

# LOUISIANA MONTHLY MORBIDITY LHSASA

DISEASES REPORTED DURING THE MONTH OF

MAY, 1974

BY PARISH OF RESIDENCE

## TRICHINOSIS: ACADIA PARISH

Charles T. Caraway, D.V.M., M.P.H.  
Philip A. Mackowiak, M.D.  
Section of Epidemiology

Although *Trichinella spiralis* has almost certainly infected man and other vertebrates since time immemorial, it was not until 1835 that a 1st year medical student, working at

Bartholomew's Hospital in London, identified the organism in human muscle tissue. At that time James Paget, in the course of his dissection of a 50 year old Italian man who had died of

BUREAU OF VITAL STATISTICS

DIVISION OF HEALTH MAINTENANCE AND AMBULATORY PATIENT SERVICES

Prepared by: <b>TABULATION AND ANALYSIS</b>	ASEPTIC MENINGITIS	DIPHTHERIA	ENCEPHALITIS	ENCEPHALITIS, POST INFECTION	HEPATITIS A AND UNSPECIFIED	HEPATITIS B	TUBERCULOSIS, PULMONARY	MENINGOCOCCAL INFECTIONS	PERTUSSIS	RABIES IN ANIMALS	RUBELLA *	SEVERE UNDERNUTRITION	SHIGELLOSIS	TYPHOID FEVER	OTHER SALMONELLOSIS	TETANUS	MEASLES	GONORRHEA	SYPHILIS, PRIMARY AND SECONDARY	
TOTAL TO DATE 19 73	35	0	10	3	285	64	276	25	9	20	93	21	94	3	65	2	80	9039	361	
TOTAL TO DATE 19 74	30	0	10	0	247	97	228	21	5	9	58	17	51	2	55	1	11	10453	283	
TOTAL THIS MONTH	7	0	4	0	36	18	62	1	0	2	21	4	12	0	16	1	5	1916	55	
ACADIA							1											10		
ALLEN																				
ASCENSION					2	1													3	
ASSUMPTION																			1	
AVOUELLES							1					1							19	
BEAUREGARD							1								1				2	
BIENVILLE																			7	
BOSSIER															2				11	
CADDO					3		2												135	1
CALCASIEU							4				1		1		1				71	
CALDWELL							1												1	
CAMERON																				
CATAHOULA							1												2	
CLAIBORNE																			7	
CONCORDIA																			3	
DESOTO																			23	
EAST BATON ROUGE					2	2	3				3				2		2		86	16
EAST CARROLL																			2	
EAST FELICIANA												1							2	
EVANGELINE																			9	
FRANKLIN																			3	
GRANT											1									
IBERIA																			4	
IBERVILLE							1												14	

\* INCLUDES RUBELLA, CONGENITAL SYNDROME

Louisiana Department  
of Health and Welfare  
Louisiana State Library  
Baton Rouge, Louisiana

MAY, 1974



BUREAU OF VITAL STATISTICS		DIVISION OF HEALTH MAINTENANCE AND AMBULATORY PATIENT SERVICES																	
Prepared by: TABULATION AND ANALYSIS	ASEPTIC MENINGITIS	DIPHtherIA	ENCEPHALITIS	ENCEPHALITIS, POST INFECTION	HEPATITIS A AND UNSPECIFIED	HEPATITIS B	TUBERCULOSIS, PULMONARY	MENINGOCOCCAL INFECTIONS	PERTUSSIS	RABIES IN ANIMALS	RUBELLA	SEVERE UNDERNUTRITION	SHIGELLOSIS	TYPHOID FEVER	OTHER SALMONELLOSIS	TETANUS	MEASLES	GONORRHEA	SYPHILIS, PRIMARY AND SECONDARY
	JACKSON																		3
JEFFERSON					9						1		2		2		3	149	7
JEFFERSON DAVIS						1												4	
LAFAYETTE							2								1			28	
LAFOURCHE	1					1									1			9	
LASALLE																		1	
LINCOLN					1					1								47	
LIVINGSTON																		5	
MADISON																		5	
MOREHOUSE																		13	
NATCHITOCHE																		16	
ORLEANS	6		3		7	13	41						5		1	1		707	18
OUACHITA							1											93	4
PLAQUEMINES					4										1			3	1
POINTE COUPEE																		1	
RAPIDES					1		2											81	
RED RIVER																		4	
RICHLAND																		7	
SABINE																			
ST. BERNARD			1		1		1											4	
ST. CHARLES																		11	
ST. HELENA																		1	
ST. JAMES																		6	
ST. JOHN																		9	
ST. LANDRY																		32	2
ST. MARTIN													1					8	
ST. MARY					1													13	2
ST. TAMMANY					1													25	
TANGIPAOA					1							2			2			28	2
TENSAS																		2	
TERREBONNE																		4	
UNION					1													6	
VERMILION																		8	
VERNON					1						15		3					78	1
WASHINGTON																		19	
WEBSTER					1		1		1						1			37	
WEST BATON ROUGE																		3	
WEST CARROLL															1			2	
WEST FELICIANA																		28	1
WINN																		1	
OUT OF STATE																			

