

# An Analysis of Ratbites In Baltimore, 1948-52

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**T**HE PROBLEM of persons being bitten by rats is often superseded by the more pressing problems associated with rodent control. If the situation were merely mechanical, the treatment of a laceration or wound, while important, would not be too significant. However, when the rat is so closely associated with man that it can bite him, the possibility of disease transmission exists from the vectors present or from such pathologies as leptospirosis, salmonellosis, or ratbite fever.

The establishment in May 1947 of a separate division of rodent control in the Baltimore City Health Department resulted in focusing attention on the incidence of ratbites as an important phase of a control program.

The data presented in this report was accumulated by the division of rodent control on a citywide basis. Hospital records were checked wherever possible, and each victim or his family was interviewed. A previous study by Richter in 1945 (1) was based on data from a limited area of approximately 2 square miles, known in Baltimore as the Eastern Health District. The differences between the data of the two reports can be attributed to the greater scope of the present report.

## Ratbite Case Reporting

In Baltimore, a city of more than 900,000 persons which at one time had a rat population thought to equal the human population, there is no provision for the compulsory reporting of ratbites. No cases of ratbite were reported prior to January 1948, but in that year a total of 14 ratbites from 14 separate locations was reported to the division of rodent control. Of this total, 36 percent of the ratbites were re-

ported by the police, 50 percent by relatives or friends, 7 percent by the admitting hospital, and 7 percent by miscellaneous sources. On the other hand, 42 percent of the cases were treated at a hospital.

Of 322 ratbites tabulated between January 1, 1948, and December 31, 1952, hospitals reported 31.7 percent of the cases to the health department, thus leading in the reporting as would be expected, since 231 or 71.7 percent of all the persons bitten were treated in hospitals. Parents and relatives reported 21.7 percent of the cases. Private physicians treated 8.4 percent of the bites but reported less than 1 percent of the total (table 1).

These statistics, however, do not reveal the true picture of the great improvement that has been accomplished in reporting. In 1948 hospitals reported 7 percent of the ratbites, and in 1951 more than 54 percent of the reports came from this source. The figures for 1952 again show more than 50 percent of the ratbites were reported by hospitals. The reporting by physicians, while not as spectacular in improvement, continues to show an increase. Approximately 15 percent of the reports were from within the health department, the cases having been discovered by sanitarians or public health nurses. The police have been invaluable in their assistance by reporting over 13 percent of the bites.

All such information is secured without benefit of a definite requirement for reporting and can probably be attributed to the educational activities of the health department as well as the excellent cooperation of the hospitals and the others involved.

## Ages of Victims

Children 6 years of age or less are the predominant victims of ratbites. Approximately 60.5 percent (195) of all victims were in this age group, and 24.8 percent (80) were infants less than 1 year old. An additional 11.2 percent (36) occurred in children from 7 through 12 years of age; 6.2 percent (20) occurred through the age of 21, while 16.1 percent of the total were reported for persons over 21. In approximately 6 percent of the cases no age was reported (table 2).

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**Table 1. Agencies reporting annual totals of ratbites**

Reporter	Total		1952		1951		1950		1949		1948	
	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent
Hospital.....	102	31.7	52	52.0	32	54.2	12	15.0	5	7.2	1	7.0
Parent or relative.....	70	21.7	14	14.0	8	13.5	24	30.0	24	34.8	-----	-----
Police.....	45	13.9	18	18.0	6	10.2	12	15.0	4	5.8	5	36.0
Occupant, friend or neighbor.....	20	6.2	3	3.0	-----	-----	6	7.5	4	5.8	7	50.0
Health department sanitarian.....	18	5.6	4	4.0	1	1.7	4	5.0	9	13.0	-----	-----
Health department nurse.....	19	5.9	4	4.0	2	3.4	6	7.5	7	10.2	-----	-----
Visiting nurse.....	11	3.4	0	0	3	5.1	6	7.5	2	2.9	-----	-----
Physician.....	3	.9	1	1.0	1	1.7	1	1.3	-----	-----	-----	-----
Miscellaneous.....	34	10.6	4	4.0	6	10.2	9	11.2	14	20.3	1	7.0
Total.....	322	99.9	100	100	59	100	80	100	69	100	14	100

In approximately 80 percent of the cases, the victim was bitten while asleep, generally in the very early morning. Of course, incidental bites have occurred through inadvertence, as for example, a policeman who was bitten on the ankle while interrogating a householder, or the young school boy who chased a rat and caught it.

