

THESIS

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T H E S I S

RELATION OF INSECTS TO THE POLLINATION OF PEARS AND
APPLES.

By

Albert G. Craig and Dillman S. Bullock

Class of 1902.

Michigan Agricultural College.

THESIS

94939

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Relation of Insects to the Pollination
of Pears and Apples.

Introduction.

It has long been known that many varieties of pears and apples are self-sterile while many other varieties do much better when cross-fertilized; as is shown by the work of M. B. Waite of the U. S. Dep't of Agriculture and F. A. Waugh of the Vermont Experiment Station.

Cross-pollination may take place in nature in any one of three ways namely:- by birds, by wind, and by insects. The work done by birds would be purely accidental and so insignificant. Since the pollen of pears and apples is sticky and heavy the wind can accomplish very little if anything. The great work of pollination then falls to the insects and it was with these facts in mind that this work on "The Relation of Insects to the Pollination of Pears and Apples" was taken up.

In carrying on this thesis the following divisions of the work have been considered and kept in mind throughout.

1. Number and names of insects found on pear and apple trees during the period of blooming.
2. Do the same insects work on the two fruits?
3. What proportion of the insects visit the flowers

systematically.

4. The effect of weather upon the different insects with reference to their working.

5. When our large orchards are in full bloom are there enough insects to go around.

We began collecting insects the first day that any pears were in blossom and the work was continued every day until the apples were out of bloom. While we did not collect all or any where near all the insects seen never the less the number of insects collected on the different days is we believe approximately proportional to the number working on the respective days.

The observations on the weather are taken from the official records kept by the Chemical Department of the College. While these are very valuable there are many things connected with them which are inaccurate and hinder us in drawing conclusions, as: for example on May 23 we do not know whether the .76 inches of rain came during the day or the night previous. So here is an error which can not be avoided.

We are indebted to Professor U. P. Hedrick for the general plan of the work, and many valuable suggestions. Also we wish to express our thanks to R. H. Pettit for assistance in identifying many of the specimens.

Table I.

Kinds and dates of

insects collected on pears in 1901.

Hemiptera:

Capsidae:-

May 6	-----2
" 7	-----1
" 8	-----2
" 9	-----1
" 10	-----4
" 11	-----3
" 14	-----6
" 15	-----3
" 17	-----2
Total	-----24

Corimelaenidae:-

May 7	-----3
" 8	-----9
" 10	-----5
" 11	-----13
" 13	-----1
" 14	-----3
" 15	-----5
" 16	-----1
Total	-----40

Grand Total-----64

1. Introduction

The purpose of this study is to investigate the effects of the proposed system on the performance of the participants.

The study was conducted in a controlled environment with a sample of 30 participants.

The results of the study are as follows:

2. Methodology

The study was conducted in a controlled environment with a sample of 30 participants.

The participants were divided into two groups: the control group and the experimental group.

The control group received the standard training, while the experimental group received the proposed system.

The data was collected over a period of 10 weeks.

The results were analyzed using statistical methods.

The study was approved by the ethics committee of the institution.

The results of the study are as follows:

The experimental group showed significantly higher performance than the control group.

The results were statistically significant at the 0.05 level.

The study was conducted in a controlled environment.

3. Results

The results of the study are as follows:

The experimental group showed significantly higher performance than the control group.

The results were statistically significant at the 0.05 level.

The study was conducted in a controlled environment.

The results of the study are as follows:

The experimental group showed significantly higher performance than the control group.

The results were statistically significant at the 0.05 level.

The study was conducted in a controlled environment.

Diptera:-

Tipulidae:-

May 15-----1

Total-----1

Culicidae:

May 10-----1

Total-----1

Chironomidae:

May 13-----2

Total-----2

Bibionidae:

May 13-----1

" 14-----1

" 15-----3

Total-----5

Stratiomyidae:

May 7-----1

" 10-----5

" 11-----2

" 13-----4

" 14-----5

" 15-----9

" 16-----1

Total-----27

~~Rapididae~~

May 10-----7

" 11-----2

May 13-----8
" 14-----19
" 15-----17
" 16-----4
Total-----57

Syrphidae:

May 9-----1
" 10-----1
Total-----2

Conopidae:

May 6-----5
" 8-----1
" 15-----3
Total-----9

Muscidae:

Tachininae:

May 3-----1
" 15-----3
Total-----4

Sarcophaginae:

May 15-----1
Total-----1

Dexiinae:

May 10-----2
" 13-----1
" 14-----2
Total-----5

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Anthomyiinae:

May	8	-----	2
"	10	-----	4
"	11	-----	1
"	13	-----	5
"	14	-----	3
"	15	-----	2
"		Total-----	17

Acalyptrate Muscidae:

May	7	-----	1
"	10	-----	1
"	13	-----	1
		Total-----	3
		Total-----	30

Grand Total-----136

Coleoptera:-

Pselaphidae:-

May	6	-----	13
"	7	-----	2
"	11	-----	4
"	14	-----	3
		Total-----	22

Coccinellidae:-

Megilla maculata:-

May	6	-----	1
"	7	-----	2
"	8	-----	1

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May 10-----5
" 11-----2
" 14-----9
" 15-----7
" 16-----1

Total-----28

Hippodamia parenthesis:

May 16-----1

Total-----1

Coccinella 9-notata.

May 4-----1
" 6-----1
" 7-----1
" 10-----1
" 15-----1
" 16-----1

Total-----6

Total-----35

Dermeestidae:

Anthrenus scrophulariae:

May 4-----1
" 6-----1
" 7-----1
" 8-----2
" 14-----1
" 16-----2

Total-----8

Lampyridae:

May 15-----1

Total-----1

Scarabaeidae:

Aphodius inquinatus:

May 10-----1

Total-----1

Hoplia:

May 15-----1

Total-----1

Total-----2

Cerambycidae:

May 17-----1

Total-----1

Chrysomelidae:

Lina lapponica:

May 4-----2

Total-----2

Diabrotica:

May 7-----1

" 8-----1

" 14-----1

Total-----3

Unidentified:

May 11-----1

" 15-----1

--9--

Total-----2

Total-----7

Bruchidae (?):-

May 8-----2

Total-----2

Grand Total-----81

Hymenoptera:-

Braconidae:-

May 4-----1

Total-----1

Vespididae:-

Vespa

May 15-----1

Total-----1

Polistes

May 4-----2

" 6-----1

" 15-----1

Total-----4

Total-----5

Andrenidae:-

May 3-----17

" 4-----13

" 6-----20

" 7-----40

" 8-----4

" 9-----1

" 10-----21

May 11-----2

" 13-----1

" 14-----2

" 15-----40

" 16-----3

Total-----164

Apidae:-

***Bombus virginicus*:-**

May 8-----2

Total-----2

***Apis mellifica*:**

May 3-----1

" 4-----2

" 6-----3

" 7-----2

" 8-----2

" 10-----6

" 13-----1

" 15-----1

Total-----18

Unidentified:

May 6-----1

Total-----1

Total-----21

Grand Total-----191

Table II Summary of Table I.

