

SPOTTED FEVER GROUP RICKETTSIOSES

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RICKETTSIA (GENUS)

Rickettsia

Spotted Fever Group

R. conorii
R. parkeri
R. sibirica
R. rickettsii
R. amblyommii
R. montana
R. rhipicephali
R. australis
R. akari
R. felis
R. honei
R. helvitica
R. japonica
R. massiliae
R. mongolotimonae
R. peacockii
R. slovaca

Typhus Group

R. typhi
R. prowazekii

Ancestral

R. canadensis
R. bellii

SPOTTED FEVER GROUP

RICKETTSIAE

- *R. conorii*
- *R. parkeri*
- *R. sibirica*
- *R. rickettsii*
- *R. amblyommii*
- *R. montana*
- *R. rhipicephali*
- *R. australis*
- *R. akari*
- *R. honei*
- *R. helvetica*
- *R. japonica*
- *R. massiliae*
- *R. felis*
- *R. mongolotimonae*
- *R. peacockii*
- *R. slovaca*

MEDITERRANEAN SPOTTED FEVER

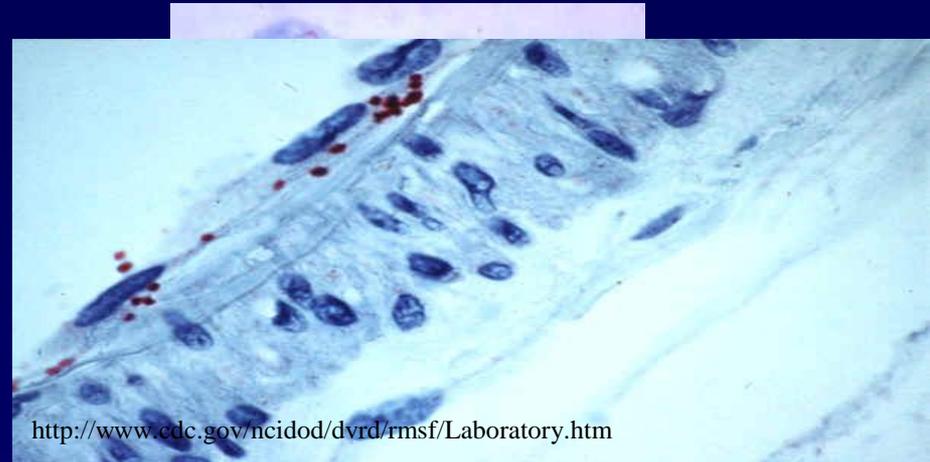
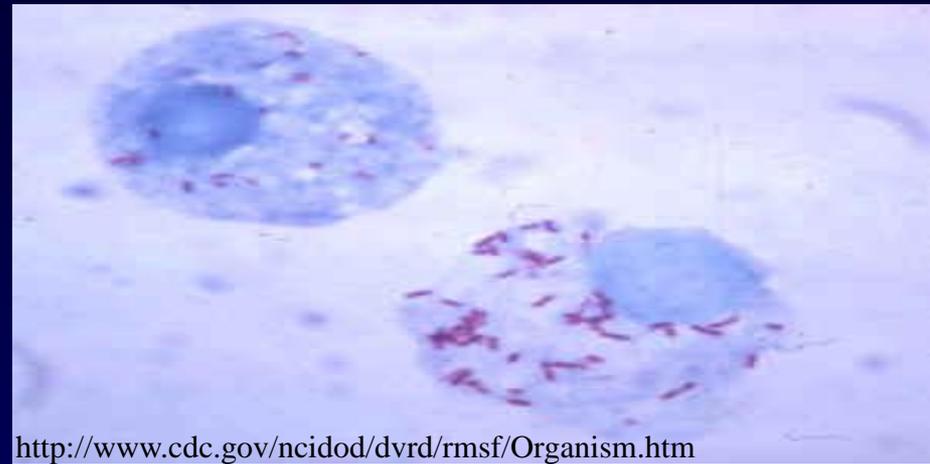
Rickettsia conorii: PCR and DNA Sequencing Seroconversion

- Fever
- Anorexia
- Lethargy
- Incoordination



RICKETTSIA PATHOGENESIS

- Gram negative
- Arthropod borne
- Infect endothelial cells
 - macrophages
 - smooth muscle
- Systemic multi-organ disease
- Acute vs chronic



MONTANA

Lethargy

Depression

Right rear lameness

Hemorrhages (ret/mm)

Anterior Uveitis

Icterus

Edema



IXODID TICK VECTORS

- *D. variabilis*
 - Eastern US
- *D. andersonii*
 - Western US/Canada
- *R. sanguineus*
 - US, Mexico, Central America
- *A. cajunensis*
 - South America



ROCKY MOUNTAIN SPOTTED FEVER

Rickettsia rickettsii

Gram negative

Intracellular Bacteria

Spotted Fever Group

Tick Transmission

Dermacentor variabilis

Dermacentor andersoni

*Rhipicephalus sanguineus***



BACKGROUND:

