Item ID Number	03032	☐ **Not Scanned**
Author	Krogh, Peter S.	
Corporate Author		
Report/Article Title	Typescript: A Report on the Habits and Habitats of the Old Field Mouse, Peromyscus polionotus	
Journal/Book Title		
Year	1974	
Month/Day	August 1	
Color	☐	
Number of Images	15	
Descripton Notes	Research conducted at TA C-52A, Eglin AF Reservation	

A REPORT

ON

THE HABITS AND HABITATS OF THE OLD FIELD MOUSE,

PEROMYSCUS POLIONOTUS

Prepared for

Lt Col William E. Ward, DFLS

by

C/1C Peter S. Krogh

1 August 1974

TABLE OF CONTENTS

ABSTRACT

The purpose of this report is to gather information on the habits and habitats of the old field mouse, *Peromyscus polionotus*, in an attempt to answer some questions which developed during previous research conducted on the Test Area C-52A, Eglin AFB Reservation, Florida.

During the decade of the sixties, this test area was used "for assessing the dissemination and deposition characteristics of aerially delivered liquid and particulate materials from spray tanks..." (6:12), particularly a herbicide containing 2,3,7,8-tetrachlordibenzo-p-dioxin (TCDD) which has been found in the livers of these mice in this area. In the laboratory, this chemical has been found to be teratogenic. Thus, since the mouse is in part of man's food chain, this the cause of great concern.

Through studies of the structure of the mouse's burrow and studies of the food they eat, it has been found that they do not acquire the TCDD through their diet; however, there is the possibility, through the extensive structure of their burrow, that they pick up the TCDD on their skin when digging and that it enters their bodies through a process of grooming.

INTRODUCTION

Purpose

The purpose of this report is to gather information on the habits and habitats of old field mouse, Peromyscus poliontus, which will add to the previously conducted research at Eglin AFB, Florida, concerning the effects of 2,3,7,8-tetrachlorodibinzo-p-dioxin (TCDD) when introduced into the ecosystem. Hopefully, this research will answer a few of the questions which developed during previous research.

Problem

According to the Dow Prehearing Memorandum, "TCDD is probably a teratogen". The memorandum goes on further to say that, "one teratogenic response commonly associated with TCDD is left palate." (4:5) Concerning the relationship between TCDD and the mouse, Raymond W. Fullerton states in a Special Report to the Dept of Agriculture that ," In mice, 2,4,5-T and TCDD produce terata -- cleft palates and abnormal kidneys." (5:2) Since there is a good change that the mouse is part of man's food chain, specifically through eating, the livers of the mouse's predators, than the problem of teratogenicity in man becomes a great concern. Rather than attempting the impossible task of halting the TCDDs path in the human food chain after it reaches the mouse, the problem is made easier to stop it before it reaches the mouse. Thus, the problem can be solved by learning how the TCDD enters into the liver of the mouse.

Scope

This report is a culmination of four weeks of research of the habits and habitats of the old field mouse on TA C-52A, Eglin AF Reservation, in hopes that some information, concerning the entrance of TCDD into the mouse, will be deducted.

PHYSICAL DESCRIPTION OF TA C-52A

According to TR-74-12, the test area C-52A is a three square mile cleared area on the Eglin AFB Reservation which "was used for assessing the dissemination and deposition characteristics of delivered liquid and particulate materials from spray tanks and other systems of a similar nature." (6:12) (See Figures 1 and 2 for maps of the Test Area C-52A.)

According to Frank B. Golley in his book Mammals of Georgia, "This species (Peromyscus polionotus) may be found in a dray, sandy habitat...on beaches, sandy flood plains in the foothills, but is most common in the stage of old-field succession in sandy olf fields." (1:112) During the research conducted in the summer of 1974, parts of the test area, where vegetation cover ranges from 40% - 60%, seemed to be perfectly suited for Peromyscus polionotus. For a detailed description of the vegetation of the Test Area C-52A, see section III of TR-74-12. (Ref 6) Thus, even though the vegetation cover has increased since the time of the publication of TR-74-12, there still remains several areas suitable to the old field mouse.

MATERIALS AND METHODS OF FIELD WORK

In order to figure out how TCDD enters the mouse's liver, it becomes necessary to find how and where this mouse lives in the ground, and what types of food it eats.

There are two popular hypothesis to date that the TCDD enters the mouse either through the food chain on through a process of grooming. In the second case, the TCDD may attach to the skin of the mouse when he makes his burrow and through a process of grooming, which according to Cadet First Class White, USAFA, occurs during approximately 10% of their could easily enter the body. Thus, with the knowledge, through personal conversation with Capt Alvin L. Young, Associate Professor of Life Sciences, USAFA, that TCDD stays within the top 12 inches of soil, it becomes necessary to actually dig up burrows and determine their structure.