Hemiptera	64	14%
Capsidae-----24		
Corimelaenidae-----40		
Diptera	134	29%
Tipulidae-----1		
Culicidae-----1		
Chironomidae-----2		
Bibionidae-----5		
Stratiomyidae-----27		
Empididae-----57		
Syrphidae-----2		
Conopidae-----9		
Muscidae-----30		
Coleoptera	78	17%
Pselaphidae-----22		
Coccinellidae-----35		
Dermestidae-----8		
Lampyridae-----1		
Scarabaeidae-----2		
Cerambycidae-----1		
Chrysomelidae-----7		
Bruchidae-----1		
Hymenoptera	191	40%
Braconidae-----1		
Vespididae-----5		
Andrenidae-----21		
Apidae-----21		

2

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This summary shows a total of 458 specimens collected representing four orders and twenty-three families. Of these we see that only nine families are represented by as many as ten specimens each and these nine families contain ninety-five percent (95%) of the insects collected. Fifty-eight percent (58%) of the insects collected belong to the three families Corimelaenidae, Stratiomyidae, and Andrenidae and thirty-five percent (35%) belong to the Andrenidae. Fourteen percent (14%) belong to the Hemiptera, twenty-nine to the Diptera, seventeen to the Coleoptera and forty to the Hymenoptera.

In conclusion it may be said that the greater proportion of the insects that work on pears belong to the Diptera and Hymenoptera and of these the Hymenoptera are the more important.

Table III.

Kinds and dates of insects collected
on apples in 1901.

Hemiptera:-

Acanthiidae:

May 20-----1

Total-----1

Capsidae:

May 10-----2

" 11-----1

" 14-----2

" 15-----1

" 16-----3

" 17-----1

Total-----10

Pentatomidae:

May 10-----1

Total-----1

Corimelaenidae:

May 9-----1

" 15-----1

" 16-----2

" 17-----6

" 23-----1

Total-----11

1. Introduction

The purpose of this study is to investigate the effects of the proposed system on the performance of the participants.

The study was conducted in a laboratory setting.

2. Method

2.1. Participants

Twenty participants were recruited for the study.

The participants were all students.

2.2. Procedure

The participants were divided into two groups.

The first group was the control group.

The second group was the experimental group.

The participants performed the task for 10 minutes.

The results were then compared between the two groups.

The data were analyzed using statistical methods.

The results are presented in the following table.

3. Results

The control group performed significantly better than the experimental group.

The results are shown in Figure 1.

4. Discussion

The results of the study suggest that the proposed system has a negative effect on performance.

This may be due to the complexity of the system.

Further research is needed to investigate this phenomenon.

The study has some limitations, including a small sample size.

Future studies should include a larger sample size.

The study was funded by the National Science Foundation.

Aphididae:

May 22-----2

Total-----2

Grand Total-----25

Tricoptera:

May -----1

Grand Total-----1

Diptera:

Tipulidae:

May 10-----1

" 11-----1

Total-----2

Culicidae:

May 13-----1

" 20-----1

Total-----2

Chironomidae:

May 20-----1

" 22-----1

Total-----2

Mycetophilidae:

May 17-----1

" 18-----1

" 22-----2

Total-----4

Bibionidae:

May 10-----1

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1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

1. *Journal of the American Medical Association*, 1990; 263: 1025-1028.

* = $p < .05$, ** = $p < .01$, *** = $p < .001$.

[illegible][illegible]

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May 15-----2

" 16-----3

" 20-----1

" 22-----1

" 23-----3

Total-----11

Simuliidae:

May 23-----1

Total-----1

Stratiomyidae:

May 10-----2

" 13-----1

" 15-----3

" 16-----10

" 17-----5

" 18-----2

" 20-----4

" 22-----3

" 23-----7

" 27-----3

Total-----40

~~Empididae:~~

May 10-----4

" 11-----1

" 13-----1

" 14-----5

" 15-----5

May 16-----6

" 17-----7

" 18-----2

" 20-----6

" 23-----10

" 27-----1

Total-----48

Syrphidae:

May 7-----1

" 13-----1

" 20-----1

" 22-----2

" 27-----2

Total-----7

Conopidae:

May 15-----1

Total-----1

Muscidae:

Tachininae:

May 13-----1

" 14-----1

" 15-----2

" 16-----1

" 17-----1

" 20-----2

Total-----8

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Sarcophaginae:

May 14-----1

Total-----1

Dexiinae:

May 14-----1

" 15-----1

" 20-----2

Total-----4

Anthomyiinae:

May 10-----2

" 11-----3

" 13-----1

" 14-----4

" 15-----2

" 16-----1

" 17-----1

" 18-----1

" 20-----1

" 22-----2

" 23-----4

Total-----22

Acalyptrate Mucidae:

May 14-----1

" 22-----1

" 27-----1

Chaetopiisaenea

May 23-----1

Total-----4

1. The first part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

2. The second part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

3. The third part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

4. The fourth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

5. The fifth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

6. The sixth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

7. The seventh part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

8. The eighth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government.

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Total-----39

Grand Total-----157

Coleoptera:

Coccinellidae:

Megilla maculata:

May 10-----1

" 13-----1

" 14-----8

" 16-----1

" 17-----4

" 20-----2

Total-----17

Hippodamia parenthesis:

May 16-----1

" 18-----1

Total-----2

Coccinella 9 - notata:

May 10-----3

" 14-----1

" 15-----4

" 16-----2

" 17-----1

" 18-----3

" 20-----1

" 22-----2

Total-----17

1. *Journal of the American Medical Association*, 1997; 277: 1033-1036.

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1. The first group of respondents (Group 1) consisted of 100 individuals who were randomly selected from the general population of the United States. This group was used to establish the baseline for the study.

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Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: the control group (C) and the experimental group (E). The control group (C) was divided into two subgroups: the control group (C) and the control group (C). The experimental group (E) was divided into two subgroups: the experimental group (E) and the experimental group (E).

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1987).