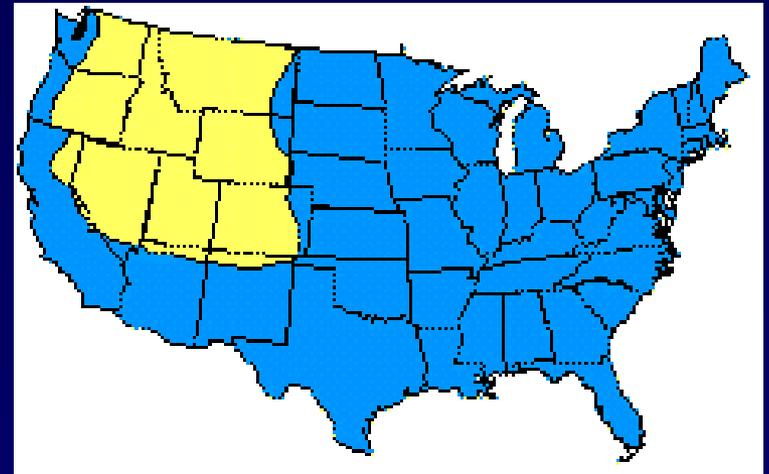
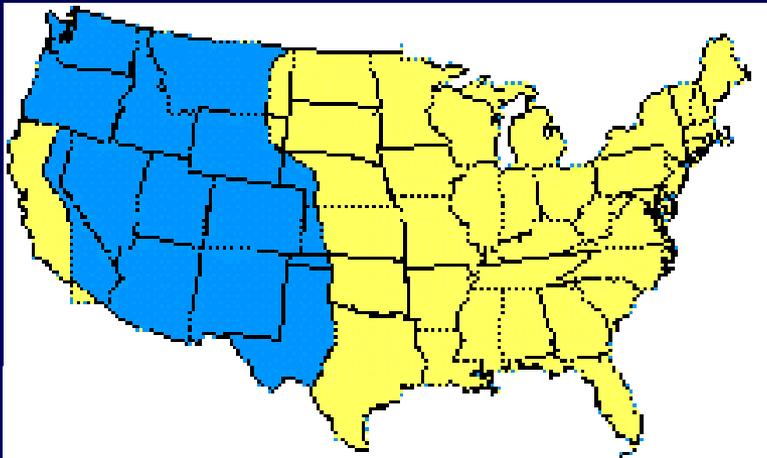
The Primary Tick Vectors of RMSF



Dermacentor variabilis
American dog tick



Dermacentor andersoni
Rocky Mountain wood tick



R. rickettsii* Transmission By *Amblyomma americanum

- Historical case based evidence
- PCR Ticks- Negative

62 Year-old Farmer

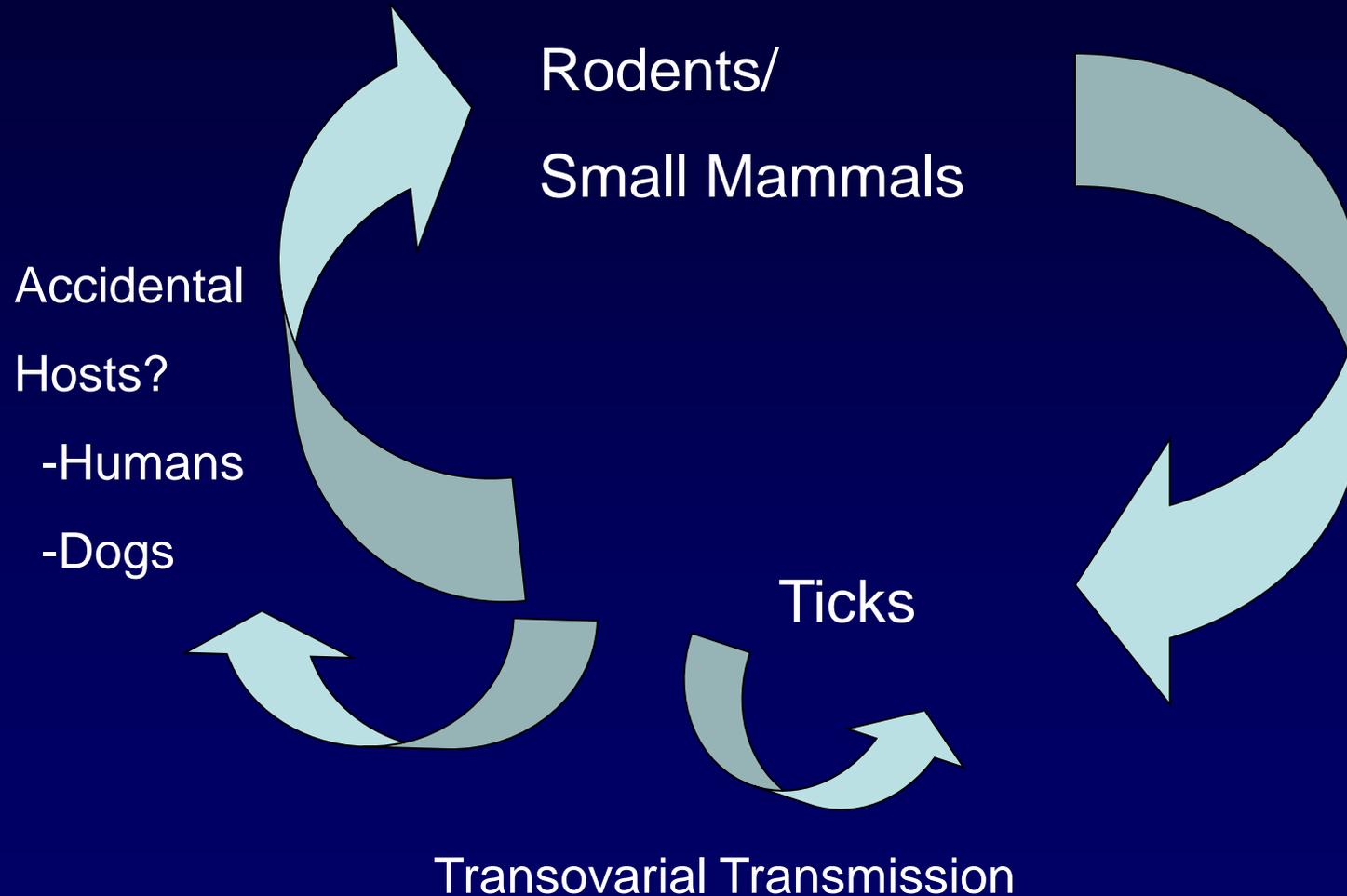
- Field exposure to ticks
- Prototypical Illness
- Seroconversion and *R. rickettsii* DNA amplified and sequenced from patient and the *A. americanum*

