

Shelby County Health Department

VECTOR CONTROL

RODENT CONTROL/URBAN-RURAL SANITATION



Rat Biology

- ▶ Family Muridae
 - ▶ Old World mice and rats, gerbils, whistling rats
 - ▶ 1150 species 260 genera
- ▶ Genus *Rattus*
 - ▶ True rats
 - ▶ 66 species

Roof Rat

- ▶ *Rattus rattus* – a.k.a. house rat, black rat, ship rat
 - ▶ Relatively large ears, tail longer than the body, pointed snout
 - ▶ On average 5 litters per year with 8 pups per litter
 - ▶ Average life span of 1 year
 - ▶ Mainly vegetarian
 - ▶ Agile climber, lives in high places

Norway Rat

- ▶ *Rattus norvegicus* – a.k.a. Brown rat, wharf rat, sewer rat, common rat, water rat.
 - ▶ Relatively small ears, tail shorter than the body, blunt snout
 - ▶ On average 7 litters per year with 9 pups per litter
 - ▶ 18 hours after giving birth experience post-partum estrus and mate again
 - ▶ Average life span of 2 years
 - ▶ Will eat anything, prefer meat

Roof Rat



Longer than Head & Body

Slim Light

Larger

Larger

Pointed

Tail

Body

Ear

Eye

Nose

Young Rat



Large

Large

Feet

Head

Small

Small

Thick Heavy

Smaller

Smaller

Blunt

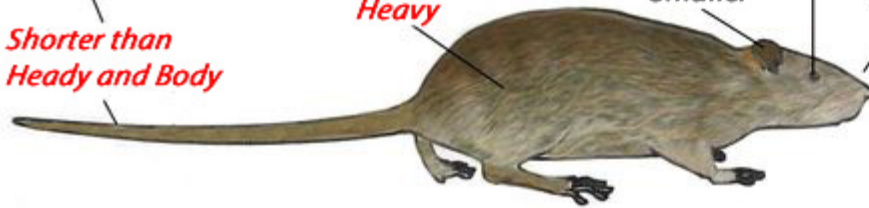
Shorter than Head and Body



House Mouse

Rounder in shape than the young rat

Norway Rat



Rodent Linked Diseases

Directly transmitted

- ▶ Hantavirus Pulmonary Syndrome (hantavirus)
- ▶ Leptospirosis (13 species of *Leptospira*)
- ▶ Rat-bite fever (*Streptobacillus moniliformis*)
- ▶ Plague (*Yersinia pestis*)
- ▶ Salmonellosis
- ▶ Tularemia
- ▶ South American Arenaviruses

Rodent Linked Diseases

Indirectly transmitted (via arthropod)

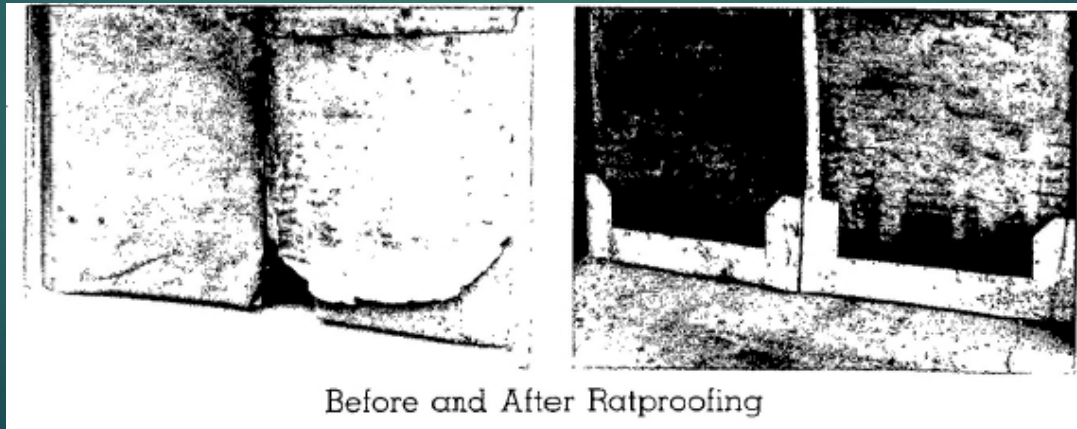
- ▶ Babesiosis
- ▶ Colorado Tick Fever
- ▶ Cutaneous Leishmaniasis
- ▶ Human Granulocytic Anaplasmosis
- ▶ Lyme Disease
- ▶ Omsk Hemorrhagic fever
- ▶ Powassan Virus
- ▶ Rickettsial pox
- ▶ Relapsing fever
- ▶ Rocky Mountain Spotted Fever
- ▶ La Crosse Encephalitis
- ▶ West Nile Virus
- ▶ Plague
- ▶ Sylvatic typhus
- ▶ Scrub Typhus
- ▶ Murine typhus