1. *Journal of the American Medical Association*, 1997; 278: 1039-1044.

• • • • •

Figure 1: Schematic representation of the experimental design. The diagram shows a sequence of events: 'Stimulus presentation' (a box with a question mark), 'Response' (a box with a question mark), 'Feedback' (a box with a question mark), and 'Inter-trial interval' (a box with a question mark). The sequence is repeated for 'Trial 1' and 'Trial 2'.

[illegible]

Adalia frigida:

May 17-----1

" 23-----1

Total-----2

Anatis 15- punctata:

May 10-----1

" 14-----1

" 15-----2

" 17-----1

" 23-----1

Total-----6

Chilcornus bivulnerus:

May 14-----1

Total-----1

Total-----45

Cleridae:

May 23-----1

Total-----1

Scarabaeidae:

Euphoria inda---

May 10-----1

Total-----1

Grand Total-----47

Hymenoptera:

Formicidae:

May 10-----2

" 11-----1

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May 15-----2

" 16-----2

" 27-----1

Total-----8

Vespidae:

Polistes:

May 17-----1

" 18-----1

Total-----2

Andrenidae:

Agapostemon:

May 15-----1

" 16-----2

" 17-----1

" 18-----5

" 23-----2

Total-----11

Nomada belfragei:?

May 10-----1

" 16-----1

" 23-----1

Total-----3

Unidentified:

May 7-----8

" 9-----1

" 10-----18

" 11-----9

" 13-----2

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May	14	-----	3
"	15	-----	56
"	16	-----	34
"	17	-----	39
"	18	-----	20
"	20	-----	8
"	22	-----	23
"	23	-----	29
"	27	-----	6

Total-----258

Total-----272

Apidae:

Bombus virginicus:

May	7	-----	1
"	11	-----	1
"	13	-----	2
"	14	-----	1
"	15	-----	2
"	16	-----	1
"	17	-----	2
"	18	-----	1
"	20	-----	1
"	22	-----	1
"	23	-----	2

Total-----15

Bombus separatus:-

May 7-----	1
" 15-----	2
" 16-----	1
" 17-----	1
" 18-----	1
" 22-----	1
Total-----	7

Bombus pennsylvanicus:

May 7-----	1
" 10-----	1
" 15-----	2
" 22-----	1
" 23-----	1
Total-----	6

Bombus feridus:

May 16-----	1
" 22-----	1
" 23-----	1
Total-----	3

Total-----31

Apis mellifica:

May 11-----	2
" 13-----	1
" 14-----	6
" 15-----	8
" 16-----	5

May 17-----	8
" 18-----	3
" 20-----	8
" 22-----	4
" 23-----	1
" 27-----	2
Total-----	48
Grand Total-----	79

Table IV. Summary of Table III.

Hemiptera	25	4%
Acanthiidae-----	1	
Capsidae-----	10	
Pentatomidae-----	1	
Corimelaenidae-----	1	
Aphididae-----	2	
Tricoptera-----	1	
Diptera	157	27%
Tipulidae-----	2	
Culicidae-----	2	
Chironomidae-----	2	
Mycetophilidae-----	4	
Bibionidae-----	11	
Simuliidae-----	1	
Stratiomyidae-----	40	
Empididae-----	48	

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Syrphidae-----	7	
Conopidae-----	1	
Muscidae-----	39	
Coleoptera-----	47	8%
Coccinellidae-----	45	
Cleridae-----	1	
Searabaeidae-----	1	
Hymenoptera-----	361	61%
Formicidae-----	8	
Vespidae-----	2	
Andrenidae-----	272	
Apidae-----	79	

This summary shows a total of 592 specimens collected on apples represent twenty-five families. But of these we see that only nine families are represented by as many as ten specimens each and these nine families contain ninety-five percent (95%) of the insects collected. (Same as on pears). Ninety percent (90%) of the insects belong to the six families, Stratiomyidae, Empididae, Muscidae, Coccinellidae, Andrenidae, and Apidae; while forty-six percent (46%) belong to the Andrenidae and thirteen percent (13%) to the Apidae. Four percent (4%) belong to the Hemiptera, twenty-seven percent (27%) to the Diptera, eight percent (8%) to the Coleoptera and sixty-one percent (61%) to the Hymenoptera.

In conclusion then it may be said that by far the

greater proportion of insects which work on apples belong to the Diptera and Hymenoptera and the majority of all such insects belong to the Hymenoptera.

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Tables II and IV combined showing in parallel columns the families of insects that worked on the two fruits in 1901.

Pears	No. of specimens		Apples	No. of specimens
Hemiptera	64		Hemiptera	25
			Acanthiidae	1
Capsidae	24		Capsidae	10
			Pentitomidae	1
Corimelaenidae	40		Corinelaenidae	11
			Aphididae	1
			Tricoptera	1
Diptera	135		Diptera	157
Tipulidae	1		Tipulidae	2
Culicidae	1		Culicidae	2
Chironomidae	2		Chironomidae	2
			Mycetophilidae	4
Bibionidae	5		Bibionidae	11
			Simuliidae	1
Stratiomyidae	27		Stratiomyidae	40
Empididae	57		Empididae	48
Syrphidae	2		Syrphidae	7
Conopidae	9		Conopidae	1
Muscidae	30		Muscidae	39
Coleoptera	81		Coleoptera	47
Pselaphidae	22			
Coccinellidae	35		Coccinellidae	45
Dermistidae	8			
Lampyridae	1			

Pears	No. of specimens	Apples	No. of specimens
		Cleridae	1
Scarabaeidae	2	Scarabaeidae	1
Cerambycidae	1		
Chrysomelidae	7		
Bruchidae	2		
Hymenoptera	191	Hymenoptera	361
Braconidae	1		
		Formicidae	8
Vespidae	5	Vespidae	2
Andrenidae	164	Andrenidae	272
Apidae	21	Apidae	79

We found nearly the same number of families on both pears and apples, but some families work on pears and not on apples and vice verse.

Two families of Diptera were collected on pears and three more on apples, but they are of little importance since a total of only four specimens were found.

One specimen of Tricoptera was collected on apples and none of pears.

Nine families of Diptera were collected on pears, all of which were found on apples. Eleven families were collected on apples, two of each were not found on pears, but they are of little importance as a total of only five specimens were collected.

Eight families of Coleoptera were collected on pears,

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only two of which were found on apples. Three families of Coleoptera were collected on apples, one of which represented by one specimen was found on apples only.