Thus it can be assumed that the next Baltimorean to be bitten by a rat will probably be 6 years of age or under, possibly an infant of less than 1 year. He will be treated at a hospital, which will then report the case to the division of rodent control. Chances are the victim will be bitten on the finger or hand, for 161 of the bites covering the 5-year span of this report were on hands, fingers, or arms; 68 were on legs or lower extremities, and 70 on the head or about the face.

More than the average number of ratbites occurred from June through November with a peak during July and August. February has been the month of least activity, closely followed by January and December. In 1951, however, bites in January and February were higher than the monthly average for that year, and no bites were reported in June. Thus, experience to date has indicated that ratbite occurrences are not predictable on a seasonal basis.

Geographically, 90 percent of the ratbites reported have occurred within 2 miles of the center of Baltimore. There is a well-defined area of occurrence west and northwest of the business district, another slightly smaller area east and

still a smaller clump south of this district. The business district, on the other hand, remains relatively free with but 1 or 2 reported cases in the 5-year period. These areas in which ratbites occur are in general "the blighted areas" of the city.

In an attempt to draw an analogy between ratbite occurrences and complaints by the public concerning rat infestation an apparent ambiguity is presented. More persons complain about rats from outside the ratbite area than from within it. Therefore, the assumption may be drawn that in these bad areas, the inhabitants are either complacent about the rat problem or unaware of the assistance afforded by the municipality. Relying on experience, the inclination is toward the former assumption—these people apparently are not too concerned about rats as an immediate problem of daily existence.

#### Rodent Control Operations

As the cases of ratbite are brought to the attention of the division of rodent control, a sanitarian is assigned to investigate each case. A complete inspection of the property involved is made and a survey of adjoining properties and the exterior of the entire block is completed. As a general rule, the premises on which ratbites occurred were found to be moderately to heavily rat infested.

A random selection of cases indicates rats usually entered cellars or basements through

defective or rotted doors or window sills and open unscreened basement windows. The heaviest rat infestations were found under wooden floors constructed over dirt surfaces in basements. Crawl spaces, varying from 6 inches to 3 feet deep, under a portion of the ground floor where basements were not fully excavated were also heavily infested.

Once the rat has gained entry and has established a harborage, its progress throughout the remainder of the premises is in direct proportion to the interest the occupants have in eliminating it and the abundance of food that is available. The rat migrates to the kitchen for obvious reasons and as it builds up a family, it occupies more of the house than man. The rat uses available areas such as spaces behind walls and between floors. In addition to structural harborage, it can be assured of such incidental homes as those provided in trash and debris and "saved" materials stored in basements, closets, and occasionally in an attic.

All necessary corrections to accomplish rat-proofing, rat eradication, and improvement of sanitation are instituted under the guidance of the health department. On the infested premises in which ratbites occur, eradication measures must be undertaken immediately by "competent persons," and the division requires notification of the time and the manner of such procedures. Improvements in sanitation and ratproofing must be accomplished within a time limit prescribed by the notice. The notices may be pursuant to the general nuisance abatement ordinance or the provisions of the Ordinance on the Hygiene of Housing.

#### Dangers From Rats

Where rats become so intimately associated with man that they share the same abode and

leave their mark on the anatomy of man, disease implications are apparent. "Where the mean temperature is 45° or less, fleaborne diseases appear to be occasional, accidental, and self-limited" (2). Fortunately, Baltimore is well north of the average winter temperature zone of 45°. Nonetheless, in this city it is possible to import flea-infested rats which find harborage in warm basements.