From January 1 through May 31, 1 case of Malaria (contracted outside the U.S.A.) was also reported.

pulmonary tuberculosis, noted numerous minute white specks in the man's muscle tissue. Fascinated by his finding, he borrowed a microscope and on examining these specks, found them to be ovoid cysts each enclosing a small, coiled worm-like structure having  $2\frac{1}{2}$  spiral turns.

This same organism has been studied by many other investigators since Paget's initial identification. As a result of their collective work, we now know enough of the life cycle of the worm and the epidemiology of the disease to eliminate this illness in man. As a result of extensive control programs instituted by the United States swine industry, the epidemic form of this disease has essentially disappeared from this country. A few sporadic cases continue to occur, however, and as such serve as constant reminders to the community that vigilance against this disease must be maintained. Two such cases recently occurred in Louisiana.

#### Case Reports \*

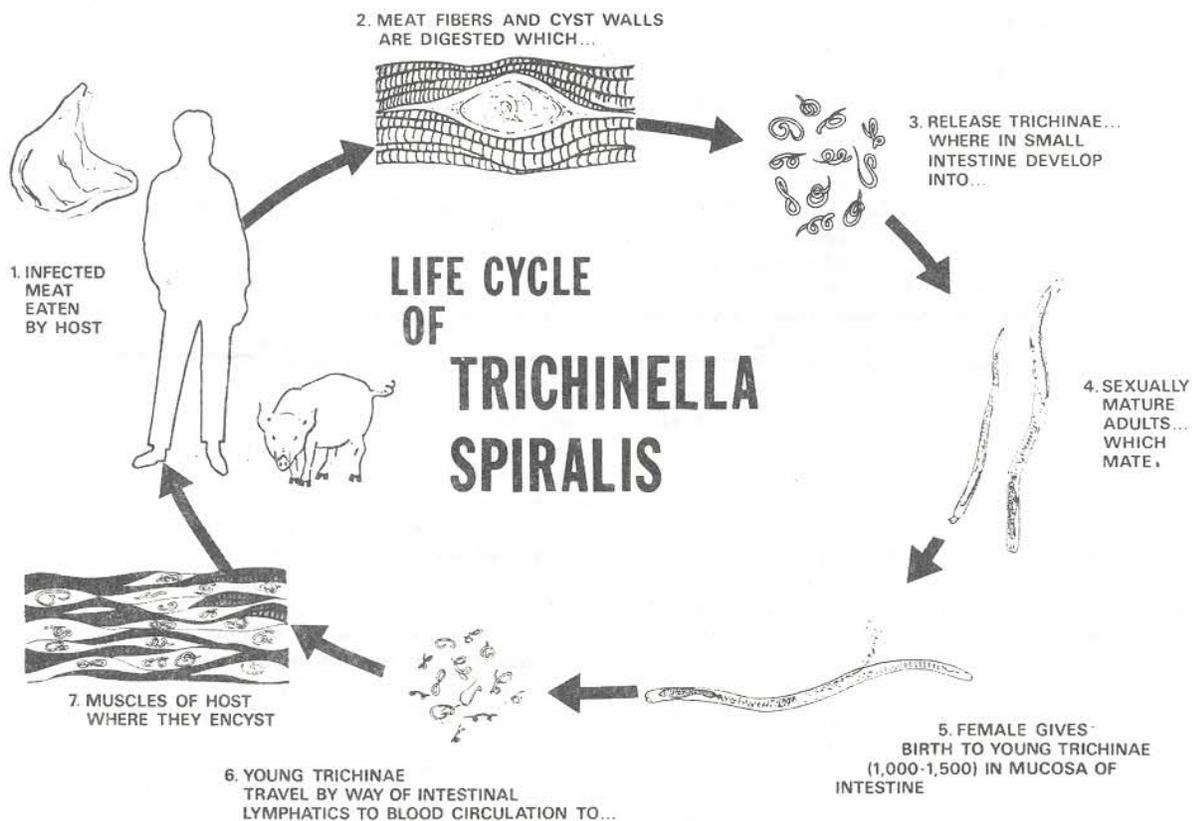
On February 19, 1974, a 20 year old male residing in Acadia Parish sought medical attention