Four families of Hymenoptera were collected on pears and three of them were found on apples. One family represented by one specimen was found on pears, but not on apples. One family represented by eight specimens was collected on apples and not found on pears.

By a further comparison of these summaries we find that the percent of Hemiptera found on pears is three and one-half times that of the same insects found on apples. The proportion of Diptera is approximately the same on the two kinds of fruit. The proportion of Coleoptera is twice as great on pears as on apples. But with regard to the Hymenoptera the proportion is much greater on apples than on pears.

Table VI.

A classification of the insects on the two
fruits in 1901 according to character
of work done in pollination.

A. Insects that carry pollen only accidentally.

I. Those that get on the flowers only accidentally.

	Pears	Apples
Hemiptera		
Acanthiidae		1
Pentatomidae		1
Aphididae		2
Tricoptera		1
Diptera		
Tipulidae	1	2
Culicidae	1	2
Mycetophilidae		4
Simulidae		1
Coleoptera		
Coccinellidae	35	45
Lampyridae	1	
Cleridae		1
Scarabaeidae	2	1
Cerambycidae	1	
Chrysomelidae	7	
Bruchidae	1	
Hymenoptera		
Braconidae	1	
	(49) 9%	(70) 12%

II. Those that visit the flowers systematically
but carry pollen only accidentally.

Hemiptera	Pears	Apples
Capsidae	24	10
Corimelaenidae	40	11
Diptera		
Chironomidae	2	2
Bibionidae	5	11
Stratiomyidae	27	40
Empididae	57	48
Syrphidae	2	7
Conopidae	9	1
Muscidae	30	39
Coleoptera		
Pselaphidae	22	
Derme stidae	8	
Hymenoptera		
Formicidae		8
Vespidae	<u>5</u>	<u>2</u>
	225 51%	171 28%

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The following are the results of the survey.

B. Those that visit flowers and carry pollen systematically.

Hymenoptera

Andrenidae	164	272
Apidae	<u>21</u>	<u>79</u>
	185 40%	359 60%

From this table we see that the only insects that are of any particular value to the orchardist in assisting in pollination are the Andrenidae and Apidae.

The proportion of the different classes can readily be seen from the table.

Table VII.

Dates and Families of insects collected together
with weather reports for 1901.

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 3			19	51.3°	100%	0	N.E.5
	Diptera		1				
		Muscidae	1				
	Hymenoptera		18				
		Andrenidae	17				
		Apidae	1				
May 4			22	59.3	100%	0	S.5
	Coleoptera		4				
		Coccinellidae	1				
		Dermeestidae	1				
		Chrysomelidae	2				
	Hymenoptera		18				
		Braconidae	1				
		Vespidae	2				
		Andrenidae	13				
		Apidae	2				
May 5			0	65 1/3	80%	0	S.E.3
May 6			53	64.6	30%	0	E.7

Date	Order	Family	No.	Temp	Sun-shine	Rain	Wind
May 6	Hemiptera		2				
		Capsidae	2				
	Diptera		5				
		Conopidae	5				
	Coleoptera		21				
		Pselaphidae	13				
		Coccinellidae	7				
		Dermestidae	1				
	Hymenoptera		25				
		Vespidae	1				
		Andrenidae	20				
		Apidae	4				
May 7			66	61.6°	40%	.01	S.7
	Hemiptera		4				
		Capsidae	1				
		Corimelaenidae	3				
	Diptera		2				
		Stratiomyidae	1				
		Muscidae	1				
	Coleoptera		7				
		Pselaphidae	2				
		Coccinellidae	3				
		Dermestidae	1				
		Chrysomelidae	1				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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Date	Order	Family	No.	Temp.	Sun-Shine	Rain	Wind
May 7	Hymenoptera		53				
		Andrenidae	48				
		Apidae	5				
May 8			28	58.6°	0	.69	S.
	Hemiptera		11				
		Capsidae	2				
		Corimelaenidae	9				
	Diptera		3				
		Conopidae	1				
		Muscidae	2				
	Coleoptera		6				
		Coccinellidae	1				
		Dermestidae	2				
		Chrysomelidae	1				
		Bruchidae	2				
	Hymenoptera		8				
		Andrenidae	4				
		Apidae	4				
May 9			5	58.6°	0	.24	E.
	Hemiptera		2				
		Capsidae	1				
		Corimelaenidae	1				
	Diptera		1				
		Syrphidae	1				