Murine Typhus

- ▶ A zoonotic rickettsia transmitted by fleas and lice.
 - ▶ *Rickettsia typhi* by the Oriental rat flea and rat louse
 - ▶ *Rickettsia felis* by the cat flea
- ▶ Transmission to people by
 - ▶ Rubbing flea/louse feces into the bite or other cut/abrasion
 - ▶ Inhalation of dried feces
 - ▶ Feces contact with mucus membrane or conjunctiva
- ▶ Murine typhus outbreak in the early 1940's with 2,000-5,000 cases reported annually.
 - ▶ Cases from the Southeastern and Gulf Coast states.
 - ▶ Recent outbreaks
 - ▶ Galveston, TX 2013 – 12 cases
 - ▶ Austin, TX 2008 – 33cases, 3 of 17 cat, 4 of 9 dogs, 12 of 17 opossums positive
 - ▶ No positive rats or raccoons. Cat flea most common arthropod.
 - ▶ California 2006 – 6 cases
 - ▶ Hawaii 2002 – 47 cases

History

- ▶ The rodent control program started in 1940.
- ▶ Back then the control of rats was performed by the Bureau of Sanitation.
- ▶ In 1940 they surveyed 129 industrial plants for rat infestation & rat proofed 10 of the largest buildings to prevent the spreading of typhus (fever)
- ▶ A full-time program was created in 1941 under the Bureau of Sanitary Engineering and USPHS.



History

▶ 1943

- ▶ “ The principle objective of the program is that all buildings in the city shall be rat-proofed, freed of rats and maintained in a rat-proof and rat-free condition under the direction of the division. Also, any business buildings constructed in the future shall be equipped with rat-proofing.”

▶ 1944 beginning of intense program in Memphis

History

- In 1944, the USPHS leaves and the program undergoes name changes: Murine Typhus Control and then to Typhus Control in 1945.
- Staff of an engineer, a sanitarian, a field supervisor, 3 foreman, and 23 laborers
 - 324 businesses rat proofed at a cost of \$63.39 each
 - 261 businesses rats eradicated at a cost of \$27.83 each
 - Revenue of \$28,200 and expenditures of \$27,800

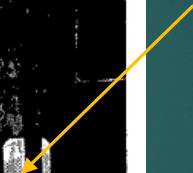
1944 Rat proofing



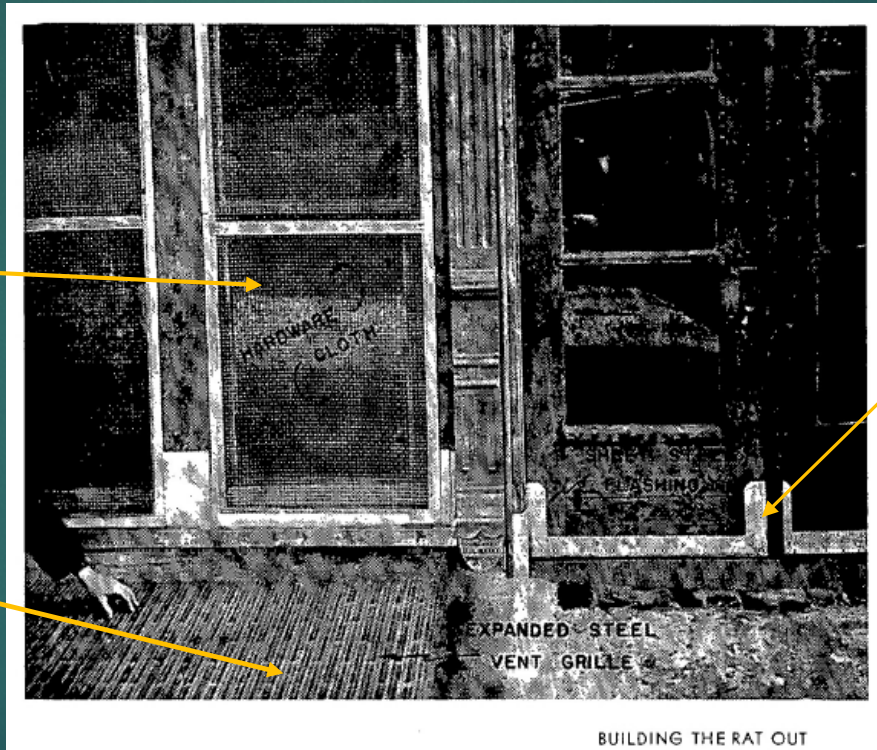
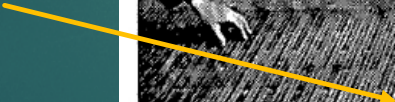
Hardware Cloth