because of unexplained swelling of his lower legs and feet, generalized myalgia, and pruritis. At the time of his initial examination, his physician also noted facial swelling, most pronounced in the periorbital area. A chest X-ray was obtained and revealed a small right lower lobe infiltrate.

According to the patient his 19 year old sister-in-law had similar symptoms and was at that time hospitalized because of these complaints. The physician learned from the man that he and the sister-in-law had shared a single common meal of fried pork chops and vegetables approximately one week before the onset of their symptoms.

The man was admitted to a local hospital where physical examination revealed bilateral rales and wheezes in the anterior and posterior lung fields, non-pitting edema of both feet, generalized muscle tenderness, and extreme pain on extension of the arms. Initial laboratory studies included: hematocrit 33%, hemoglobin 10.6, white blood count 13,500 (polys 64%, lymphs 14%, eosinophils 22%), sedimentation rate 14mm,

Figure 1



CPK 1,000 units, SGOT 115, LDH 200, and a chest X-ray revealing a right lower lobe infiltrate and a questionable left lower lobe infiltrate.

During the first 5 days after hospitalization the patient exhibited spiking fever ranging from 102° to 103°F. He continued to complain of generalized myalgia. Because of apparent nuchal rigidity, a spinal tap was performed and yielded crystal clear fluid containing a single white cell, a glucose of 59 mg%, protein 11.5 mg%, chloride 112 meq/L, and a negative gram stain.

On the 9th hospital day the patient's gastrocnemius muscle was biopsied. A fresh slide crushed preparation of the specimen revealed numerous *Trichinella spiralis* larvae as did subsequent permanent hematoxylin and eosin slides.

The patient was placed on prednisone 60 mg orally daily and Mintizol suspension 12.5 cc orally twice daily. Within several days his temperature returned to normal and his myalgia decreased to the point that he was able to ambulate with very little difficulty. A repeat CPK on March 9 was 450 units.

The patient's sister-in-law experienced an almost identical illness characterized by spiking fever, malaise, muscle pain, leukocytosis with eosinophilia, and facial edema. She was hospitalized and treated with a combination of Minocin and Decadron and is now fully recovered.

In investigating these two cases, the Acadia Parish Health Unit discovered that the pork chops eaten by the two patients had been obtained at a local market. Although two additional persons (the wife and daughter of the male case) ate with the two cases, neither ate pork chops because they appeared inadequately cooked. None of the incriminated pork chops were available for examination nor was it possible to determine the exact origin of these. No additional cases of trichinosis have been identified in Acadia Parish.

### The Organism

When an animal consumes flesh infected with cysts of *Trichinella spiralis*, the cysts are digested out of the flesh in its stomach as a result of the action of gastric acid on the infected tissue. The larvae excyst in the duodenum and soon invade the duodenal and jejunal mucosa where they develop through 4 ecdyses into minute thread-like adult males and females. This process takes from 5 to 7 days.