RICKETTSIA RICKETTSII **TRANSMISSION**



Breitschwerdt EB, et al: Emerging Infectious Diseases 2010

SYLVATIC CYCLE-RMSF



RICKETTSIA RICKETTSII: Transovarial Transmission

- Infected Offspring
- Localized Pockets
- Exclusion by other SFG rickettsiae



RMSF IN THE "BIG APPLE"

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A FOCUS OF ROCKY MOUNTAIN SPOTTED FEVER WITHIN NEW YORK CITY

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DAVID C. PERLMAN, M.D., NATHAN LITMAN, M.D., MICHAEL LEVI, SC.D.,
GERALD NATHENSON, M.D., JORGE L. BENACH, PH.D., RAFI AL-HAFIDH, PH.D.,
AND JOAN CASEY, M.D.

Abstract In the spring and summer of 1987, four persons acquired Rocky Mountain spotted fever within New York City, an area in which the disease had not previously been known to be endemic. Three of the four patients were residents of the Soundview area of the Bronx. All diagnoses were confirmed by indirect fluorescent-antibody tests. Environmental investigation revealed that the tick vector for *Rickettsia rickettsii*, *Dermacentor variabilis*, was present in a local park. Of the 66 specimens of *D. variabilis* collected, 5 (8 percent) were positive for rickettsiae from the spotted fever group. Of an additional 96

specimens of *D. variabilis*, 5 (5 percent) were found positive for rickettsiae by a more specific monoclonal antibody assay. Eight additional New York City parks in all five boroughs were searched for ticks. *D. variabilis* was found in only one other park; of the 147 ticks collected there, none were positive for rickettsiae. These findings emphasize the focal nature of Rocky Mountain spotted fever and the need to consider that disease in the differential diagnosis of any obscure acute febrile illness, even in the absence of a history of travel to known endemic areas. (N Engl J Med 1988; 318:1345-8.)

COMPARATIVE MEDICAL FEATURES OF RMSF

	<u>Canine</u>	<u>Human</u>
Fever	+	+
Rash	+	+
Gangrene	+	+
Anemia	+	+
Neutropenia	+	+
Neutrophilia	+	+
Thrombocytopenia	+	+
Hypoproteinemia	+	+
DIC	-	-

