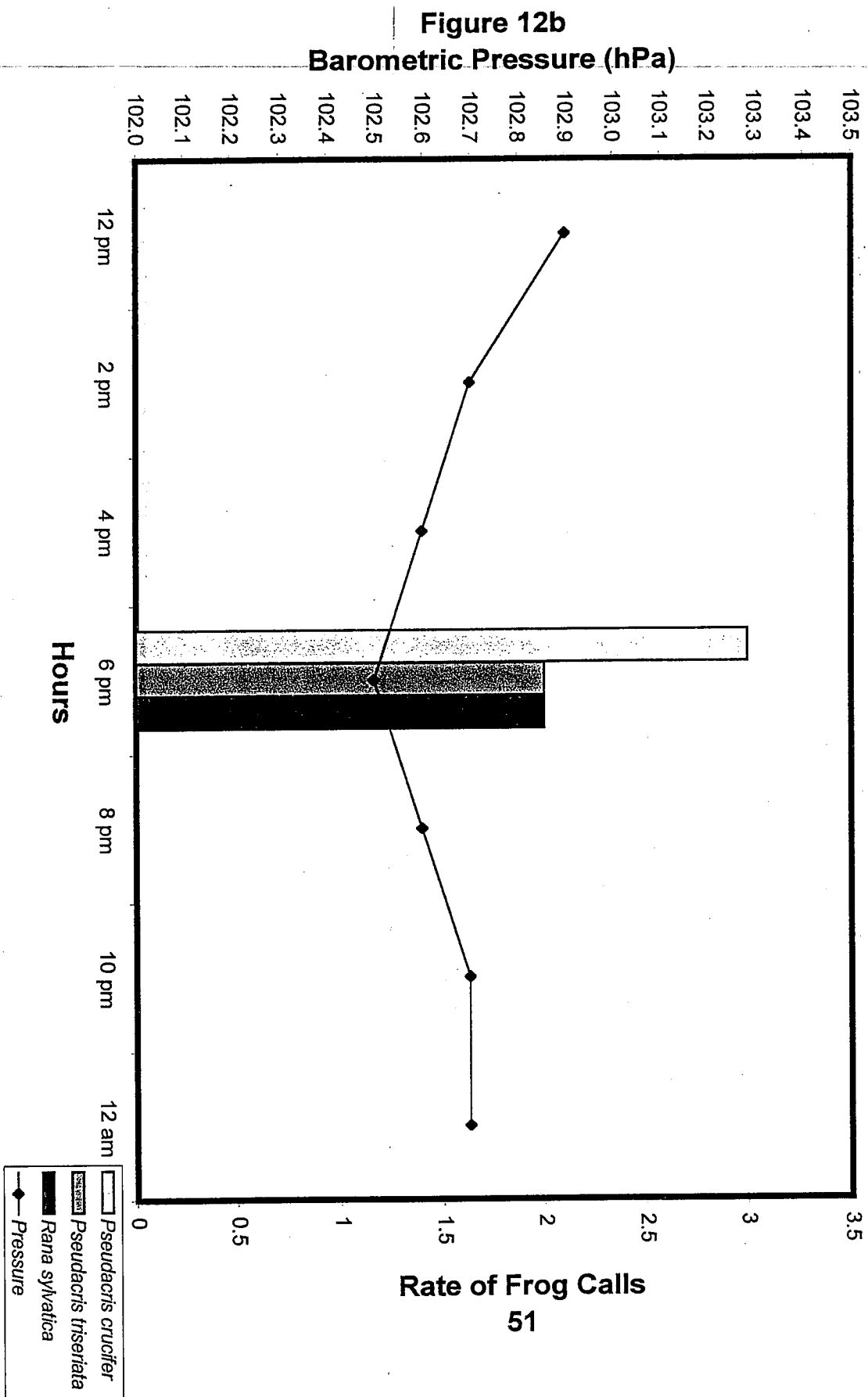


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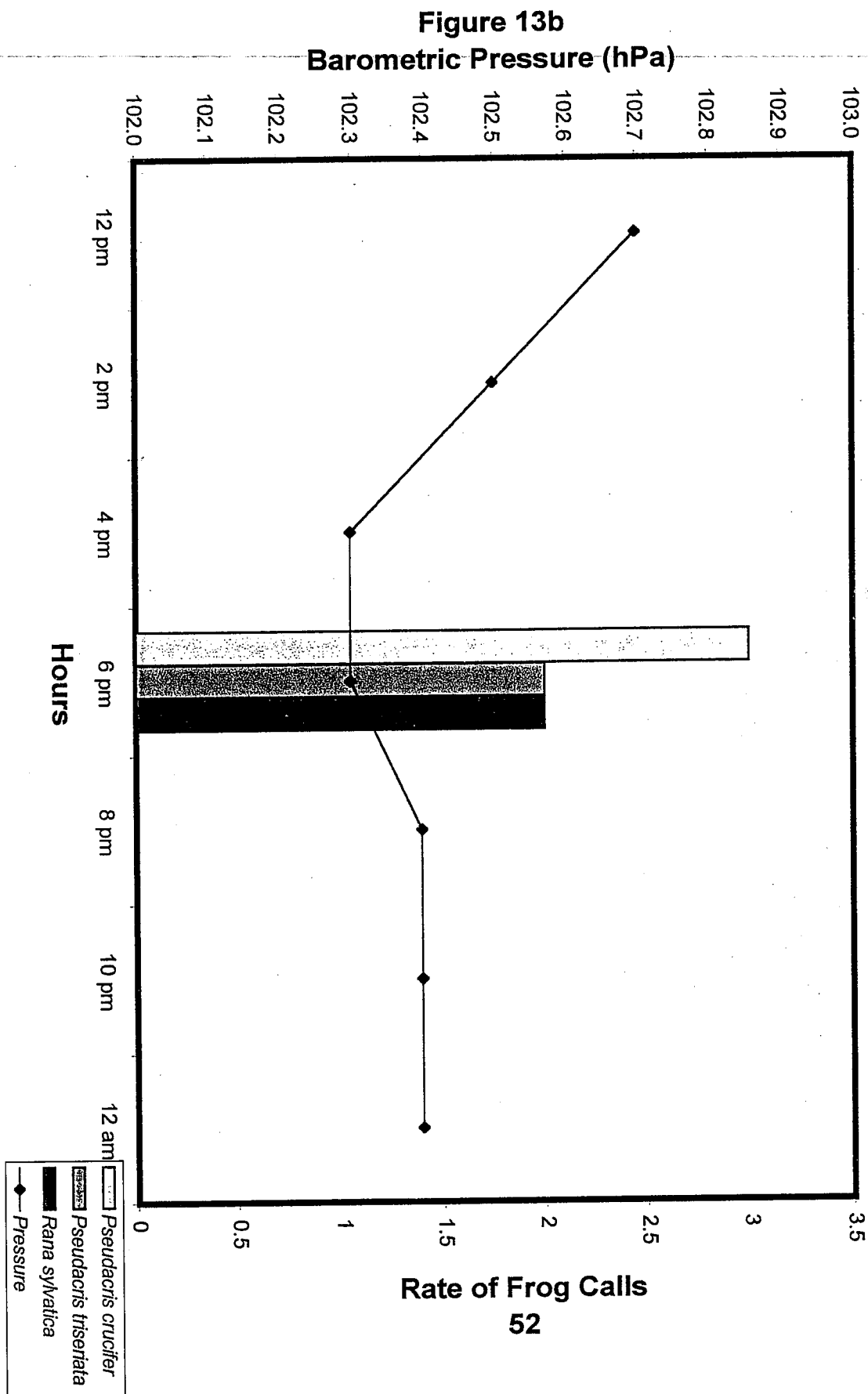
Figure 11b
Barometric Pressure (hPa)