Sheet steel Flashing



Expanded Steel Vent Grille

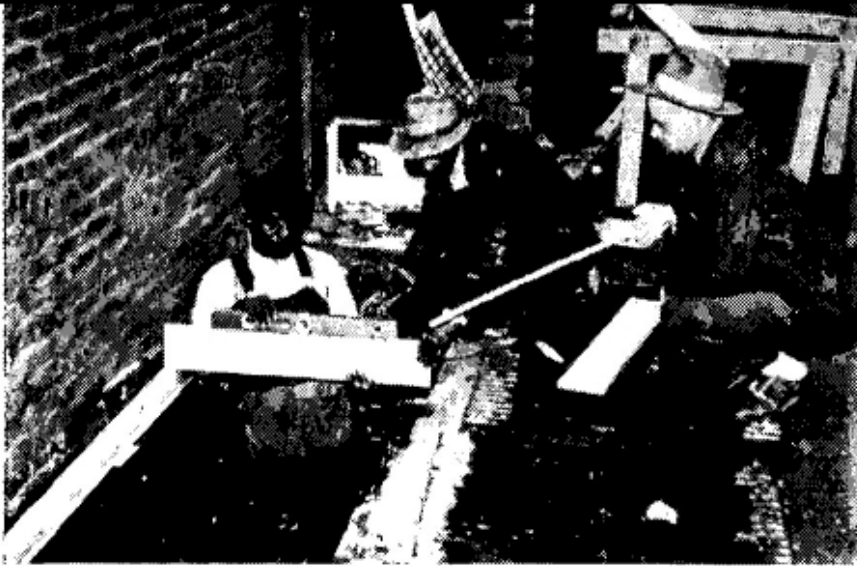


BUILDING THE RAT OUT

History

- The use of rodenticide introduced in 1945
- Compound 1080 was the rodenticide of choice.
 - AKA Sodium fluoroacetate, Ratsbane
 - Disrupts the citric acid cycle
 - Also used as a predacide
 - 1080 collars are put on goats or sheep, when coyotes attempt to kill them the collar is punctured. A collar contains .00067 lbs 1080.

1945



BEFORE

Building the



AFTER

Rat Out

History



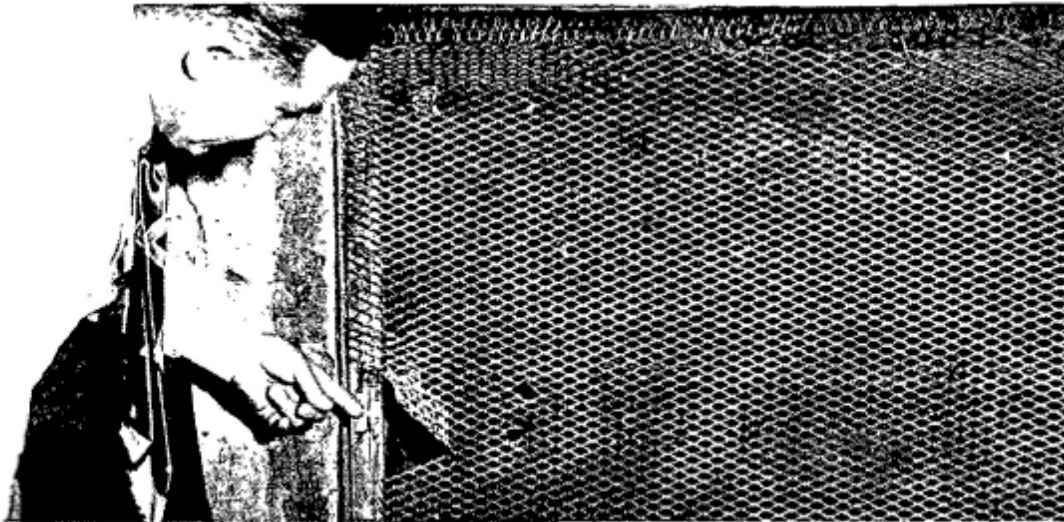
- Three cases of typhus fever in 1946
 - 2 imported from elsewhere in U.S.
 - 1 locally acquired
- 1,675 buildings already rat proofed and freed of rats inspected every 45 days
 - “It is realized that the manner of conducting the maintenance inspection services and the results obtained determine the ultimate success or failure of the program.”