It was just such an "accidental" situation which occurred in late 1946 and early 1947 when 7 cases of endemic typhus with 1 fatality occurred in a crowded row of houses not far from a local railroad line (3).

No evidence of plague in Baltimore could be found by complete search of city health department records. However, as recently as early 1951, a case of ratbite fever (*Spirillum minus*) was diagnosed in a local hospital, and in 1951 and 1952 the first 3 cases of Haverhill fever were recorded (4).

The presence of *Leptospira* in significant proportions in the rat population has been demonstrated in local studies (5) and confirmed by several cases of leptospirosis. Although typhus, plague, and leptospirosis are not transmitted by ratbites, it is well to consider the three diseases whenever rats live in close proximity to persons. The role of rats in ratbite fever, also known as Haverhill fever, has been defined by the authorities with the exception of the occurrence of sporadic cases of Haverhill fever without recorded reference to ratbites (6).

The high percentage of ratbites occurring in children 6 years of age and under gives some cause for reflection. Why the preponderance of victims in this age group? Is it possible that rats sense the defenselessness of the very young? Perhaps these occurrences can be at-

Table 2. Annual number of ratbites within age groups

Year	Under 1 year	1-6 years	7-12 years	13-21 years	Over 21 years	Age not determined	Total
1948	1	5	0	0	0	8	14
1949	20	26	7	6	3	7	69
1950	18	26	9	6	16	5	80
1951	16	19	8	6	10	0	59
1952	25	39	12	2	22	0	100
Total	80	115	36	20	51	20	322

tributed to some extent to carelessness or neglect by parents in failing to cleanse the child after feeding and before putting him to bed. Many persons have reflected on this problem without providing more than theoretical assumptions. Only through the continued and concerted efforts of the health department directed toward eliminating those environmental factors that favor rat propagation and rat life can we hope to reduce the occurrences of ratbites and the potential ratborne disease hazards.

### Summary

Baltimore does not require reporting of ratbites. However, through education by health officials and the excellent cooperation of hospitals and other agencies, this information is now being obtained.

Children 6 years of age or less are the predominant victims of ratbites and the incident usually occurs in the early morning while the victim is asleep. Most often the victim is bitten on the arm or leg. Although not predictable on the basis of present limited data, the peak season for these occurrences appears to be during July and August, and a steady de-

cline is noted to a low in February. Ninety percent of the ratbite incidence takes place within 2 miles of the center of the city. All are investigated and corrections are required by the Baltimore City Health Department's division of rodent control.

The close association of rat to man, as demonstrated by many ratbites, causes reflection as to the potential of ratborne diseases.

### REFERENCES

- (1) Richter, C. P.: Incidence of rat bites and rat-bite fever in Baltimore. *J. A. M. A.* 128: 324-326 (1945).
- (2) U. S. Public Health Service: Rat-borne disease prevention and control. Atlanta, Ga., Communicable Disease Center, 1949. 292 pp.
- (3) Davis, J. W., Schulze, W. H., Ewing, C. L., and Schucker, G. W.: Endemic typhus in Baltimore. *Southern Med. J.* 41: 21-26 (1948).
- (4) 137th Annual Report of the Department of Health, City of Baltimore, 1951.
- (5) Davis, D. E.: The relation between the level of population and the prevalence of *Leptospira*, *Salmonella*, and *Capellaria* in Norway rats. *Ecology* 32: 465-468 (1951).
- (6) U. S. Public Health Service: The control of communicable diseases in man. *Pub. Health Rep.* Reprint No. 1697 (revised 1950).

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## Municipal Sewage Treatment Plant Construction

Contracts for 204 projects to abate water pollution and conserve water resources, with a total expenditure of \$64.6 million, were awarded by municipalities during the second quarter of 1953.

Of the 204 projects, 118 are for new plants and 86 are for additions, enlargements, or replacements of existing facilities. Individual projects range in cost from over \$22 million for the city of Miami proper for a new plant to \$1,590 for improvement in San Francisco.