The first problem was to identify a mouse burrow (See Fig 3). After that, to determine the structure of the hole, a certain technique had to be developed in digging up the hole so that the tunnel would not be lost, in the event of a sharp turn. This resulted into cutting two inch slices of soil and, also, digging a pit in front of the hole to aid in following the path. For pictures of the different stages of this technique, see Figure 4. Once the hold was finished, the use of a ruler helped to determine the dimensions (length, depth and width of hole).

However, as far as determining the actual turns, another technique of pouring plaster down the hole was developed. The plaster was actually mixed out in the field, poured down the hole, and dug up very carefully within a few days. At least one day was used to let the plaster dry. See Figure 5 for pictures of finished casts of burrows. Sometimes the technique didn't work well due to the plug of sand left in the top of the burrow. With the burrow plugged up, the plaster would not fill the hole. In those cases, the technique used was to dig down about twelve inches to go under the plug and pour the plaster from there.

In order to determine what types of food the mice eat, the technique used was to observe outside the hold for external food and to dig carefuly and check occasionally for internal food. This food, mainly seeds, was scooped into large plaster Petrice dishes (9" diameter) and then brought back to the lab to be sifted with a U.S. Standard Sieve Series (opening of 1.00 mm), dried, weighed, separated with forceps, and identified under a disecting microscope. The identification process included aid from the University of Florida Herbaium and personal aid from Capt Alvin L. Young.

STRUCTURE OF BURROWS IN CONTROL AND TREATED AREAS

Just as no two houses are alike, no two burrows are identical. However, most of the burrows follow a general pattern. This general pattern includes a mound of dirt on the surface (See Fig 3), a tunnel at about 45½ to the surface which goes down approximately 18-22 inches. There is a sand plug within the first 12 inches. The burrow levels off for about 18 inches where there is found a nest. At this point, the burrow widens to about 6 inches in diameter. After the nest, the burrow tends to make a turn both upward and to a side while at the same time, it narrows to its original 2 inch diameter. The tunnel normally ends approximately six inches from the surface.

Data taken from actual measurement of 23 adult male Peromyscus polionotus show that on the average, their total length is 119 mm (4.7 inches), and their hind foot is, on the average, 17 mm (.7 inches). (1:121) These statistics tell much about the mouse's digging ability. In his book, Mammals of Georgia, Frank B. Golley states that, "The old field mouse is an able digger and constructs a burrow system which may be quite extensive. The entrance tunnel is ofter marked by a mound of sand and is closed by a plug of sand approximately four inches from the opening when the mouse is in the nest." (1:122)

It has been found through this summer's research that this statement has been supported by the mice living on TA C-52A. A total of 15 mouse burrows were investigated. Four of them were plastered and eleven were dug up. The average dimensions of the burrows were as follows:

Average length - 55.4 inches.
Average depth - 21.2 inches
Average width - 2.0 inches

For an animal as small as the mouse, this is quite an extensive home, indeed. However, the range in dimensions show that each mouse is his own architect. The range for the length went from 24 inches to 96 inches. The range for the depth went from 11 inches to 48 inches, and the width stayed close to 2 inches in diameter.

Some exceptions to the typical burrows included some burrows without a nest, some without a tunnel after the nest, and some that had several more turns than normal.

Now why these burrows differ by such a high degree, no one knows. Maybe the nestless burrows are merely unfinished. W. Wedgwood Bowen ~~Maurice P. Mettee, Jr.~~, states in his article Variation & Evolution of Gulf Coast Populations of Beach Mice Peromyscus polionotus (Bulletin ~~to~~ the Florida State Museum for Biological Sciences) that maybe this tunnel dug after the burrow is a tunnel to escape from predators. (3:24) This seems quite possible since this tunnel ofter came with a few inches from the surface and well away from the main entrance.

It has, also, been suggested by Maj Cockerham, Instructor of Life Sciences, USAFA, that these "unfinished" burrows are used merely to escape predators, thus, no need for a nest or extensive tunnel.

In conclusion, the typical mouse burrow cannot be constured (picked) until many more are researched. However, through the results of this work, it appears that the burrows, while more extensive in length than what was first thought, will most likely not go any deeper than 48-60 inches.

FOOD SOURCES FOUND BOTH EXTERNALLY AND INTERNALLY TO BURROWS

According to Frank B. Golley, in his book, Mammals of Georgia, "The food of Peromyscus polionotus is primarily seeds of grass and herbs, although insects may be utilized during periods when this food type is available." (1:122) More specifically, Gooley states that, "Seeds of hespedeza, diodiz teres, and permix acetosella are commonly utilized." (1:122) Through this summer's research, it was found that the mouse eats whatever seems to be around. Identification of several types of seeds was made with seeds found both externally and internally to the burrows. included are seeds from such plants as: Euphorbia maculata, Diodia teres, Thynchasa galactiodes, Polygala, and Convolvulus repans. See Appendices B and C for data on each burrow. An interesting fact is that Diodiz teres was found most internally and Cuphorbia maculata was found most exterrally to the burrows. As a matter of fact, these were to two most commonly found seeds.