VECTOR BORNE INFECTIONS VETERINARY MEDICINE & HUMAN MEDICINE



RMSF: GANGRENE

BEFORE



AFTER



THE FAMILY DOG AS A SENTINEL FOR TICK-TRANSMITTED INFECTIONS

- LYME DISEASE
- EHRLICHIOSIS
- RMSF
- BARTONELLOSIS
- ANAPLASMOSIS



FATAL HUMAN AND CANINE RMSF

Elchos BN, Goddard J: JAVMA 223:1450, 2003

Dog 1: 2 Yr-old-M Dachshund

Seizures, Petechiae Recumbent

Dx: Rodenticide Toxicity, Tx Vit K

DAY 2: Leukocytosis, Thrombocytopenia,
Hyponatremia, Hypoalbuminemia

Dx: Ehrlichiosis, Tx: Doxycycline, Died

Dog 2: Maltese dies 8 days after dog 1

FATAL HUMAN AND CANINE RMSF

Two Weeks Later: Owner: 46 Yr-old F

Acute Onset Fever, Headache, Vomiting
Back Pain

Dx: Muscle Sprains & Acute Cystitis

Tx: Ibuprofen, TMS

Three Days Later: Progressive Illness, Rash
Encephalopathy, CT/Cerebral Edema, Death
Liver, Spleen, Kidney *Rickettsia* PCR+

Basset Hound= Fever, Doxy, *Rr* titer 1:16,384

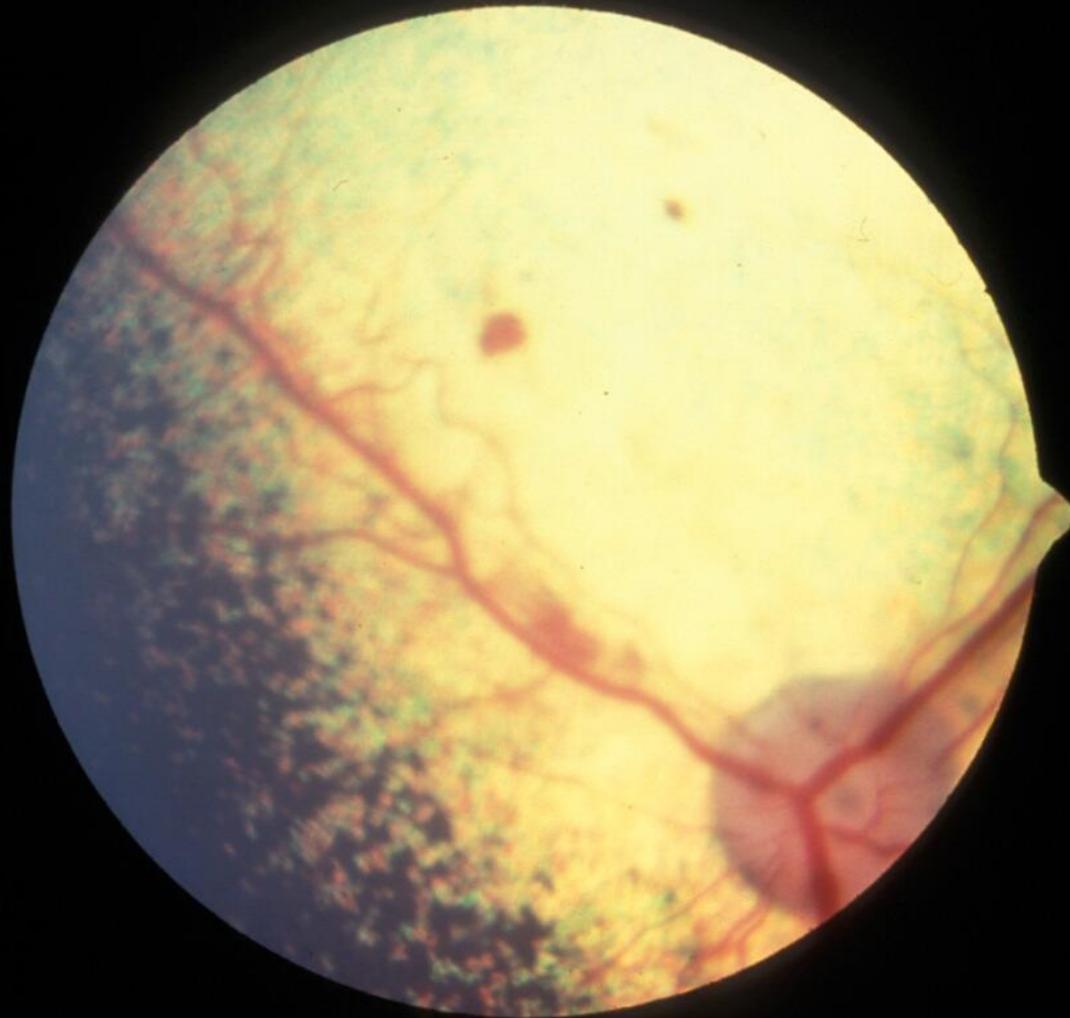
“As an aside, I posted a case of a dog and the owner both being ill with possible tick related disease on the ACVIM listserve several months ago. You offered some advice, and insight on RMSF. Both the dog and the owner had extremely high convalescent titers, and made a full recovery. The owner was gravely ill, and on a ventilator for about a week. Her attending physician had never seen Rocky Mountain, so it was a huge help that the dog was diagnosed with the same thing early in her owner's illness. I believe it helped save the owner's life. So thanks for your help!”