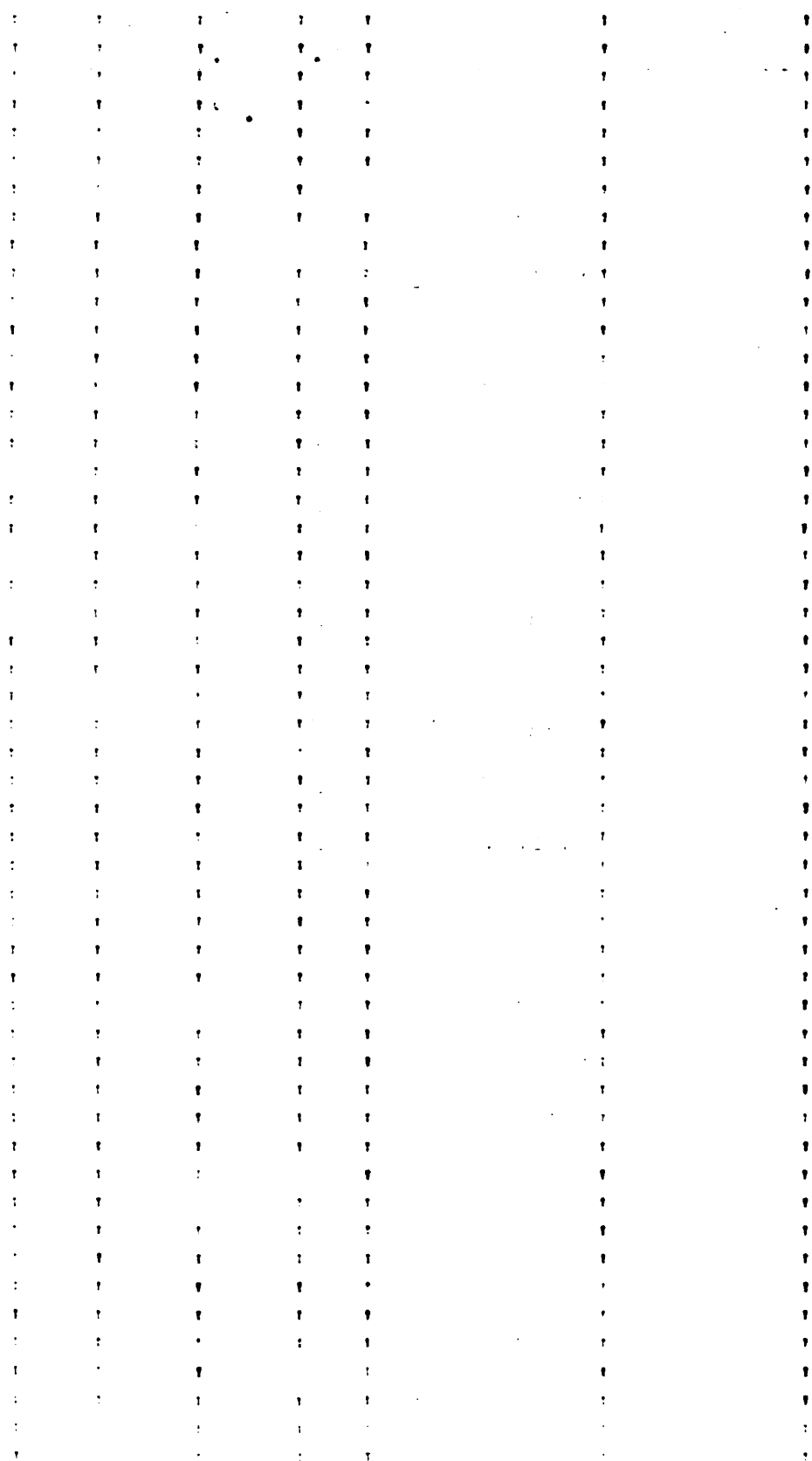
Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 9	Hymenoptera		2				
		Andrenidae	2				
May 10			105	61°	75%	0	S.E.
	Hemiptera		12				
		Capsidae	6				
		Pentatomidae	1				
		Corimelaenidae	5				
	Diptera		31				
		Tipulidae	1				
		Culicidae	1				
		Bibionidae	1				
		Stratiomyidae	7				
		Empididae	11				
		Syphidae	1				
		Muscidae	9				
	Coleoptera		13				
		Coccinellidae	11				
		Scarabaeidae	2				
	Hymenoptera		49				
		Formicidae	2				
		Andrenidae	40				
		Apidae	7				
May 11			49	53.6°	80%	.16	W.
	Hemiptera		17				
		Capsidae	4				
		Corimelaenidae	13				

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 11	Diptera		10				
		Tipulidae	1				
		Stratiomyidae	2				
		Empididae	3				
		Muscidae	4				
	Coleoptera		7				
		Pselaphidae	4				
		Coccinellidae	2				
		Chrysomelidae	1				
	Hymenoptera		15				
		Formicidae	1				
		Andrenidae	11				
		Apidae	3				
May 12				40.6°	60%	.14	W
May 13			49	47°	80%	0	W.
	Hemiptera		13				
		Corimelaenidae	13				
	Diptera		28				
		Culicidae	1				
		Chironomidae	2				
		Bibionidae	1				
		Stratiomyidae	5				
		Empididae	9				

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 13		Syrphidae	1				
		Muscidae	9				
	Hymenoptera		7				
		Andrenidae	3				
		Apidae	4				
May 14			91	46.3°	95%	0	N.W.3
	Hemiptera		11				
		Capsidae	8				
		Corimelaenidae	3				
	Diptera		43				
		Bibionidae	1				
		Stratiomyidae	5				
		Empididae	24				
		Muscidae	13				
	Coleoptera		25				
		Pselaphidae	3				
		Coccinellidae	20				
		Dermeestidae	1				
		Chrysomelidae	1				
	Hymenoptera		12				
		Andrenidae	5				
		Apidae	7				

[The page contains faint vertical lines and illegible markings.]

Date	Order	Family	No.	Temp.	Sun-shine	Rain	Wind
May 15			196	53.6°	100%	0	S.W.3
	Hemiptera		10				
		Capsidae	4				
		Corimelaenidae	6				
	Diptera		54				
		Bibionidae	5				
		Stratiomyidae	12				
		Empididae	22				
		Conopidae	4				
		Muscidae	11				
	Coleoptera		16				
		Coccinellidae	14				
		Lampyridae	1				
		Scarabaeidae	1				
	Hymenoptera		116				
		Formicidae	2				
		Vespidae	2				
		Andrenidae	97				
		Apidae	15				
May 16			90	62°	90%	0	S.4
	Hemiptera		6				
		Capsidae	3				
		Corimelaenidae	3				
	Tricoptera		1				



Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 16	Diptera		26				
		Bibionidae	3				
		Stratiomyidae	11				
		Empididae	10				
		Muscidae	2				
	Coleoptera		7				
		Coccinellidae	7				
	Hymenoptera		50				
		Formicidae	2				
		Andrenidae	40				
		Apidae	8				
May 17			84	65.3°	10%	.07	S.W.7
	Hemiptera		9				
		Capsidae	3				
		Corimelaenidae	6				
	Diptera		15				
		Mycetophilidae	1				
		Stratiomyidae	5				
		Empididae	7				
		Muscidae	2				
	Coleoptera		8				
		Coccinellidae	7				
		Cerambycidae	1				
	Hymenoptera		52				

1. The first part of the document discusses the importance of maintaining accurate records of all personnel movements and activities. It emphasizes that this information is crucial for ensuring the security and operational readiness of the organization.

2. The second part of the document outlines the specific procedures for collecting and analyzing data from various sources. It details the methods used to identify potential threats and assess the risk posed by different individuals or groups.

3. The third part of the document provides a detailed overview of the current status of the organization's security measures. It highlights the strengths of the existing system and identifies areas where improvements are needed.

4. The fourth part of the document discusses the role of personnel in maintaining the security of the organization. It emphasizes the importance of training and education in ensuring that all personnel are aware of their responsibilities and the potential consequences of their actions.

5. The fifth part of the document provides a summary of the key findings of the study. It highlights the most significant risks and the most effective strategies for mitigating them.

6. The sixth part of the document provides a detailed overview of the current status of the organization's security measures. It highlights the strengths of the existing system and identifies areas where improvements are needed.