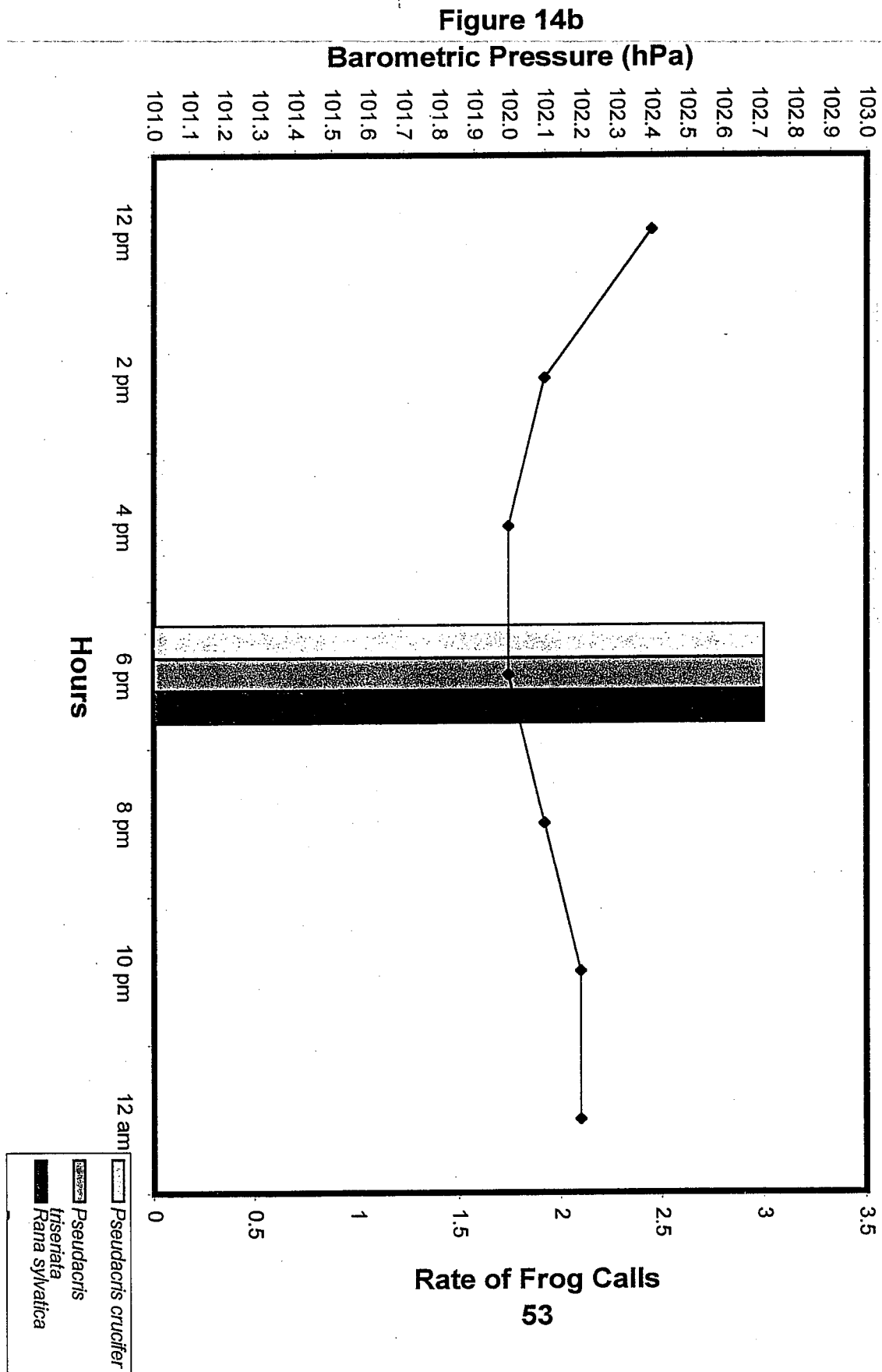
February 23



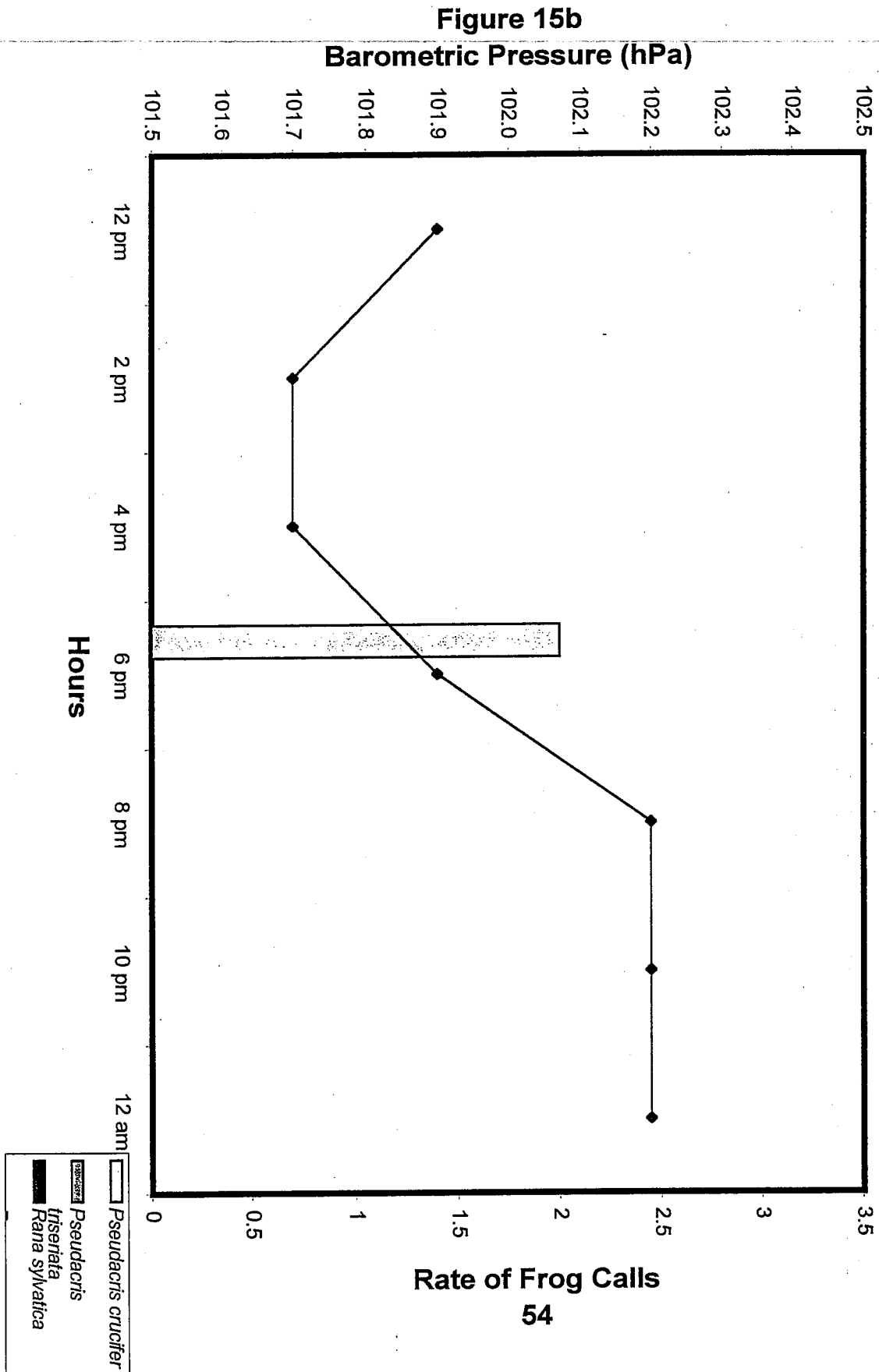
February 24



February 26



February 27



March 1

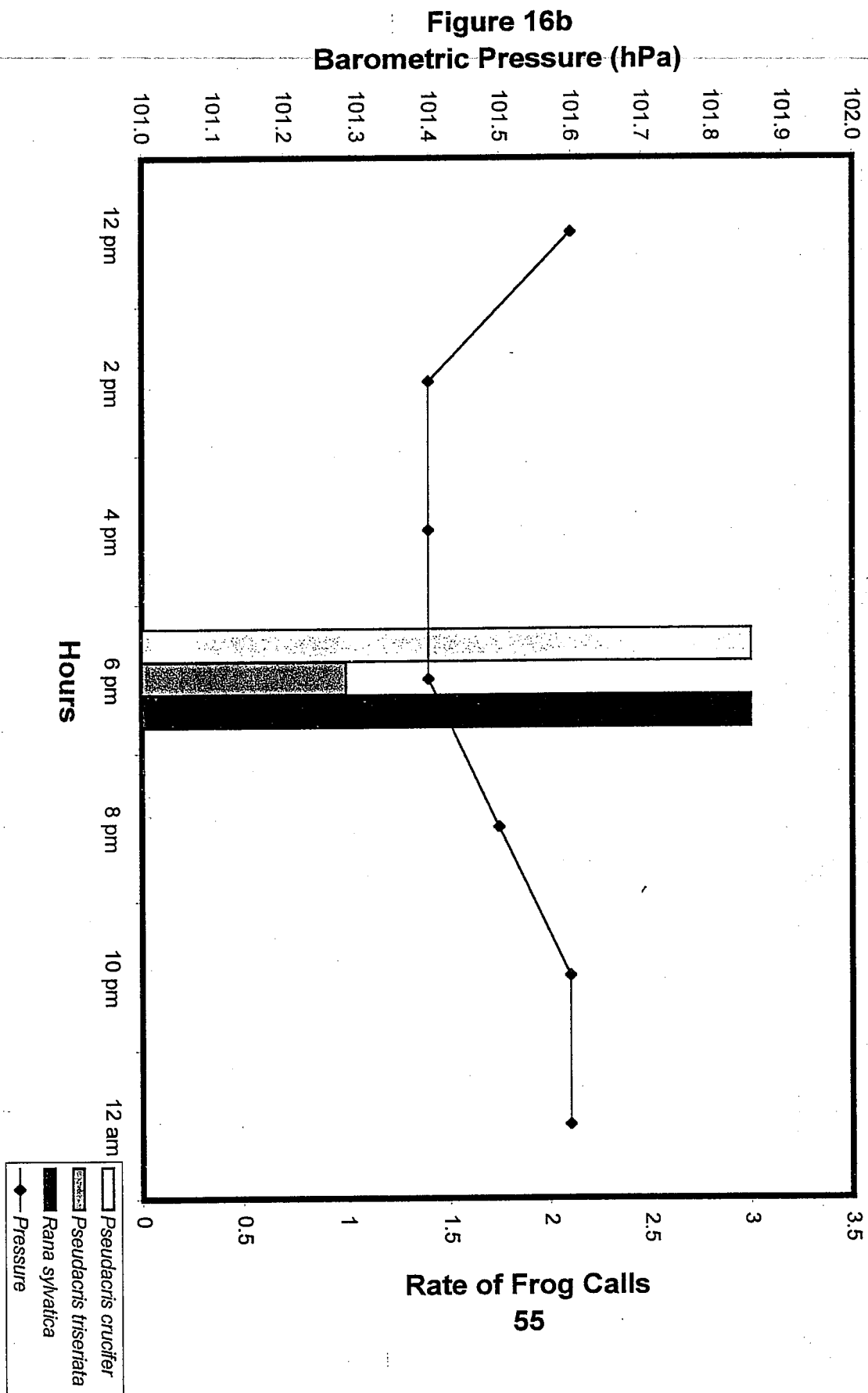