History

- Four cases of typhus fever in 1947
 - All 4 lived in the City of Memphis. No other available info.
- Block-by-block inspections covered 2/3 of Memphis
 - Estimated cost or rat proofing given to owner
 - They could do the work themselves
 - Hire a private contractor to do the work
 - Contract with the Health Dept.
 - Final inspection done by Health Dept. to check compliance

History

- ▶ 1949 rat proofing by the Health Department ended
 - ▶ Objectives became
 - ▶ Eradication, Elimination of harborage, Elimination of food supply, Maintenance of rat proofed buildings



Routine maintenance inspection services are necessary in the successful operation of a long-range rat proofing and rat eradication program.

History

Year	Rat Proofing		Rat Eradication		Total Budget
	No. of Businesses	Cost per Business	No. of Businesses	Cost per Business	
1944	324	\$63.39	261	\$27.83	Sanitation
1945	517	\$67.85	474	\$33.35	Sanitation
1946	834	\$58.85	1144	\$12.07	\$59,153.70
1947	513	\$86.44	576	\$16.05	\$79,315.77
1948	289	\$75.94	360	\$19.11	\$53,653.61
1949	-	-	-	-	\$17,447.35
1950	-	-	-	-	\$7,973.23
1951	-	-	-	-	\$4,037.32

History

- ▶ 1952 – 1957 only inspections no use of rodenticide and no dedicated budget
- ▶ 1958 use of rodenticide returns
 - ▶ Anticoagulant bait is used
- ▶ 1963 sees a rise in the rodent population
 - ▶ 16 rat bite cases
- ▶ 1964 – 1966 continued rodent increase
 - ▶ 189 rat bites in 1964
 - ▶ 315 rat bites in 1965
 - ▶ 493 rat bites in 1966

History

- ▶ 1968 begins pilot rodent control program
 - ▶ 14 rat bite cases
 - ▶ 1,216 premise inspections
 - ▶ 836 lbs. of anticoagulant used
 - ▶ 200 lbs. Red Squill used
- ▶ 1969 Division of Housing Improvement provides funds for rat control
 - ▶ 18,742 premise inspections
 - ▶ 8,628 lbs. of anticoagulant used
 - ▶ 858 lbs. Red Squill used

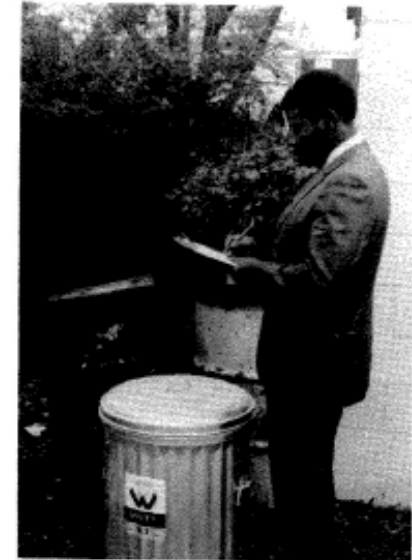
History

- ▶ 1970 – June 1972 funding from Dept. of Housing and Urban Development



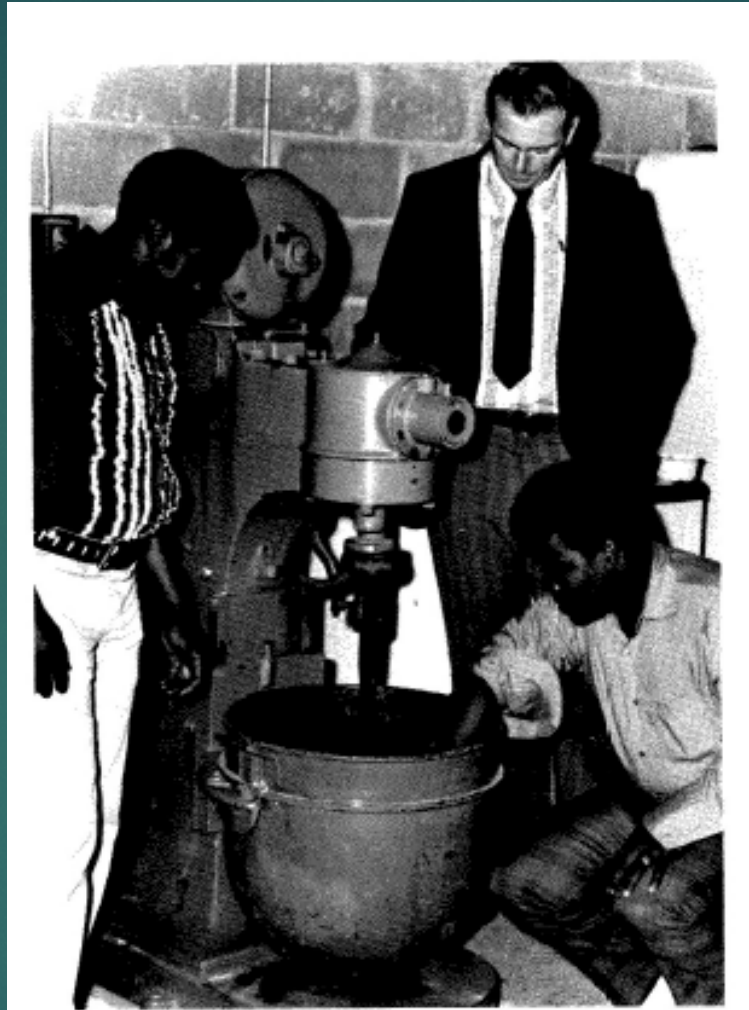
Rodent control included fumigation of burrows, as well as baiting and removal of harborage.