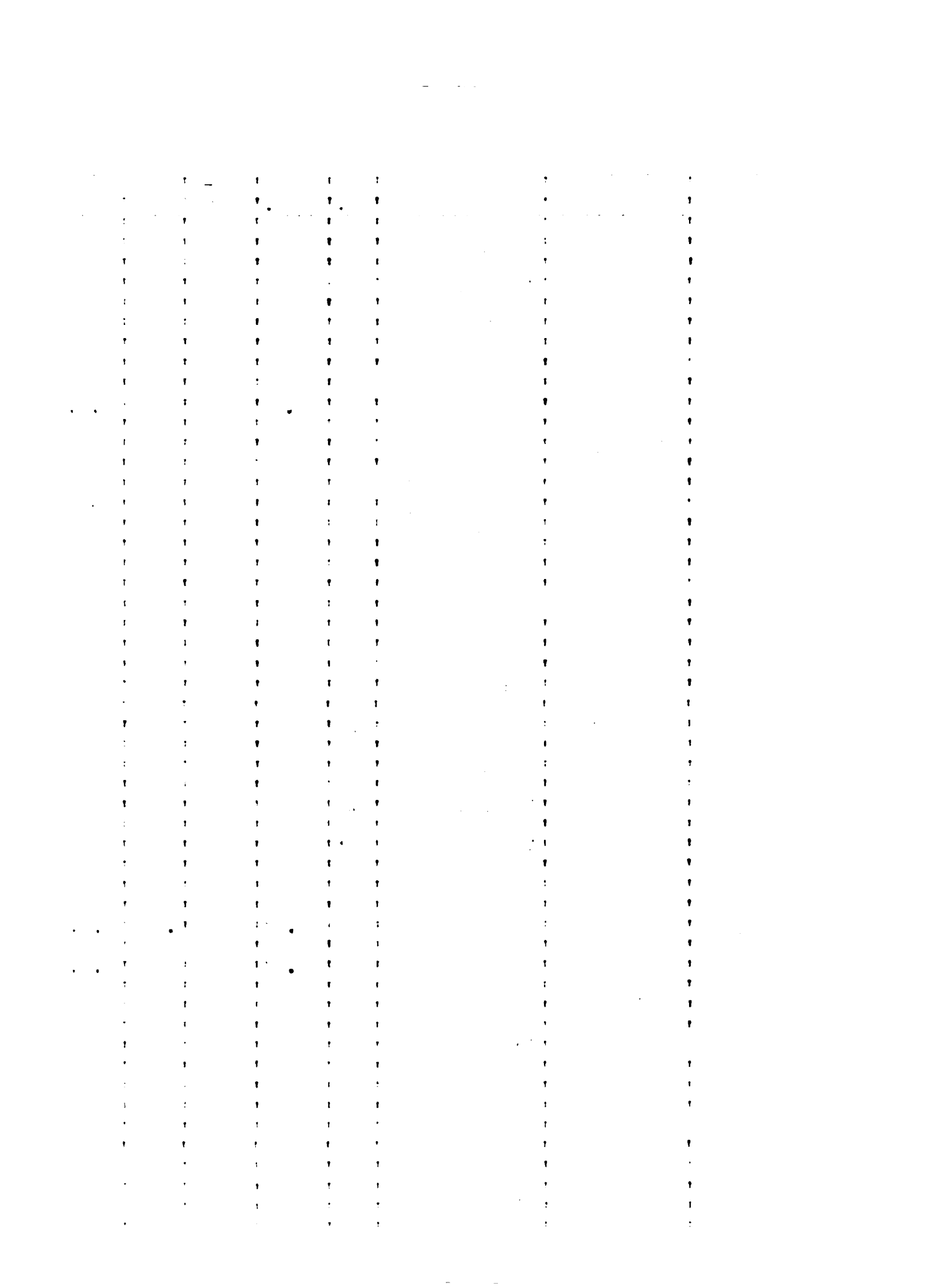
7. The seventh part of the document discusses the role of personnel in maintaining the security of the organization. It emphasizes the importance of training and education in ensuring that all personnel are aware of their responsibilities and the potential consequences of their actions.

8. The eighth part of the document provides a summary of the key findings of the study. It highlights the most significant risks and the most effective strategies for mitigating them.

9. The ninth part of the document provides a detailed overview of the current status of the organization's security measures. It highlights the strengths of the existing system and identifies areas where improvements are needed.

10. The tenth part of the document discusses the role of personnel in maintaining the security of the organization. It emphasizes the importance of training and education in ensuring that all personnel are aware of their responsibilities and the potential consequences of their actions.

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
		Vespidae	1				
		Andrenidae	40				
		Apidae	11				
May 18			41	59.6°	60%	0	N.E.4
	Diptera		6				
		Mycetophilidae	1				
		Stratiomyidae	2				
		Empididae	2				
		Muscidae	1				
	Coleoptera		4				
		Coccinellidae	4				
	Hymenoptera		31				
		Vespidae	1				
		Andrenidae	25				
		Apidae	5				
May 19				52.6°	0	.02	N.E.6
May 20			41	53.6°	0	0	N.E.7
	Hemiptera		1				
		Acanthiidae	1				
	Diptera		19				
		Culicidae	1				
		Chironomidae	1				
		Bibionidae	1				



Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 20		Stratiomyidae	4				
		Empididae	6				
		Syrphidae	1				
		Muscidae	5				
	Coleoptera		3				
		Coccinellidae	3				
	Hymenoptera		17				
		Andrenidae	8				
		Apidae	9				
May 21				56.6°	0	.29	N.E.13
May 22			47	59.3°	40%	0	S.W.12
	Hemiptera		2				
		Aphididae	2				
	Diptera		12				
		Chironomidae	1				
		Mycetophilidae	2				
		Bibionidae	1				
		Stratiomyidae	3				
		Syrphidae	2				
		Muscidae	3				
	Coleoptera		2				
		Coccinellidae	2				
	Hymenoptera		31				
		Andrenidae	23				

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Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
		Apidae	8				
May 23			66	67.3°	85%	.76	S.W.8
	Hemiptera		1				
		Corimelaenidae	1				
	Diptera		26				
		Bibionidae	3				
		Simuliidae	1				
		Stratiomyidae	7				
		Empididae	10				
		Muscidae	5				
	Coleoptera		2				
		Coccinellidae	1				
		Cleridae	1				
	Hymenoptera		37				
		Andrenidae	32				
		Apidae	5				
May 24				53.6°	0	0	N.E.12
May 25				50°	0	0	N.11
May 26				47.6°	0	0	N.9
May 27			16	55.6°	60%	0	N.10
	Diptera		7				
		Stratiomyidae	3				
		Empididae	1				
		Syrphidae	2				
		Muscidae	1				

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 27	Hymenoptera		9				
		Formicidae	1				
		Andrenidae	6				
		Apidae	2				

Conclusion.