Even though seeds appeared to make up the majority of the mouse's diet, 36 mg of insect material (including wings and legs) was found inside burrow number one. Thus, Peromyscus polionotus do indeed eat both insects and seeds.

CONCLUSION

In order to find out how TCDD enters the mouse's liver, it becomes necessary to dig up the actual burrow and find out where, in the ground, the mouse live and what the mouse eats. Through the techniques described in Materials and Method section of digging up burrows and pouring plaster into burrows, it was found that Peromyscus polionotus dig quite extensive burrows and that their diet consists of mainly seeds of diodia teres and euphorbia maculatata and also insects.

Two thesis of how TCDD entered their bodies is through eating the seeds or through direct contact with the TCDD in the ground and subsequently grooming. Capt Alvin L. Young , indicates that the TCDD has not been found in the seeds. Thus, the remaining grooming hypothesis appears to be a possible answer. The combined evidence that TCDD stays mainly in the top 12 inches of the soil, and that the mouse spends much time digging in the top 12 inches seems to support the grooming hypothesis.

One final conclusion, if, in fact, the grooming hypothesis proves satisfactory, then it seems plausible and practical to get rid of the TCDD by burying it below the burrows. Since the burrows are only 36" deep, this task would appear to be a feasible answer.

REFERENCES

1. Gooley, Frank B., Mammals of Georgia, Athens: University of Georgia Press, 1962.

2. Fullerton, Raymond W., Margaret B. Eculson, and Alfred R. Nolting. Special Report: Dept of Agriculture, Scientific Workshop held in Washington, D.C., 8-9 March 1974.

3. Memorandum, Dow Prehearing Memorandum (No 2), Corrected Copy, 8 February 1974.

4. Mette, Maurice F., Jr., Variation and Evolution of Gulf Coast Populations of Beach Mice, Peromyscus Polionotus. Gainsville: Bulletin of the Florida State Museum for Biological Sciences (XII, 1), 1968.

5. TR-74-12, Ecological Studies on A Herbicide-Equipment Test Area TA C-52A. Eglin AFB, Florida, January 1974.

APPENDIX A

Dimensions of Burrows**

Burrow #	Site	Test or Control	Date	Length	(Inches) Depth	Diameter
1	C-11	T	14 June 74	24	18	2
2*	A-9	T	14 Jun 74	26	18	2
3	SE of TA	C	19 Jun 74	72	36	2
4	SE of TA	C	19 Jun 74	72	18	2
5*	SE of TA	C	19 Jun 74	--	--	--
6	Grid 1	T	22 Jun 74	66	22	2
7	Grid 1	T	22 Jun 74	40	12	2
8	Grid 1	T	22 Jun 74	72	17	2
9	0-4	T	22 Jun 74	34	11	2
10	D-3	T	24 Jun 74	24	48	2
11	D-3	T	24 Jun 74	46	16	2
12	SE of TA	C	25 Jun 74	96	16	2
13	SE of TA	C	27 Jun 74	60	19	2
14*	SE of TA	C	2 Jul 74	70	18	2
15*	SE of TA	C	2 Jul 74	74	28	2

** See Figures 1 and 2 for sites of burrows.

APPENDIX B

WEIGHTS OF NEST, INTERNAL, AND EXTERNAL FOOD (gm)

Burrow #	Nest **	Internal Food	External Food
1	7.555	.818	--
2*	--	--	.144
3	11.847	.220	.173
4	8.460	.059	.334
5*	--	--	.326
6	4.686	--	.087
7	--	--	.064
8	1.946	4.450	--
9	17.772	5.672	.283
10	--	--	.666
11	12.849	.644	.289
12	7.525	.136	.291
13	6.050	11.025	.189

** The nest material was found to be made of mainly, three type of plants: Panicum wrightianum, Panicum repens, and Panicum virgatum. Also found intertwined in the grasses was found pieces of cloth, threat, dead snake seales, insect wings, and bark.

APPENDIX C

TYPES OF FOOD FOUND IN AND AROUND BURROWS

BURROW NO	EXTERNAL FOOD	INTERNAL FOOD
1	--	Euphorbia maculata
2	Euphorbia maculata Diodia teres Thynchosa galactioides Polygala polygama	--
3	Diodia teres	Diodia teres
4	Euphorbia maculata Diodia teres	Diodia teres
5	Euphorbia maculata Diodia teres	--
6	Diodia teres	--
7	Diodia teres	--
8	--	Diodia teres
9	Diodia teres Thynchosa galactioides Polygala polygama Convolvulus repons	Diodia teres
10	Euphorbia maculata	--
11	Euphorbia maculata	Euphorbia maculata
12	Euphorbia maculata Diodia teres	Diodia teres
13	Euphorbia maculata Diodia teres	Diodia teres