Figure 17b
Barometric Pressure (hPa)

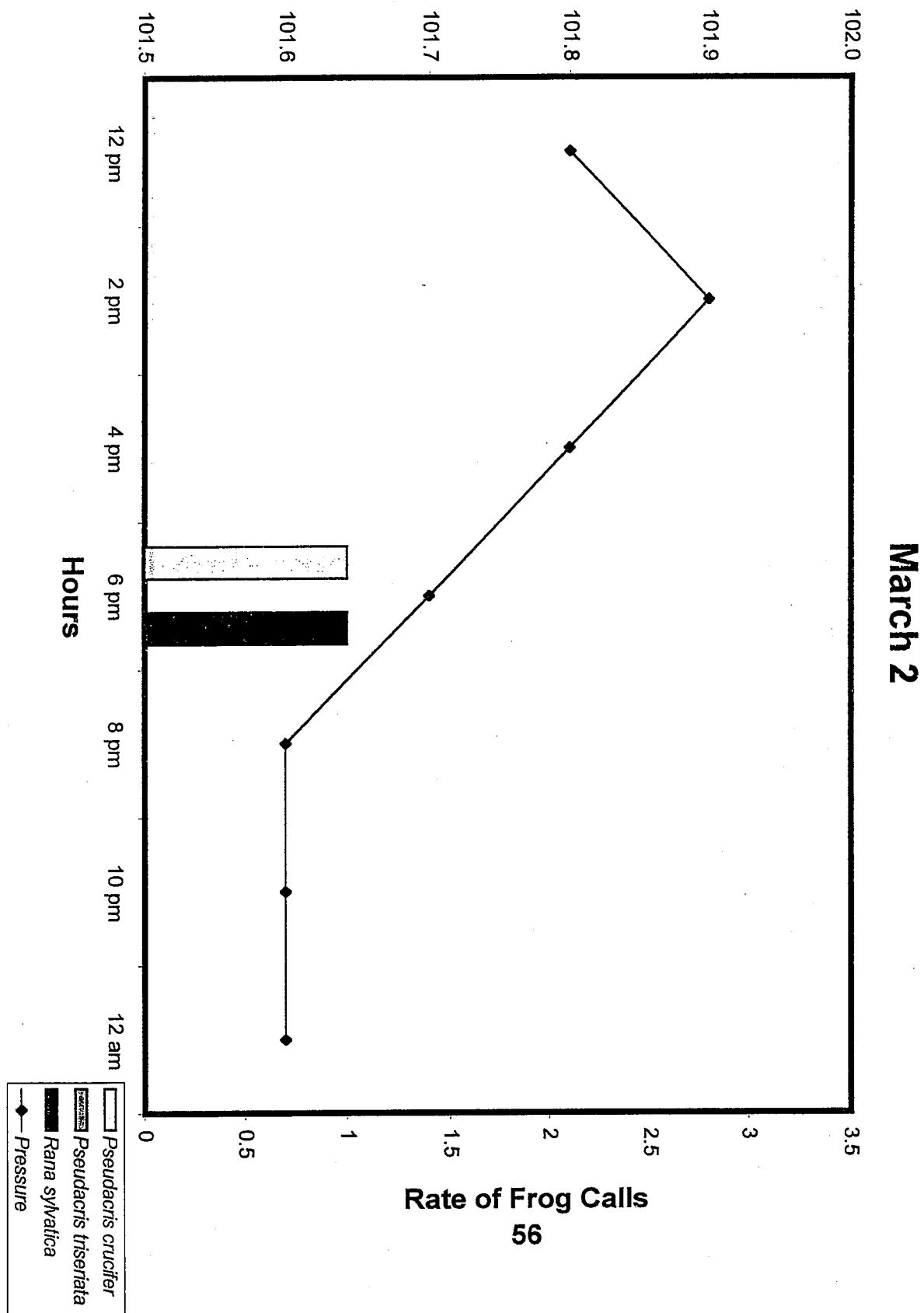
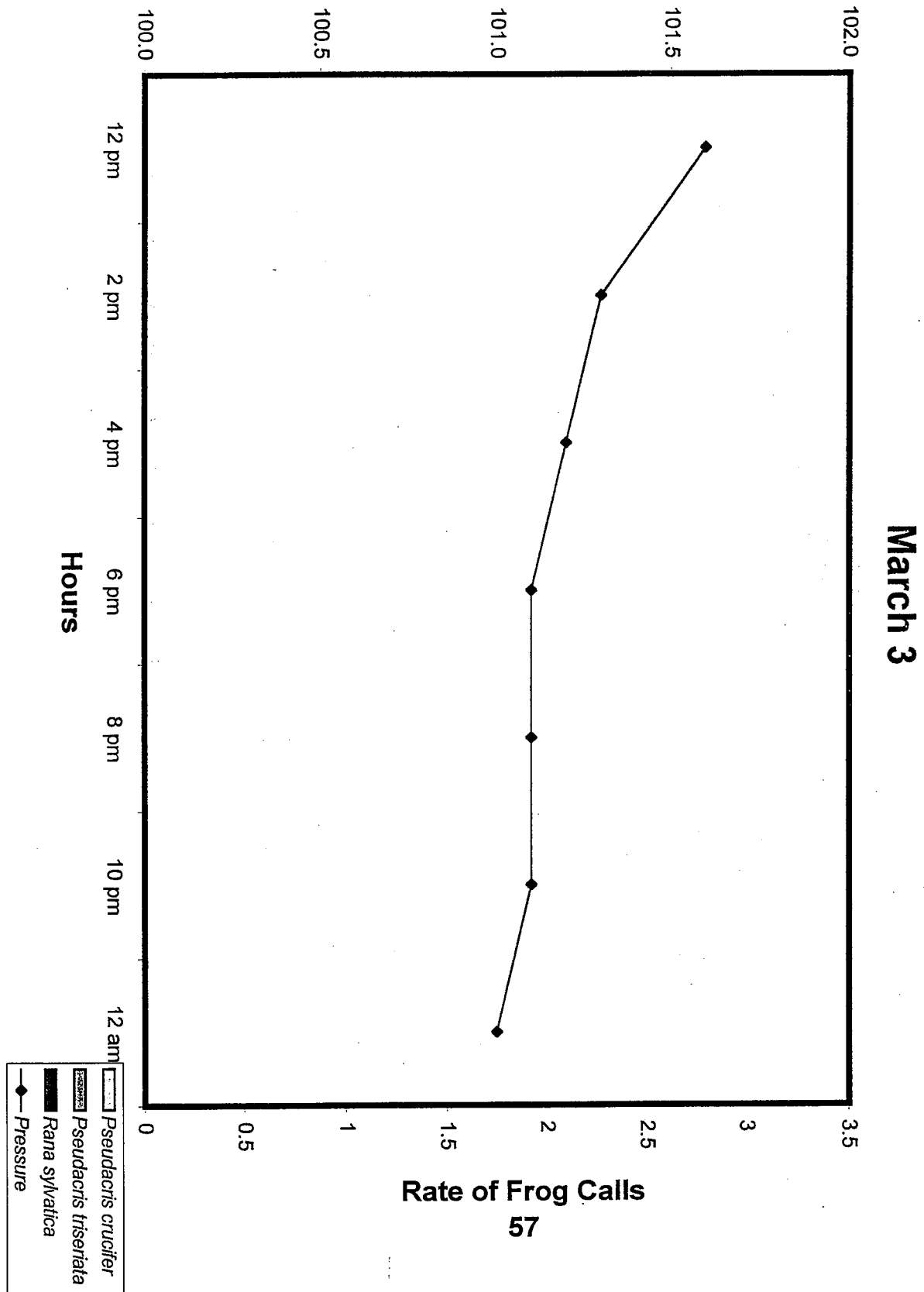
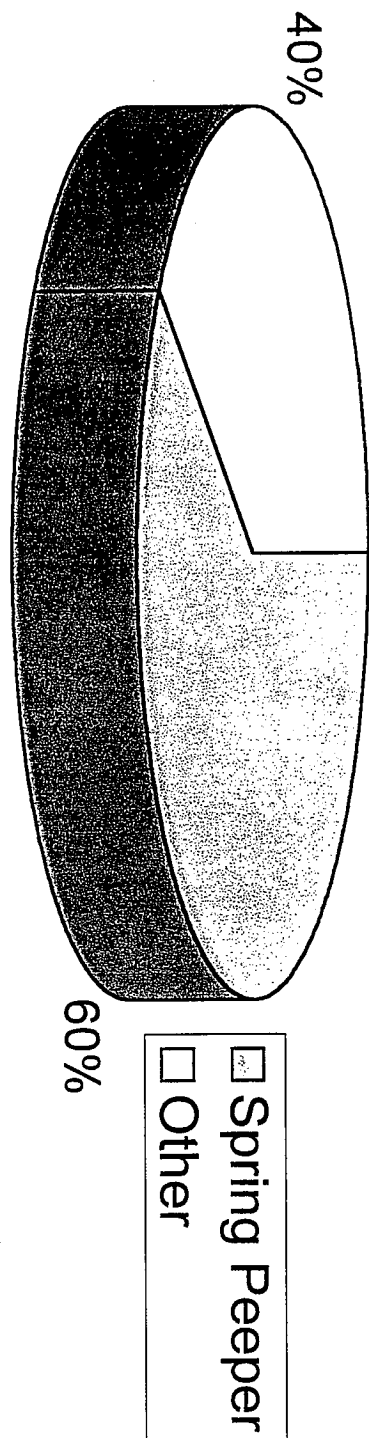