Hemiptera.--As far as this order is concerned we can find no definite relation between either the sunshine, temperature, or rainfall and the number of specimens found.

Diptera.--Sunshine seems to have a greater influence on the number of specimens found than temperature, but rainfall prevents their working.

Coleoptera.--The higher the temperature the more specimens found. No relation between sunshine and specimens.

Hymenoptera.--The warmer the day the more specimens found. Sunshine same as temperature. Rainfall lessens number of insects found.

In general the warmer the day and the more sunshine the greater the number of insects moving.

Introduction to work of 1902.

As there is a great difference in insects from one year to another as well as in the weather, and owing to chances for error in last year's work the idea this year was to repeat for a check about the same work as was done last spring attempting however greater accuracy. The methods of work were the same as previously. More careful records were kept of the weather and one hour was spent each day collecting on each fruit.

Table VIII.

Kinds and dates of
insects collected on pears in 1902.

Hemiptera:-

Acanthiidae.

May 14-----1

Total-----1

Capsidae:

May 3-----1

" 5-----3

" 6-----2

" 7-----2

" 8-----2

" 9-----2

" 11-----1

" 12-----3

" 16-----1

Total-----17

Pentatomidae:

Cosmopepla carnifex:

May 16-----1

Total-----1

Unidentified:

May 3-----1

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May 4-----1
" 5-----1
" 6-----1
" 8-----1
" 16-----1

Total-----6

Total-----7

Corimelaenidae:

May 4-----1
" 17-----1

Total-----2

Grand Total-----27

Neuroptera:

May 3-----1

Grand Total-----1

Tricoptera:

May 6-----1

Grand Total-----1

Diptera:

Chironomidae:

May 6-----2

Total-----2

Mycetophilidae:

May 4-----2
" 8-----1
" 12-----3
" 13-----3

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May 14-----1

Total-----10

Bibionidae:

May 13-----1

" 14-----2

Total-----3

Tabanidae:

May 15-----1

Total-----1

Stratiomyidae:

May 3-----1

" 5-----6

" 6-----1

" 7-----5

" 8-----11

" 9-----1

" 12-----3

" 13-----2

" 14-----8

" 15-----5

" 16-----15

" 17-----6

Total-----64

Epididae:

May 3-----1

" 5-----3

" 6-----1

" 9-----1

Empididae: (cont.)

May	11	-----	2
"	12	-----	19
"	13	-----	15
"	14	-----	26
"	15	-----	18
"	16	-----	3
"	17	-----	13
"	19	-----	3
Total			-----105

Syrphidae:

May	2	-----	3
"	3	-----	1
"	4	-----	2
"	5	-----	7
"	6	-----	3
"	7	-----	2
"	8	-----	20
"	9	-----	1
"	11	-----	9
"	12	-----	5
"	13	-----	1
"	14	-----	3
"	15	-----	3
Total			-----60

Conopidae:

May	5	-----	1
"	12	-----	2

Conopidae (cont.):

May 15-----1

Total-----4

Muscidae:

Tachininae:

May 8-----2

" 11-----1

" 14-----1

" 17-----1

Total-----5

Sarcophaginae:

May 8-----2

" 11-----2

" 12-----2

" 15-----1

Total-----7

Dexiinae:

May 11-----1

" 12-----1

" 14-----2

" 16-----1

Total-----5

Muscinae:

May 14-----2

" 16-----2

Total-----4

Anthomyiinae:

May 5-----2

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Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains. The concentration of the *Agrobacterium* suspension was 10⁶ cells/ml (○), 10⁷ cells/ml (□), 10⁸ cells/ml (△), 10⁹ cells/ml (◇), and 10¹⁰ cells/ml (●). The error bars represent the standard deviation of three independent experiments.

$$\vdots$$

Figure 1. The effect of the concentration of the solution on the adsorption of the dye. The concentration of the solution was 0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 150.0, 200.0, 300.0, 400.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0, 1500.0, 2000.0, 3000.0, 4000.0, 5000.0, 6000.0, 7000.0, 8000.0, 9000.0, 10000.0, 15000.0, 20000.0, 30000.0, 40000.0, 50000.0, 60000.0, 70000.0, 80000.0, 90000.0, 100000.0, 150000.0, 200000.0, 300000.0, 400000.0, 500000.0, 600000.0, 700000.0, 800000.0, 900000.0, 1000000.0, 1500000.0, 2000000.0, 3000000.0, 4000000.0, 5000000.0, 6000000.0, 7000000.0, 8000000.0, 9000000.0, 10000000.0, 15000000.0, 20000000.0, 30000000.0, 40000000.0, 50000000.0, 60000000.0, 70000000.0, 80000000.0, 90000000.0, 100000000.0, 150000000.0, 200000000.0, 300000000.0, 400000000.0, 500000000.0, 600000000.0, 700000000.0, 800000000.0, 900000000.0, 1000000000.0, 1500000000.0, 2000000000.0, 3000000000.0, 4000000000.0, 5000000000.0, 6000000000.0, 7000000000.0, 8000000000.0, 9000000000.0, 10000000000.0, 15000000000.0, 20000000000.0, 30000000000.0, 40000000000.0, 50000000000.0, 60000000000.0, 70000000000.0, 80000000000.0, 90000000000.0, 100000000000.0, 150000000000.0, 200000000000.0, 300000000000.0, 400000000000.0, 500000000000.0, 600000000000.0, 700000000000.0, 800000000000.0, 900000000000.0, 1000000000000.0, 1500000000000.0, 2000000000000.0, 3000000000000.0, 4000000000000.0, 5000000000000.0, 6000000000000.0, 7000000000000.0, 8000000000000.0, 9000000000000.0, 10000000000000.0, 15000000000000.0, 20000000000000.0, 30000000000000.0, 40000000000000.0, 50000000000000.0, 60000000000000.0, 70000000000000.0, 80000000000000.0, 90000000000000.0, 100000000000000.0, 150000000000000.0, 200000000000000.0, 300000000000000.0, 400000000000000.0, 500000000000000.0, 600000000000000.0, 700000000000000.0, 800000000000000.0, 900000000000000.0, 1000000000000000.0, 1500000000000000.0, 2000000000000000.0, 3000000000000000.0, 4000000000000000.0, 5000000000000000.0, 6000000000000000.0, 7000000000000000.0, 8000000000000000.0, 9000000000000000.0, 10000000000000000.0, 15000000000000000.0, 20000000000000000.0, 30000000000000000.0, 40000000000000000.0, 50000000000000000.0, 60000000000000000.0, 70000000000000000.0, 80000000000000000.0, 90000000000000000.0, 100000000000000000.0, 150000000000000000.0, 200000000000000000.0, 300000000000000000.0, 400000000000000000.0, 500000000000000000.0, 600000000000000000.0, 700000000000000000.0, 800000000000000000.0, 900000000000000000.0, 1000000000000000000.0, 1500000000000000000.0, 2000000000000000000.0, 3000000000000000000.0, 4000000000000000000.0, 5000000000000000000.0, 6000000000000000000.0, 7000000000000000000.0, 8000000000000000000.0, 9000000000000000000.0, 10000000000000000000.0, 15000000000000000000.0, 20000000000000000000.0, 30000000000000000000.0, 40000000000000000000.0, 50000000000000000000.0, 60000000000000000000.0, 70000000000000000000.0, 80000000000000000000.0, 90000000000000000000.0, 100000000000000000000.0, 150000000000000000000.0, 200000000000000000000.0, 300000000000000000000.0, 400000000000000000000.0, 500000000000000000000.0, 600000000000000000000.0, 700000000000000000000.0, 800000000000000000000.0, 900000000000000000000.0, 1000000000000000000000.0, 1500000000000000000000.0, 2000000000000000000000.0, 3000000000000000000000.0, 4000000000000000000000.0, 5000000000000000000000.0, 6000000000000000000000.0, 7000000000000000000000.0, 8000000000000000000000.0, 9000000000000000000000.0, 10000000000000000000000.0, 15000000000000000000000.0, 20000000000000000000000.0, 30000000000000000000000.0, 40000000000000000000000.0, 50000000000000000000000.0, 60000000000000000000000.0, 70000000000000000000000.0, 80000000000000000000000.0, 90000000000000000000000.0, 100000000000000000000000.0, 150000000000000000000000.0, 200000000000000000000000.0, 300000000000000000000000.0, 400000000000000000000000.0, 500000000000000000000000.0, 600000000000000000000000.0, 700000000000000000000000.0, 800000000000000000000000.0, 900000000000000000000000.0, 10000000