At first the adult worms appear to lodge in the glandular crypts where fertilization of the females occurs. Later the females burrow into the villi, the interglandular stroma, the deeper

Table 1  
REPORTED TRICHINOSIS  
IN THE UNITED STATES, 1947 - 1971

YEAR	NUMBER OF CASES	NUMBER OF DEATHS
1947	451	14
1948	487	15
1949	353	9
1950	327	9
1951	393	10
1952	367	10
1953	395	7
1954	277	1
1955	264	4
1956	262	5
1957	178	4
1958	176	4
1959	227	3
1960	160	3
1961	306	7
1962	194	1
1963	208	5
1964	198	1
1965	199	3
1966	115	3
1967	67	0
1968	84	1
1969	192	0
1970	109	3
1971	115	3

Source: Juranek DD, 1972

layers of the intestinal wall, and even into the mesenteric lymph nodes. After fertilization the females begin to deposit larvae, each female being capable of producing between 1,000 and 3,000 larvae. Some of these at first escape into the intestinal lumen but later the majority reach the intestinal lymphatics or the mesenteric venules and are distributed throughout the body. They are carried through the right heart and lungs to the arterial circulation, which they reach between the 9th and 23rd day. They may become temporarily lodged in various tissues of the body but form viable cysts almost exclusively in striated muscle. The greatest invasion takes place in muscles poor in glycogen. The most commonly infected muscles include the diaphragm, muscles of the larynx, tongue, abdomen and intercostal spaces, biceps, psoas, pectoral, gastrocnemius, and deltoid.

In man the encysted larvae may remain viable for years, although calcification usually occurs in 6 to 9 months. Five larvae per gram of body weight can cause death in man, but as many as 1,000 per gram have been recorded in persons who died of other causes. In pigs 10 larvae per gram may be lethal.

Figure 1 summarizes the life cycle of this extremely well adapted parasite.

#### Some Epidemiological Facts

In the past 25 years reported cases of trichinosis have declined markedly in the United States, as have deaths from the disease (Table 1).

During the period 1936-41, 16.1 percent of 5,313 human diaphragms examined in the United States showed the presence of *Trichinella* larvae or cysts. A similar study in 1966-68 showed a prevalence of only 4.2 percent. Furthermore, only 13% of the infected diaphragms in the 1966-68 study contained viable larvae, whereas 45% of those infected diaphragms identified in the earlier study harbored living larvae. This suggests

ducted by 2 other New Orleans hospitals between 1966 and 1968, all of the 74 cadavers examined were negative.

Man is by no means the only animal infected by *Trichinella*. This organism has been found in the muscles of at least 60 different species of mammals, and is distributed throughout nearly all countries of the world including the Arctic and parts of Africa. Animal products identified as sources of trichinosis in cases seen in the United States during 1971 are typical of vehicles responsible for infections in this country (Table 2). Although cattle are not natural reservoirs of *Trichinella*, beef products may become contaminated by infected pork after slaughter through the use of common grinders or from intentional mixing.

Table 2

#### SOURCES OF INFECTION FOR CASES OF TRICHINOSIS UNITED STATES, 1971

FOOD	NUMBER OF CASES
Pork products	82
Sausage	44
Chops	5
Bacon	5
Shoulder roasts	4
Pork butts	3
Ribs	3
Head cheese	1
Pork soup	1
Unspecified	16
Nonpork products	25
Bear meat	13
Chopped beef	6
Hamburger	4
Beef sirloin	1
Beef steak tartare	1
Unknown	8
TOTAL	115

Source: Juranek DD, 1972

that the majority of these *Trichinella* infections were acquired in the remote rather than the recent past.

In Louisiana only 6 cases of trichinosis have been reported during the past 12 years (1962-1973). One year earlier (1961), however, an outbreak of 11 cases occurred in Rapides Parish which was traced to uncooked, home prepared smoked sausage. In an autopsy survey conducted by a New Orleans hospital in 1936, 3.5% of individuals examined had evidence of *Trichinella* infection. In a second survey con-

#### The Disease

The diagnosis of trichinosis is confirmed in the laboratory by muscle biopsy and a variety of serologic tests. The clinical picture, however, is all that is required to lead one to a strong suspicion of this diagnosis. The fate of a person who eats trichinous meat depends largely on the number of larvae that he ingests. Ingestion of 20-30 larvae probably goes unnoticed by man. When he ingests a few hundred of these larvae man develops clinical manifestations of acute trichinosis. The resulting illness usually occurs in 3 stages: An intestinal stage which coincides with penetration of the intestinal mucosa, a second stage of muscular invasion, and a final period of convalescence.