Veterinary Internist, Pennsylvania 9/28/2010

RMSF: ORAL PUSTULES



MONTANA: FOCAL RETINAL HEMORRHAGES



MONTANA: SCROTAL DERMATITIS



MONTANA: PROPRIOCEPTIVE DEFICITS



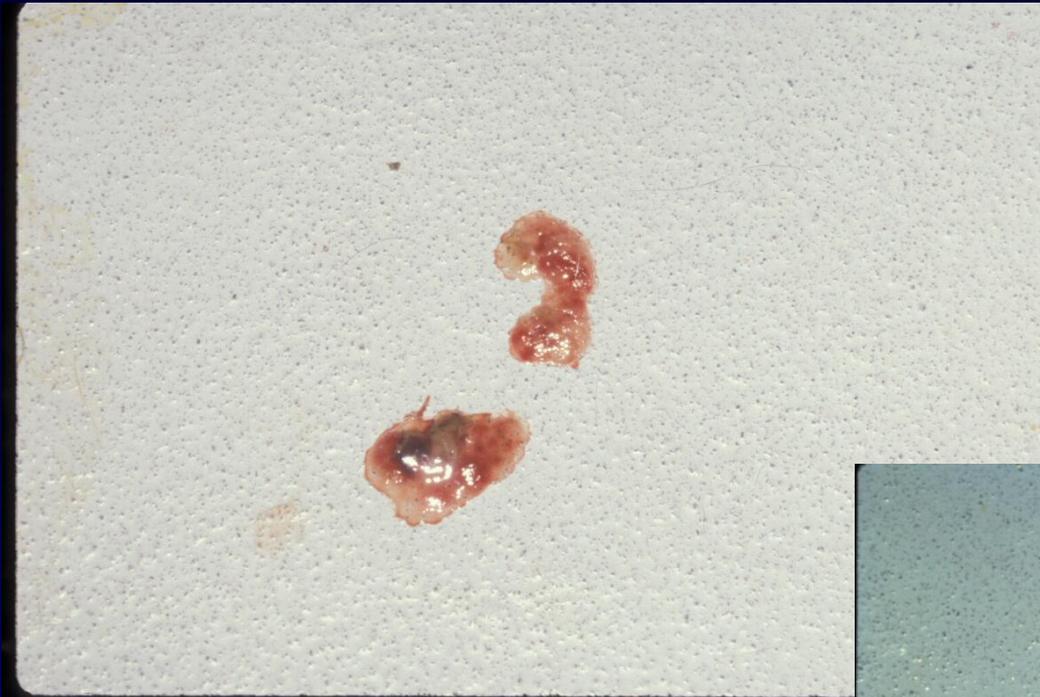
MONTANA: RAPID THERAPEUTIC RESPONSE



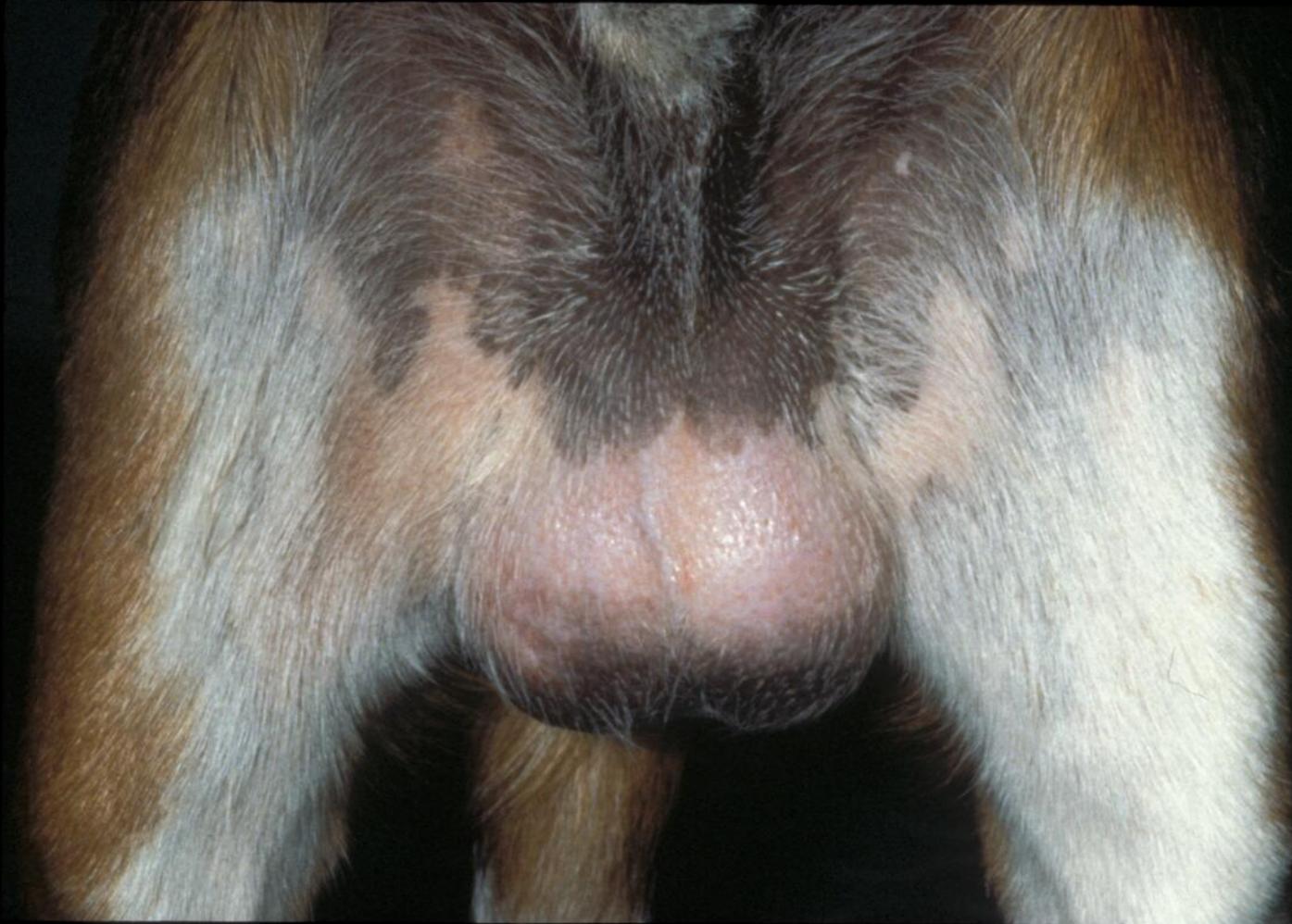
RMSF: POORLY LOCALIZING PAIN