Figure 18b
Barometric Pressure (hPa)



10C or above & Falling Barometric Pressure

Figure 19b



0C or above and Falling Barometric Pressure

Figure 20b

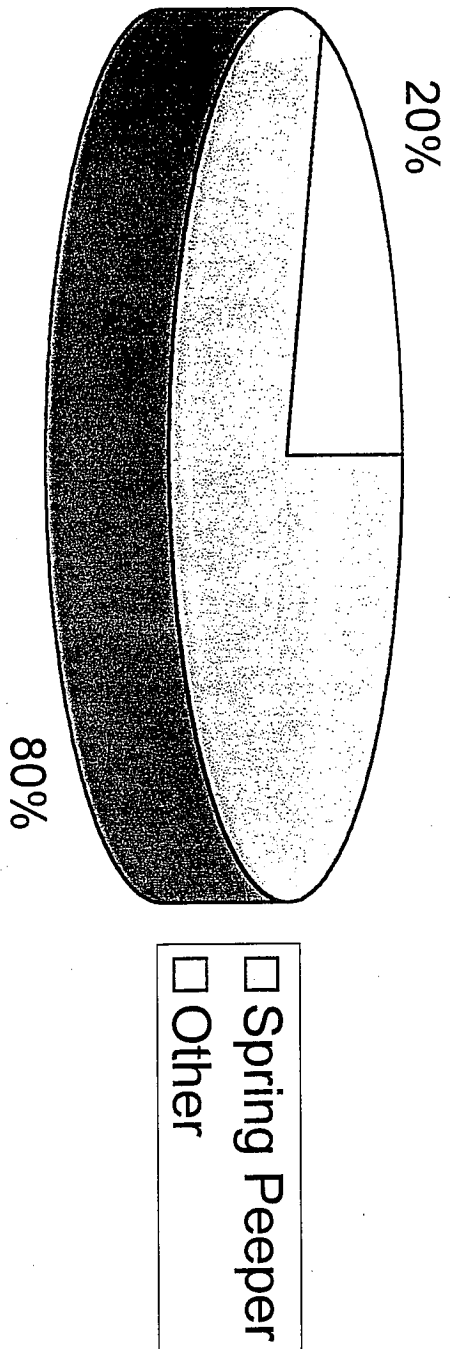
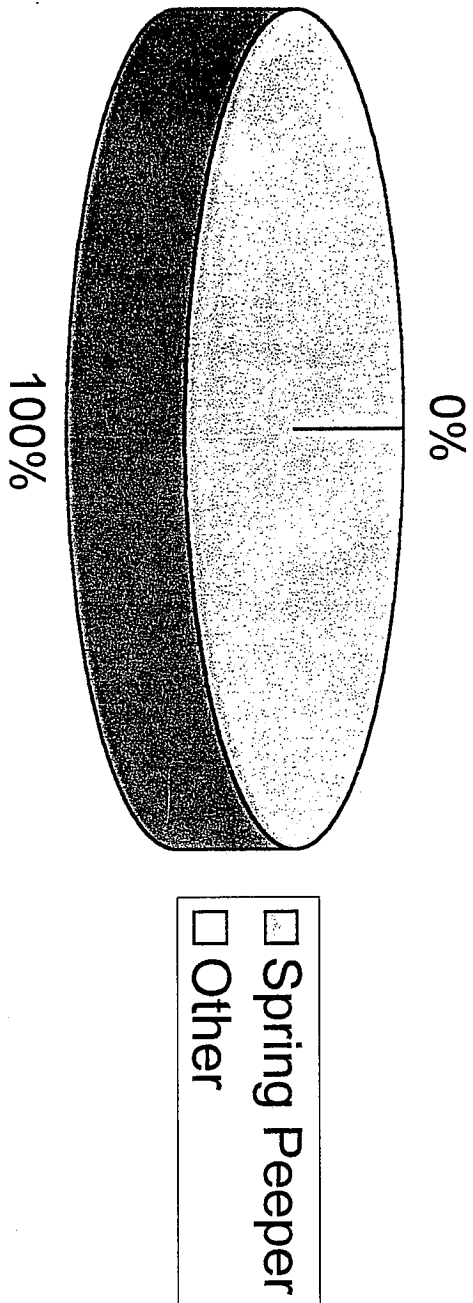