Control was achieved through extensive baiting with anticoagulant and emetic type baits.



Two thousand galvanized regulation cans were distributed on a loan basis.

1971



*Red Squill bait mixing. LtoR:
William Simpson, Roy Wise, Larry
Jones.*

History

- ▶ 1972-1982 Comprehensive Rat Control Project
 - ▶ Funding from Dept. of Health, Education, and Welfare
- ▶ 1973 most employees
 - ▶ 12 employees to kill rats
 - ▶ 35,799 lbs anticoagulant, 4,884 lbs Red Squill
 - ▶ 9 environmentalists for code enforcement
 - ▶ 5 educators for health education

History

- ▶ 1974 Comprehensive Rat Project
 - ▶ Prior to program 50% of premises rat infested, now only 2%

Comprehensive Rat Control Project Statistical Summary: 1974

Rat Bites (City-wide)	64	Abandoned automobiles removed	89
City blocks initially treated & inspected	251	Notices to vacant property owners concerning cleaning	212
Premises initially inspected for rat infestation	6,776	New garbage cans obtained resulting from enforcement inspections	2,793
Premises initially treated for rat infestation	2,008	Health Education:	
Bait reinspections	6,593	Home visits	8,643
Pounds of rodenticide used	21,541	Referrals to other departments or agencies	1,010
Inspection, Clean-Up & Code Enforcement:		Intra-Project referrals serviced	3,784
Initial premise inspections for code violations	7,307	Radio and television appearances	11
Re-inspections for code violations	42,528	Newspaper articles	11
Court case appearances	250	Group presentations	53
City blocks subjected to comprehensive clean-up	272	Total attendance	6,859
Truck loads of trash removed	1,152		

1974 – The Clean Machine



A "Clean Machine" will be put in service early in 1975. It will visit housing projects and playgrounds with exhibits and educational materials to stimulate neighborhood clean-ups.

History



- ▶ 1983-2005
 - ▶ Under various departments but acted on a complaint basis only.
 - ▶ Baiting and enforcement.
 - ▶ Average of about 8,000 complaints a year

Currently

- ▶ 2006 – present
 - ▶ Under vector control with mosquito and rabies control
 - ▶ Funded by a \$9.00 per year fee on every electrical bill
 - ▶ Vector Control total budget \$3,450,000

Currently

- ▶ There are 12 employees
 - ▶ Mostly working on code enforcement
 - ▶ 2 sets of ordinances City of Memphis, and Shelby County
 - ▶ Baiting when there is visible evidence of rats.
 - ▶ Burrows, rat droppings, actual rats
 - ▶ Not mice and not indoors

Baiting

- ▶ Use of bait stations
 - ▶ All bait stations used are tamper-resistant and weather-resistant
 - ▶ Unbreakable, locking, plastic box that is “strong enough to prohibit entry or destruction by dogs and children under six using their hands, feet, or commonly found objects.”
 - ▶ Bait stations are always placed within 100 feet of a structure



Bait Station



Baiting

- ▶ Below ground baiting
 - ▶ Homeowners must remove available food, trash, garbage, clutter, and debris first.
 - ▶ Placed at least 6 inches in to burrows using a funnel & hose, or a long handle scoop.
 - ▶ Burrows must be within 100 feet of a structure.

Baiting

- ▶ All baits and bait stations are only handled while wearing gloves
 - ▶ Required by pesticide label
 - ▶ Helps keep the bait stations free from odors.

Questions