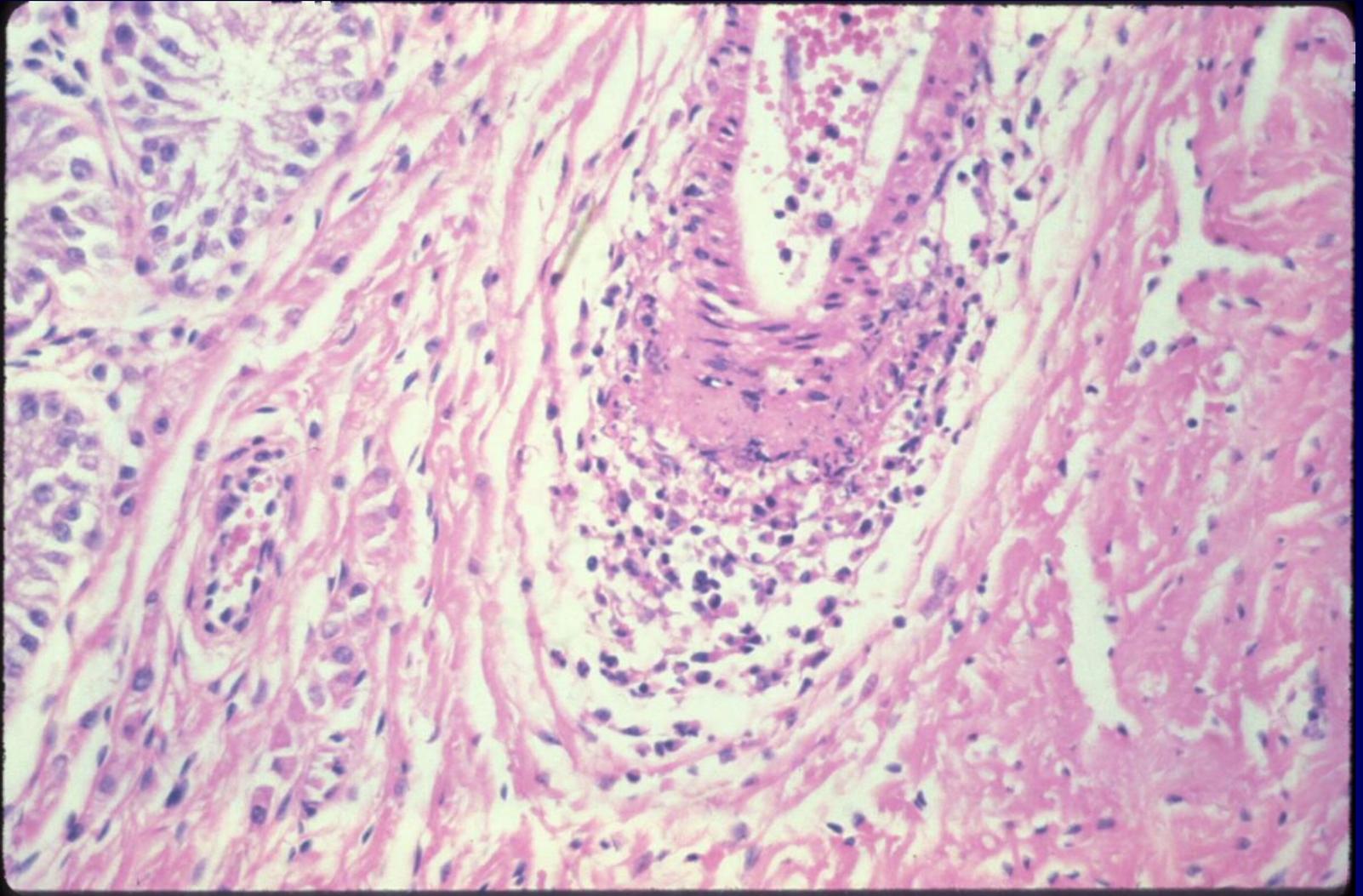
RMSF: COLONIC DIARRRHEA



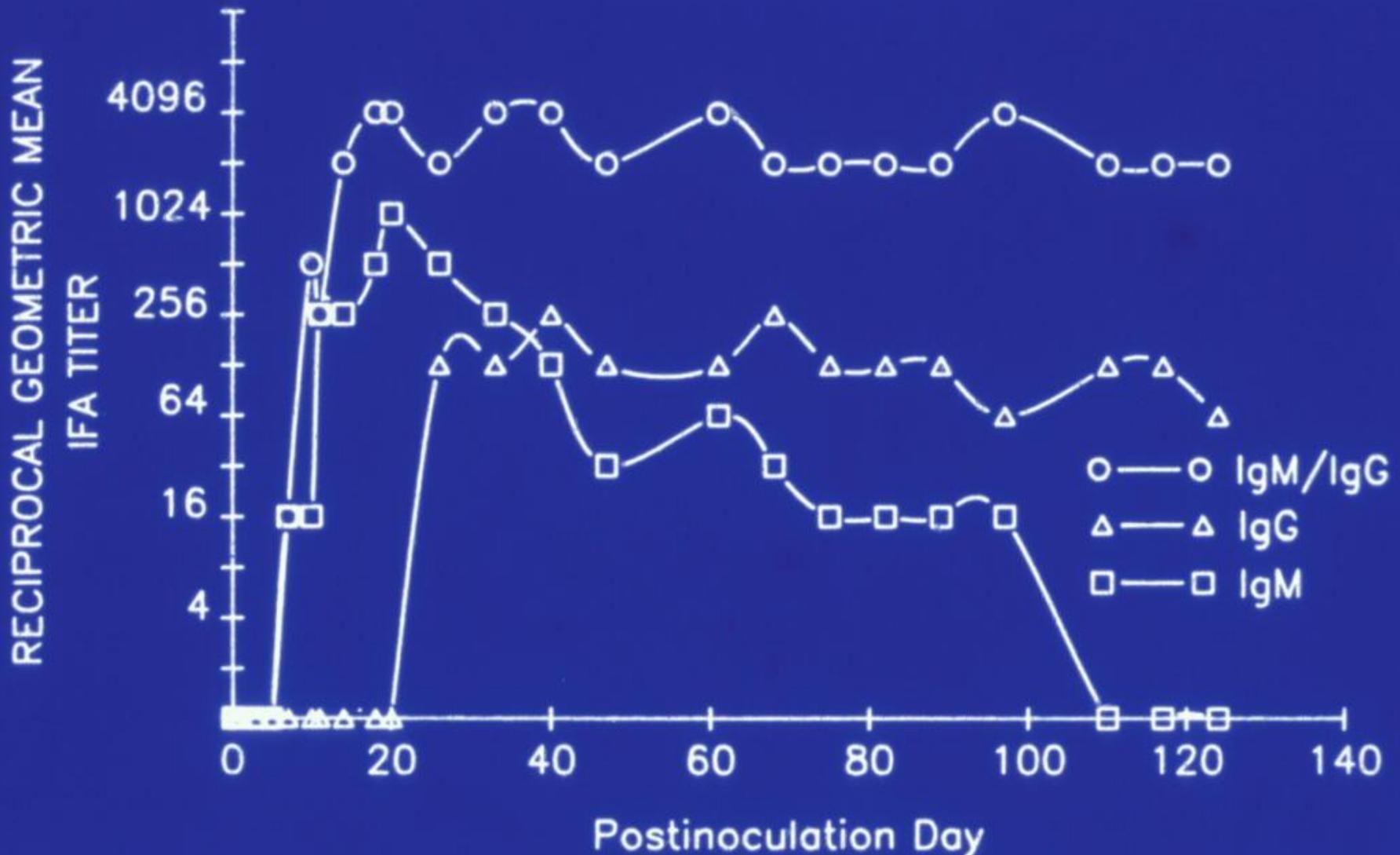
RMSF: ORCHITIS



RMSF: TESTICULAR VASCULITIS

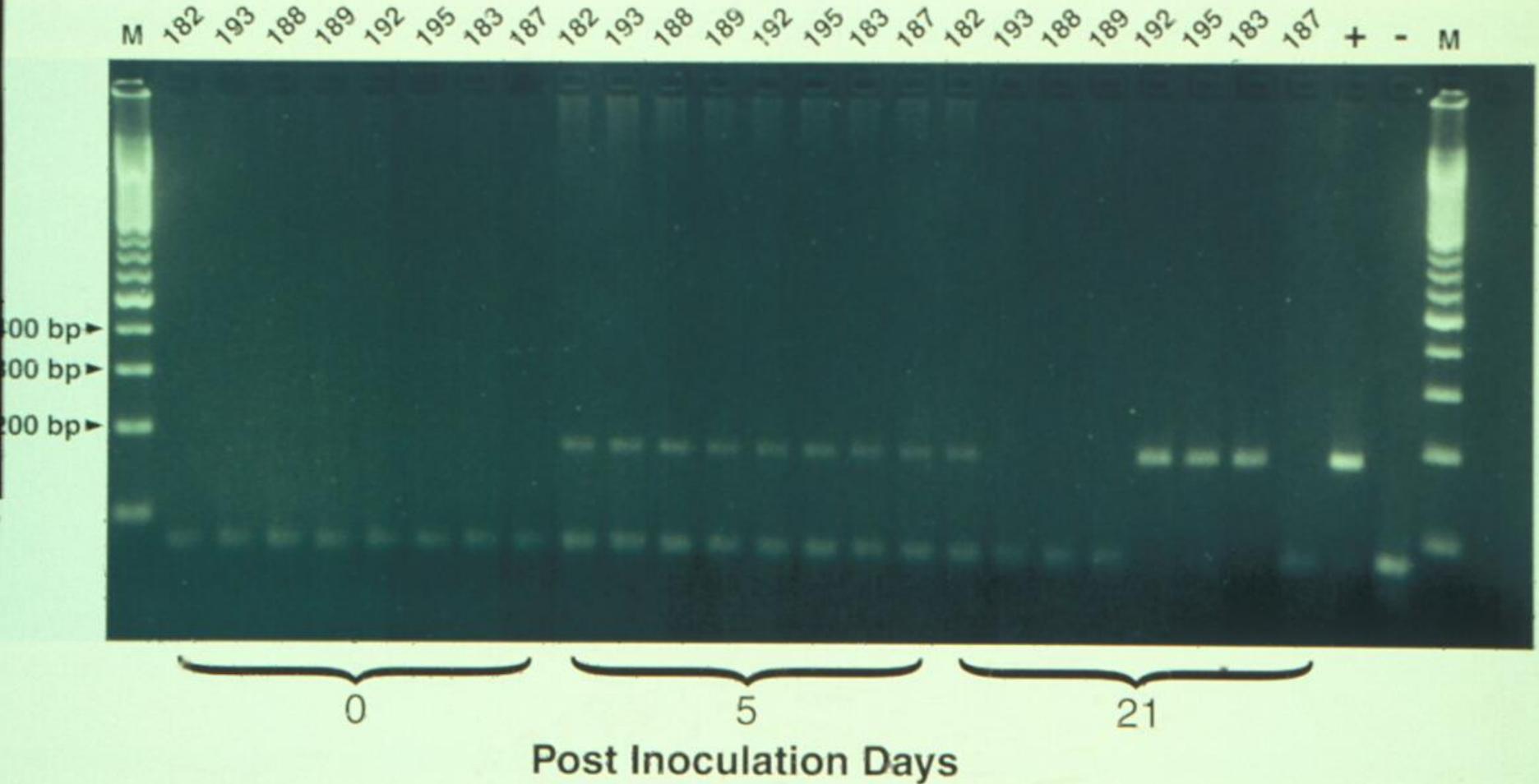


RMSF: SERODIAGNOSIS



PCR DETECTION OF RICKETTSIAL DNA

Dogs



MEBANE, NC: HUSKY KENNEL EPIZOOTIC

NEUROLOGICAL SIGNS



DISCHARGE POST-TX



SEQUENTIAL RECIPROCAL SEROLOGY RESULTS (PEPPER)

	<u>6/21</u>	<u>6/25</u>	<u>6/26</u>	<u>7/23</u>
<i>R. rickettsii</i>	16	128	512	4096
<i>R. rhipicephali</i>	16	128	512	2048
<i>R. montana</i>	Neg	64	256	2048
<i>R. belli</i>	64	256	512	256

TREATMENT OF SFG RICKETTSIOSES

- Tetracyclines are the drugs of choice: clinical response within 24-72 h
- Chloramphenicol an alternative therapy for some patients with RMSF
- Enrofloxacin appears effective for SFG, not for Ehrlichiosis
- Other broad-spectrum antimicrobials characteristically ineffective

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- Companies