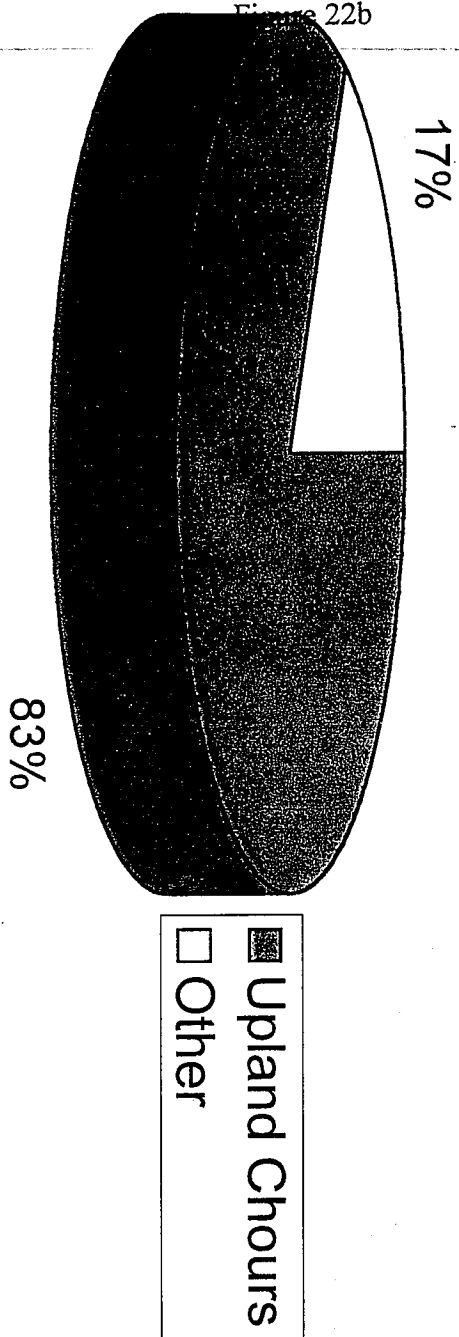
Figure 21b

**0C or above and Falling Barometric Pressure
or
.10 inches or more of Rainfall**



10C or above & Falling Barometric Pressure

Figure 22b



0C or above & Falling Barometric Pressure

Figure 23b

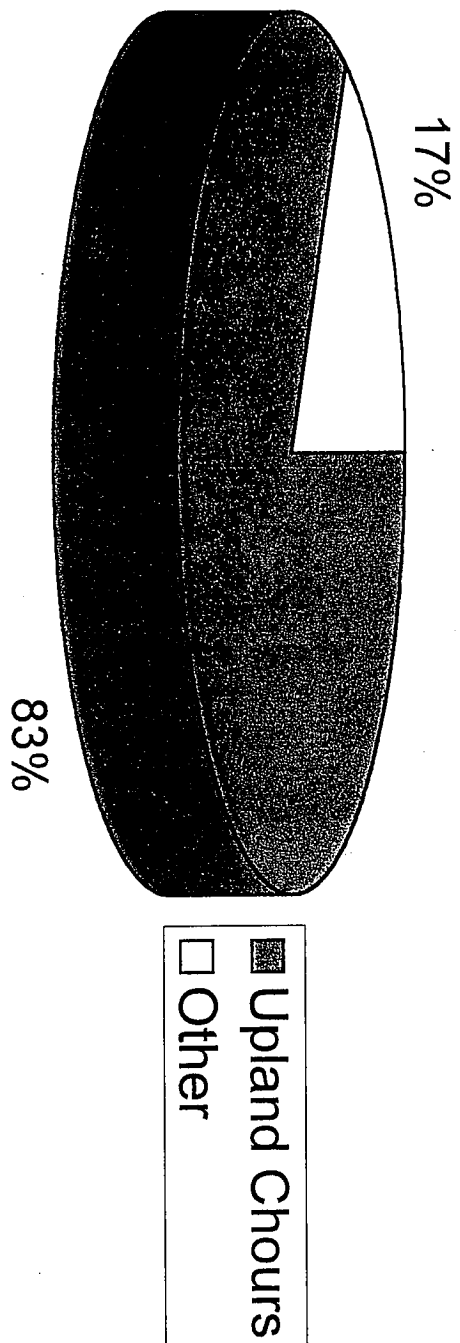
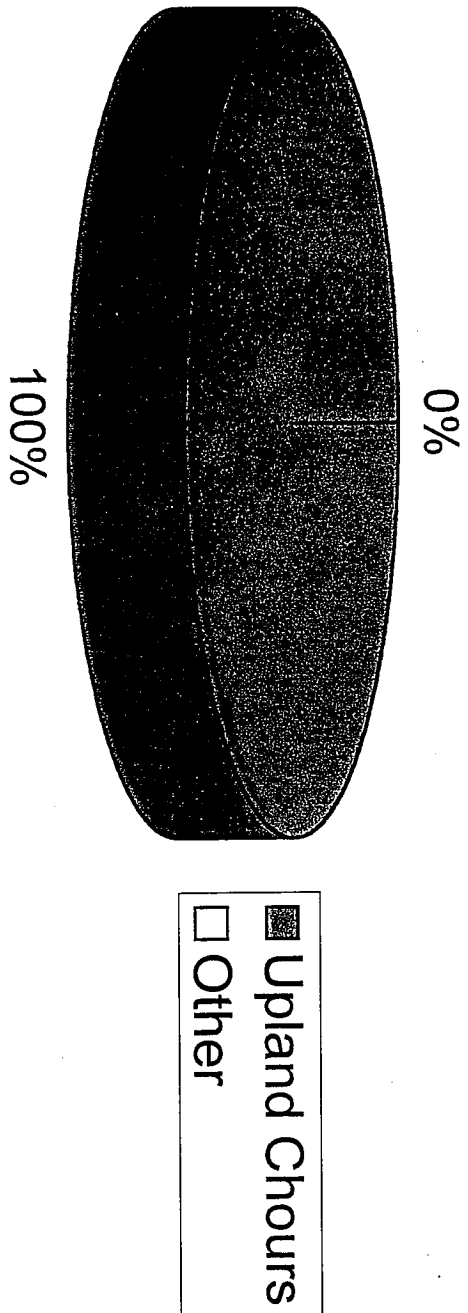


Figure 24b

**0C or above and Falling Barometric Pressure
or
10 Inches or more of Rainfall**



10C or above & Falling Barometric Pressure

Figure 25

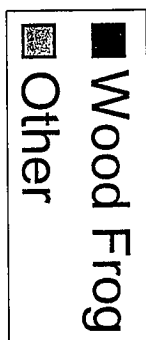
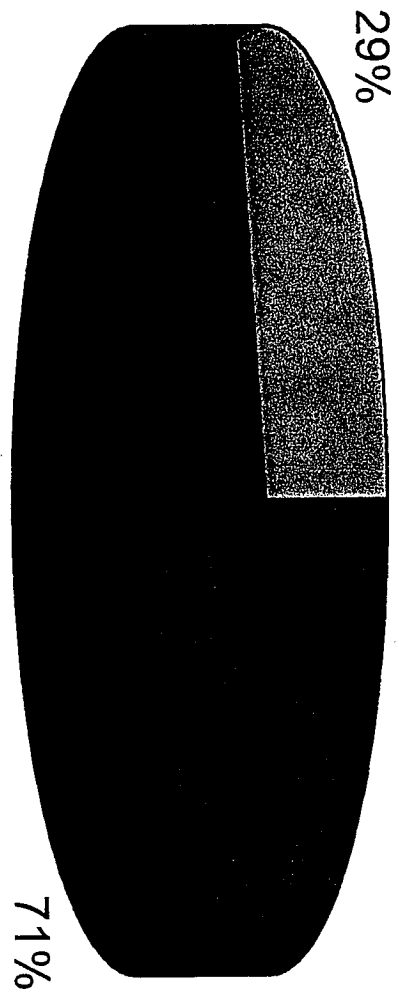