The initial phase of disease is characterized by abdominal cramps and diarrhea and may be protracted as long as 8 weeks. Additional complaints common at this time include excessive fatigue, nausea, vomiting, occasional constipation, and loss of appetite. The stage of muscle invasion usually begins with edema of the eyelids. Within a few days the patient begins to experience pain in his muscles, especially on movement.

In 1971, Suruyanon and Klunklin investigated 119 cases of trichinosis associated with an outbreak in a small village in Thailand. Their summary of the signs and symptoms reported by 67 of these patients provides a fairly characteristic picture of the clinical presentation of this disease (Table 3). White counts were greater than 10,000 in 87.5% and eosinophile counts greater than 10% in 94% of patients studied. There were 3 deaths in this outbreak, equivalent to a 2.5% mortality rate.

Typically the most severe cases of trichinosis result from the ingestion of large numbers of larvae. Infection with over a thousand

**Table 3**  
**NUMBER OF PATIENTS**  
**WITH DIFFERENT CLINICAL SYMPTOMS**  
**AND SIGNS DURING HOSPITALIZATION**

SYMPTOMS AND SIGNS	NUMBER OF PATIENTS	PERCENT
Fever	45	67.2
Myalgia	40	59.7
Diarrhoea	16	23.9
Injected eyes	13	19.4
Leg oedema	12	17.9
Sunken eyeballs	5	7.5
Periorbital oedema	3	4.5
Subconjunctival haemorrhage	2	2.9

Source: Suruyanon V, 1972

trichinellae will produce severe illness lasting up to 8 weeks and sometimes death. Complications include myocarditis, bronchitis, bronchopneumonia, encephalitis, and vascular thrombosis. Most fatal infections are the result of myocarditis.

#### *Treatment*

Mild cases of trichinosis require only bed rest, adequate hydration and nutrition, sedation, and analgesics for control of muscle pain. When severe disease develops, intensive steroid therapy is indicated and is usually associated with dramatic relief of symptoms. Thiabendazole has yet to be established as uniformly effective in the treatment of this disease but may be beneficial in a dose of 25 mg per kilogram twice a day for 5 to 7 days in patients with uncomplicated disease. Several other benzimidazole

derivatives have been shown to be active against this organism in animals but await adequate clinical trials before being approved for use in man.

#### REFERENCES

- Beeson PB, and McDermott W: Cecil-Loeb Textbook of Medicine, 13th Ed, WD Saunders Co, Philadelphia, 1971
- Campbell WC: Antiinflammatory and analgesic properties of thabendazole, *J Am Med Assoc* 216 (13): 2143
- Caraway CT and Uhrick EC: Trichinosis in a central Louisiana community, *J Louisiana State Med Soc* 113 (7): 295-299, 1961
- Conn HF: Current Therapy 1972, WB Saunders Co, Philadelphia 1972
- Duckett MG and Denham DA: The effect of cambendazole on *Trichinella spiralis* infections in mice, *J Helminthol* 44(2): 211-218, 1970
- Faust EC, Russell PF: Craig and Faust's Clinical Parasitology, 6th Ed, Lea and Febiger, Philadelphia 1957
- Gould SE: The story of trichinosis, *Am J Clin Pathol* 55: 2-11, 1971
- Juranek DD, Shultz MG: Trichinosis in the United States, 1971, *J Inf Dis* 126: 687-9, 1972
- Mast H: Treatment of common parasitic infections of man encountered in the United States (first of two parts), *N Eng J Med* 287 (10): 495-499, 1972
- Suruyanon V and Klunklin K: Human trichinosis: analysis of cases during the tenth outbreak in north Thailand, *Southeast Asian J Trop Med Pub Hlth* 3: 390-396, 1972
- Trichinosis Surveillance, Annual Summary - 1970, Center for Disease Control, Atlanta, Ga., May 1971
- Zimmermann WJ and Zinter DE: The prevalence of trichinosis in swine in the United States, 1966-70, *HSMHA Rep* 86 (10): 937-945, 1971

\* Clinical data provided by: C.R. Pearson, M.D., Lafayette Charity Hospital and W.M. Bellard, M.D., Church Point, Louisiana.