Figure 26

0C or above & Falling Barometric Pressure

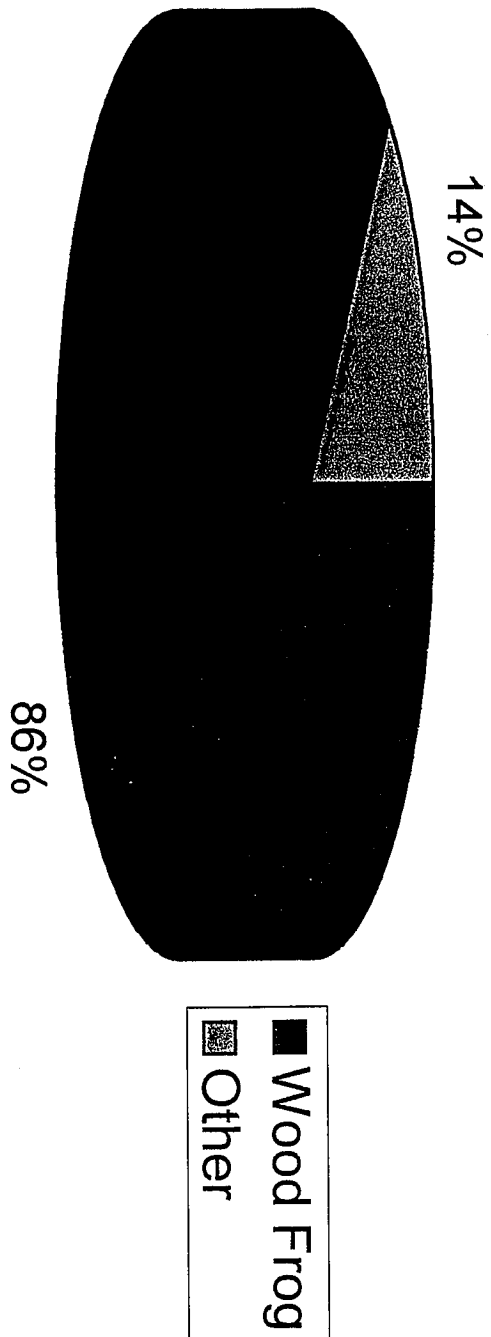
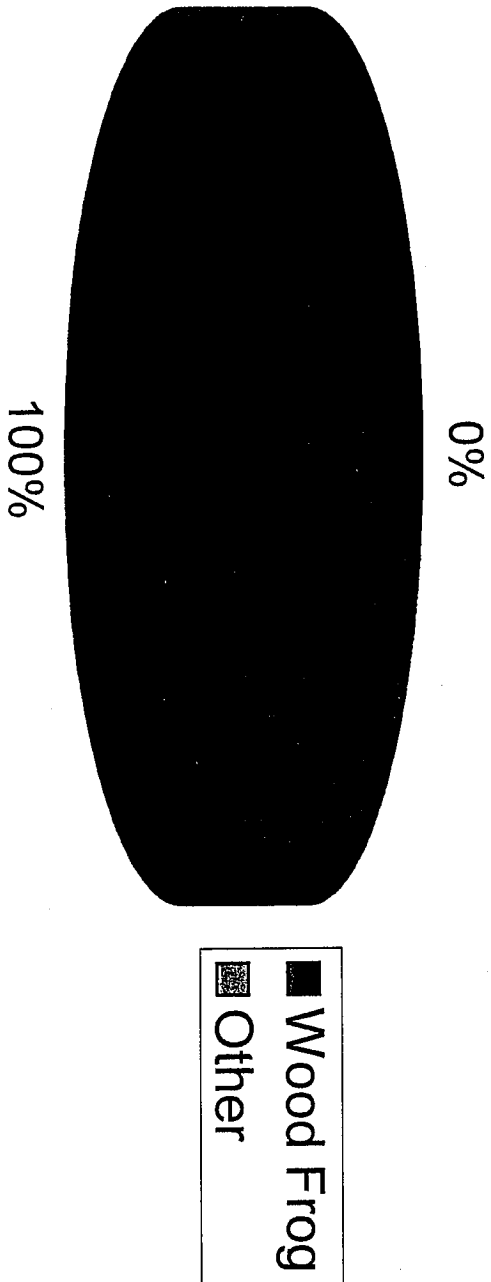


Figure 27

**0C or above and Falling Barometric Pressure
or
.10 inches or more of Rainfall**



Appendix B-
Field Study Sheets

Location: Weir Dam

Name: Laura Rayment
Larry Rayment

Date: | 27

Time: 5:30

Sunrise: 7:47 _{a.m.} Sunset: 5:37 p.m.

Weather: cold; ^{slightly} ~~clear~~ windy

Rain: ~~some~~ none

Wind (Calm) Light Gust STRONG!

Cloud cover: 90%

BP Beginning: 976 End: 975

Temp: Beginning 2 °C End: -4 °C

Frog Species:

Calling:

Seen:

Amplexus:

- Spring Peeper none
- Upland Chorus none
- Wood Frog none

Location: Weir Dam

Name: Laura Rayment
Larry Rayment

Date: 1-31-00

Time: 6:10-6:30

Sunrise: 7:35am Sunset: 5:49pm

Weather:

Rain: snow flurries

Wind Calm (Light) Gust STRONG!

Cloud cover: 75%

BP Beginning: 96.7 End: 96.7

Temp: Beginning 17°C End: 15°C

Frog Species:

Calling:

Seen:

Amplexus:

- Spring Peeper none
- Upland Chorus none
- Wood Frog none

Location: Weir Dam

Name: Laura R.
Phil Gentry

Date: 2-13

Time: 7:50-8:40pm

Sunrise: 7:20am Sunset: 6:08pm

Weather: expecting thunderstorm

Rain: none

Wind Calm Light Gust STRONG!

Cloud cover: 80 %

BP Beginning: 96.7 End: 96.7

Temp: Beginning 19°C End: 17°C

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	1	—	—
▪ Upland Chorus	—	—	—
▪ Wood Frog	—	—	—

Location: Weir Dam

Name: Laura R.
Jesse Bible

Date: 2-14

Time: 8:00-8:20 pm

Sunrise: 7:17am Sunset: . .

Weather: no heavy rain; moderate weather

Rain: light rain towards end of research

Wind Calm (Light) Gust STRONG!

Cloud cover: 90%

BP Beginning: 96.3 End: 96.3

Temp: Beginning 15°C End: 12°C

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	3	✓	—
▪ Upland Chorus	—	—	—
▪ Wood Frog	3	—	yes

* One large egg site developed after the hard rain the night before

Location:

Name: Laura R.
Jesse Bible

Date: 2-16

Time: 6:20 - 6:40

Sunrise: Sunset: 6:11 pm

Weather: warm, dry

Rain: —

Wind: (Calm) Light Gust STRONG!

Cloud cover: % clear

BP Beginning: 95.8 End: 96.8

Temp: Beginning 24°C End: 24°

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

✓

▪ Upland Chorus

1

✓

▪ Wood Frog

✓

Location: Weir Dam

Name: Laura R.
Jesse Bible

Date: 2-18

Time: 7:15

Sunrise: Sunset:

Weather: humid

Rain: expected

Wind: Calm Light Gust STRONG!

Cloud cover: 50%

BP Beginning: 96.1 End: 96.0

Temp: Beginning 21°C End: 19°C

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	3	✓	—
▪ Upland Chorus	—	—	—
▪ Wood Frog	3	✓	—

Location: Weir Dam

Name: Laura R
Lamy R.

Date: 2-19

Time: 6:45 - 7:15 pm

Sunrise: 7:15 am Sunset: 6:14 pm

Weather:

Rain: none

Wind: Calm Light Gust STRONG!

Cloud cover: 75%

BP Beginning: 96.7 End: 96.6

Temp: Beginning 20°C End: 19°C

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

—

—

▪ Upland Chorus

1

—

▪ Wood Frog

3

—

—

Location: Weir Dam

Name: Laura R
Jesse Bible

Date: 2-21

Time: 8-20

Sunrise: 7:12am Sunset: 6:17pm

Weather: Cold

Rain: none

Wind: (Calm) Light Gust STRONG!

Cloud cover: 0%

BP Beginning: 97.6 End: 97.7

Temp: Beginning 19°C End: 16°C

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	3	—	—
▪ Upland Chorus	—	—	—
▪ Wood Frog	—	—	—

Location: Weir Dahn

Name: Laura R.
Jesse Bible

Date: 2-25

Time: 7:30 - 7:50

Sunrise: Sunset:

Weather: expecting rain

Rain:

Wind Calm Light Gust STRONG!

Cloud cover: 50%

BP Beginning: 47.3 End: 97.2

Temp: Beginning 15' End: 15°

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	3	—	—
▪ Upland Chorus	3	—	—
▪ Wood Frog	3	—	—

Location: Weir Dam

Name: Laura R.
Larry Rayment

Date: 2-24-00

Time: 7:15-7:40

Sunrise: 6:19 Sunset: 7:07

Weather:

Rain: expected

Wind Calm Light Gust STRONG!

Cloud cover: 50%

BP Beginning: 97.2 End: 97.2

Temp: Beginning 12° End: 12°

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

✓

—

▪ Upland Chorus

2

—

—

▪ Wood Frog

—

—

—

Location: Steeles Creek

Name: Mrs. Rayment
Lawren

Date: 2-26-00

Time: 7:00 - 7:30

Sunrise: 6:21 Sunset: 7:05

Weather: Clear

Rain: No

Wind: Calm Light Gust STRONG!

Cloud cover: %

BP Beginning: 96.7 End: 96.7

Temp: Beginning 19°C End: 19°C

Frog Species:

Calling:

Seen:

Amplexus:

- 3
- Spring Peeper
 - Upland Chorus
 - Wood Frog

yes

✓

✓

Location: Weir Dam

Name: Laura Rayment
Jess Bible

Date: 2-26

Time: 8:17

Sunrise: 6:21 Sunset: 7:05

Weather:

Rain: none - light rain @ 9:45am

Wind Calm Light Gust STRONG!

Cloud cover: %

BP Beginning: 969 End: 969

Temp: Beginning 22° End: 22°

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

—

—

▪ Upland Chorus

3

—

—

▪ Wood Frog

3

—

—

Location: Weir Dam

Name: Caroline Dunn
Danny

Date: 2-27-00

Time: 8:45 - 9:00

Sunrise: Sunset:

Weather: Rainy

Rain: yes

Wind Calm Light Gust STRONG!

Cloud cover: %

BP Beginning: 96.2 End: 96.2

Temp: Beginning 22°C End: 22°C

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

▪ Upland Chorus

1

▪ Wood Frog

2

Location: Weir

Name: Laura Rayment
Larry Rayment

Date: 2-4

Time: 7:30-7:45

Sunrise: Sunset:

Weather: Slightly cold

Rain: none

Wind (Calm) Light Gust STRONG!

Cloud cover: 50%

BP Beginning: 96.0 End: 96.2

Temp: Beginning 19°C End: 15°C

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

2

—

—

▪ Upland Chorus

—

—

—

▪ Wood Frog

—

Location: Weir Dam

Name: Laura R
Jesse Bible

Date: 3-2-00

Time: 7:45-8:15

Sunrise: Sunset:

Weather: warm

Rain: none

Wind Calm Light Gust STRONG!

Cloud cover: %

BP Beginning: 91st End: 96

Temp: Beginning 20° End: 19°

Frog Species:

Calling:

Seen:

Amplexus

▪ Spring Peeper

▪ Upland Chorus

▪ Wood Frog

2

—

—

—

—

—
—
—

Location: Weir Dam

Name: Laura R
Jesse Bible

Date: 3-3

Time: 7:50-8:10

Sunrise: Sunset:

Weather: warm

Rain: none

Wind: Calm Light Gust STRONG!

Cloud cover: 40%

BP Beginning: 96.0 End: 95.9

Temp: Beginning 21°C End: 17°C

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	23	—	—
▪ Upland Chorus	—	—	—
▪ Wood Frog	—	—	—

Location: Wetland Steele's Creek

Name: Caroline Dunn
Danny Dunn

Date: 1-27-00

Time: 5:45 - 6:00

Sunrise: 7:47 Sunset: 5:37

Weather: Clear

Rain: No

Wind Calm Light Gust STRONG!

Cloud cover: 0 %

BP Beginning: 967 End: 972

Temp: Beginning 5°C End: -3°C

Frog Species:

Calling: N6

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

Location: Steele Creek Wetland

Name: Caroline
Danny

Date: 1-31-00

Time: 5:50 - 6:05

Sunrise: 7:35 Sunset: 5:49

Weather: flurries

Rain: No

Wind: (Calm) Light Gust STRONG!

Cloud cover: 80%

BP Beginning: 96.2 End: 96.2

Temp: Beginning 12°C End: 12°C

Frog Species:

Calling: No

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

Location: Steele Creek Wetlands

Name: Caroline Dunn
Dawn Aday

Date: 2-2-00

Time: 6:00 - 6:20

Sunrise: 7:39 Sunset: 5:47

Weather: Clear, Cold

Rain: No

Wind: (Calm) Light Gust STRONG!

Cloud cover: 10% %

BP Beginning: 96.2 End: 96.7

Temp: Beginning 13°C End: 0°C

Frog Species:

Calling: No

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

Location: Steele Creek Wetlands

Name: Caroline
Danny

Date: 2-7-00

Time: 6:10 - 6:35

Sunrise: 7:26 am Sunset: 6:02 pm

Weather: Clear

Rain: No

Wind: Calm Light Gust STRONG!

Cloud cover: 10 %

BP Beginning: 96.1 End: 96.6

Temp: Beginning 13°C End: 13°C

Frog Species:

Calling:

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

No

Location: Steele Creek Wetlands

Name: Caroline
Danny

Date: 2-9-00

Time: 5:30 - 6:05

Sunrise: 7:25am Sunset: 6:04pm

Weather: Clear

Rain: No

Wind (Calm) Light Gust STRONG!

Cloud cover: 0%

BP Beginning: 96.3 End: 96.3

Temp: Beginning 14°C End: 4°C

Frog Species:

Calling:

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

No

Location: Steele Creek

Name: Caroline Dunn

Date: 2-13-00

W/Dad

Time: 8:10 - 8:30

Sunrise: 7:20 am Sunset: 6:08 pm

Weather: Clear

Rain: No

Wind: (Calm) Light Gust STRONG!

Cloud cover: 50%

BP Beginning: End: 95.4

Temp: Beginning 19° End: 15°

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	1		
▪ Upland Chorus	-		
▪ Wood Frog	-		

Location: Steeles Creek

Name: Caroline Dunn
Danny

Date: 2-14-00

Time: 7:55 - 8:20

Sunrise: Sunset:
7:17am

Weather: Clear

Rain: No

Wind: (Calm) Light Gust STRONG!

Cloud cover: 90%

BP Beginning: 95.8 End: 95.8

Temp: Beginning 15° End: 11°C

Frog Species:

Calling:
No

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

Location: Steeles Creek

Name: Caroline
Danny

Date: 2-16-00

Time: 6:00 - 6:27

Sunrise: Sunset: 6:11 p.m.

Weather: Clear

Rain: No

Wind: (Calm) Light Gust STRONG!

Cloud cover: 10%

BP Beginning: 96.3 End: 96.4

Temp: Beginning 17°C End: 9°C

Frog Species:

Calling:

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

Location: Steele's Creek

Name: Laura

Date: 2-18

Time: 7:30

Sunrise: Sunset:

Weather: humid

Rain: expected

Wind Calm (Light) Gust STRONG!

Cloud cover: 90%

BP Beginning: 95.9 End: 95.9

Temp: Beginning 17°C End: 15°C

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

—
—

—
—

▪ Upland Chorus

3

—

—

▪ Wood Frog

3

Location: Steel Creek

Name: Caroline Dunn
Arvon

Date: 2-19-00

Time: 6:50 - 7:30

Sunrise: 7:15am Sunset: 6:14pm

Weather: Clear

Rain: No

Wind Calm (Light) Gust STRONG!

Cloud cover: 85%

BP Beginning: 90C End: 30C

Temp: Beginning 96.8 End: 96.8

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

No

No

▪ Upland Chorus

1

▪ Wood Frog

1

Location: Steeles Creek

Name: Caroline Dunn
Aaron

Date: 2-21-00

Time: 8:20 - 8:50

Sunrise: 7:12 am Sunset: 6:17 pm

Weather: Clear

Rain: No

Wind: (Calm) Light Gust STRONG!

Cloud cover: 0 %

BP Beginning: 97.0 End: 97.3

Temp: Beginning 12°C End: 1°C

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

2

▪ Upland Chorus

▪ Wood Frog

Location: ~~Steele~~ Steele Creek

Name: Caroline Dunn

Date: 2-23-00

Time: 6:20 - 6:50

Sunrise: Sunset:

Weather: expecting

Rain: No

Wind: ~~Calm~~ Light Gust STRONG!

Cloud cover: 20% mostly clear

BP Beginning: 96.8 End: 96.9

Temp: Beginning 15°C End: 15°C

Frog Species:

Calling:

Seen:

Amplexus:

- | | | | |
|-----------------|---|--|--|
| ▪ Spring Peeper | 3 | | |
| ▪ Upland Chorus | 2 | | |
| ▪ Wood Frog | 2 | | |

Location: Steeles Creek

Name: Caroline Ham
Danny
Elizabeth

Date: 2-24-00

Time: 7:20 - 7:40

Sunrise: 6:19 Sunset: 7:07

Weather: Clear

Rain: No

Wind: Calm Light Gust STRONG!

Cloud cover: 50%

BP Beginning: 96.7 End: 96.7

Temp: Beginning 19°C End: 16°C

Frog Species:	Calling:	Seen:	Amplexus:
▪ Spring Peeper	3		
▪ Upland Chorus	-		
▪ Wood Frog	2		

Location: Steeles Creek

Name: Mrs. Raymond
Lawren

Date: 2-26-00

Time: 7:00 - 7:30

Sunrise: 6:21 Sunset: 7:05

Weather: Clear

Rain: No

Wind: Calm Light Gust STRONG!

Cloud cover: %

BP Beginning: 96.7 End: 96.7

Temp: Beginning 19°C End: 19°C

Frog Species:

Calling:

Seen:

Amplexus:

- 3
- Spring Peeper
 - Upland Chorus
 - Wood Frog

yes

✓

✓

Location: Steele Creek

Name: Caroline Dunn
Danny

Date: 3-1-00

Time: 6:35 - 6:55

Sunrise: Sunset:

Weather: rained earlier this morning

Rain: clear

Wind Calm (Light) Gust STRONG!

Cloud cover: 10%

BP Beginning: 95.8 End: 95.8

Temp: Beginning 16°C End: 14°C

Frog Species:

Calling:

Seen:

Amplexus:

▪ Spring Peeper

3

▪ Upland Chorus

1

▪ Wood Frog

3

Location: *Steele Creek*

Name: _____

Date: *3-2-00*

Time: *7:20 - 7:50*

Sunrise: _____ Sunset: _____

Weather: *Clear*

Rain: *No*

Wind *Calm* Light Gust *STRONG!*

Cloud cover: % _____

BP Beginning: *96.1* End: *101*

Temp: Beginning *10°C* End: *8°C*

Frog Species:

Calling:

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

1
-
1

-
-
-

Location: Steele Creek

Name: Caroline
Eddie

Date: 3-3-00

Time: 7:50 - 8:00

Sunrise: Sunset:

Weather: Clear

Rain: No

Wind: (Calm) Light Gust STRONG!

Cloud cover: %

BP Beginning: 95.2 End: 95.2

Temp: Beginning 11°C End: 9°C

Frog Species:

Calling:

Seen:

Amplexus:

- Spring Peeper
- Upland Chorus
- Wood Frog

Appendix C-
Study Area Maps

Appendix D-
TJAS Grant Proposal

The purpose of this research is to study the effects of barometric pressure on frog calls. Research on the inhibition of cutaneous water absorption in dehydrated toads is associated with changes in barometric pressure. Studies have shown that toads can detect and react to changes in barometric pressure (Hoff and Hillyard 1993). The toads were observed to move around more frequently and change calling patterns during the barometric change. We believe if toads have proven to detect barometric changes, then other anurans could also detect changes and possibly affect the calling patterns.

The experiment will be based on two sites, the Weir Dam and Steele's Creek Wetland, which have proven to be inhabited by frogs for the past two years. Both sites will be studied simultaneously by the researchers in order to more accurately gather data. Barometric pressure, temperature, wind, and humidity will be recorded daily for a two month period using two Weather Mate Electric Barometers (\$99.95 in Ben Meadows Company 1999 Catalog). If the frog calls cannot be determined, we will attempt to catch the frogs with the use of Student Dip Nets (\$27.95 in Ben Meadows Company 1999 Catalog). In order to observe the frog specimens, it will be necessary to use headlamps (\$12.95 in Ben Meadows 1999 Catalog) at night so that our hands are free to hold the frogs.

At this time, the relative abundance of frogs will be determined and identified. Also, the different types of frog calls will be recorded. With the use of frog call tapes (\$10) we can accurately detect and identify the presence of different frogs at the sites and record the variety of the frog calls. Observation of both sites will be conducted regardless of weather, although more research may be done if storm systems are predicted to move into the region.

After the research has been completed, we will begin to look at the relationships between barometric pressure, temperature, wind, and humidity in relation to the abundance of frog calling. We believe that frogs are able to detect approaching storms by detecting the changing barometric pressure. Therefore, we expect frog calling to increase, signaling mating. Temporary storms are the optimum time in which frogs mate due to the increased amount of water in the mating pools. If the research either proves or disproves our hypothesis, then more extensive research can be conducted on frog calling in the future based on our discoveries. We hope that our research will prove useful to the advancement of the science field.

Works Cited:

Hoff KS, Hillyard SD. 1993. Inhibition of Cutaneous Water Absorption in Dehydrated Toads by Saralasin Is Associated with Changes in Barometric Pressure. *Physiological Zoology* 66(1):89-98.

Appendix E-
Contact Sheet

Contact List:

Laura Rayment:

104 Lick Branch
968-3959
Rowdy1282@aol.com

Caroline Dunn:

212 Carolyn Circle
652-2162
soccer21jr@aol.com

Aaron Aday:

3004 Shelby St. #113
652-0102

Jesse Bible:

313 Hidden Valley Rd.
989-3649

Dave Dierks:

Chief Meteorologist
WCYB
645-1555
www.wcyb.com

Kevin Hammend:

Naturalist
Steele Creek Nature Center
989-5616

Phil Gentry:

Tennessee High School Science Teacher
112 Edgemont Ave.
652-9494

Works Cited

Works Cited

- Badger D. 1997. Frogs. Hong Kong: Barnes & Noble.
- Behler J, King W. 1995. National audobon society field guide to north american reptiles and amphibians. New York: Alfred A Knopf. 743 p.
- Conant R, Collins JT. 1991. Peterson's field guides: reptiles and amphibians. Boston: Houghton Mifflin. 450 p.
- Hillyard SK, Hoff KS, Propper C. 1998. The water absorption response: a behavioral assay for physiological processes in terrestrial amphibians. *Physiological Zoology* 71(2):127-138.
- Hoff KS, Hillyard SD. 1993. Inhibition of cutaneous water absorption in dehydrated toads by saralasin is associated with changes in barometric pressure. *Physiological Zoology* 66(1):89-98.
- Jones MS, Rogers KB. 1998. Palmetto bass movements and habitat use in a fluctuating colorado irrigation reservoir. *North American Journal of Fisheries Management* 18:640-648.
- Martof BS, Palmer WM, Bailey JR, Harrison III JR. 1980. Amphibians and reptiles of the carolinas and virginia. Chapel Hill: University of North Carolina Press. 264 p.
- "The Calls of Frogs and Toads," Nature Sound Studio. CD-ROM. Copyright 1994 by Lang Elliott. North Word Press.