1. *Journal of the American Medical Association*, 1997; 277: 1033-1037.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. <i>Age</i>	1											
2. <i>Gender</i>	0.12	1										
3. <i>Marital status</i>	0.05	0.08	1									
4. <i>Income</i>	0.01	0.02	0.03	1								
5. <i>Education</i>	0.01	0.02	0.03	0.04	1							
6. <i>Health</i>	0.01	0.02	0.03	0.04	0.05	1						
7. <i>Religion</i>	0.01	0.02	0.03	0.04	0.05	0.06	1					
8. <i>Occupation</i>	0.01	0.02	0.03	0.04	0.05	0.06	0.07	1				
9. <i>Family size</i>	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	1			
10. <i>Urban/rural</i>	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	1		
11. <i>Time of day</i>	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	1	
12. <i>Season</i>	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	1

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9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 10

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Anthomyiinae: (cont.)

May	7	-----	2
"	8	-----	5
"	9	-----	1
"	11	-----	3
"	12	-----	2
"	13	-----	3
"	14	-----	2
"	15	-----	7
"	16	-----	5
"	17	-----	2

Total-----34

Total-----55

Grand Total-----304

Coleoptera:

Coccinellidae:

Megilla maculata:

May	3	-----	1
"	4	-----	1
"	5	-----	1
"	6	-----	5
"	7	-----	10
"	8	-----	2
"	9	-----	1
"	11	-----	1
"	12	-----	4
"	14	-----	3
"	15	-----	1

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971) using a Shimadzu 1601 UV-Visible Spectrophotometer. The concentration of chlorophyll was expressed in $\mu\text{g mL}^{-1}$.

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1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

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Megilla maculate: (cont.)

May 16-----1
" 17-----1
" Total-----35

Hippodamia parenthesis:

May 15-----1
Total-----1

Coccinella 9-notata:

May 5-----1
" 6-----1
" 7-----1
" 8-----1
" 12-----2
" 14-----2
" 15-----1
" 16-----1
Total-----10

Adalia figida:

May 12-----1
Total-----1

Chilocorus bivulnerus:

May 13-----1
Total-----1
Total-----48

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Dermestidae:

Anthrenus scrophulariae:

May 3-----22

" 12-----5

" 13-----1

" 14-----2

" 15-----8

" 16-----16

" 17-----20

" 19-----1

Total-----75

Total-----75

Elateridae:

May 7-----1

" 16-----1

Total-----2

Lampyridae:

May 12-----1

Total-----1

Cerambycidae:

May 5-----2

" 12-----1

" 14-----2

" 15-----1

" 16-----3

" 17-----2

" 19-----2

Total-----13

1. The first part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed. The list is as follows:

Name	Office
John A. Smith	Mayor
James B. Jones	City Clerk
William C. Brown	City Engineer
Robert D. White	City Treasurer
Charles E. Green	City Attorney
Thomas F. Black	City Commissioner of Public Works
Henry G. Gray	City Commissioner of Health
John H. White	City Commissioner of Police
William I. Black	City Commissioner of Fire
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Henry G. Gray	City Commissioner of Health
John H. White	City Commissioner of Police
William I. Black	City Commissioner of Fire
Robert J. Gray	City Commissioner of Education

Chrysomelidae:

Lina lapponica:

May 4-----1

" 16-----1

Total-----2

Odontata narvosa:

May 17-----1

Total-----1

Undetermined:

May 14-----1

Total-----1

Total-----4

Curculionidae:

May 17-----1

Total-----1-

Grand Total-----144

Hymenoptera:

Ichneumonidae:

May 3-----1

" 7-----1

Total-----2

Formicidae:

May 3-----1

" 4-----1

" 5-----2

" 12-----3

" 14-----1

Formicidae: (cont)

May 16-----1

" 17-----1

Total-----10

Vespidae:

Polistes:

May 3-----4

" 4 -----2

" 5-----3

" 12-----2

" 15-----2

Total-----13

Crabro:

May 16-----1

Total-----1

Total-----14

Andrenidae:

Nomada:

May 3-----3

" 12-----1

Total-----4

Agapostemon:

May 8-----1

" 12-----1

" 17-----2

Total-----4

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100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%

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Journal of Management Education 36(7) 809-824

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Unidentified:

May	2	-----	6
"	3	-----	30
"	4	-----	24
"	5	-----	32
"	6	-----	12
"	7	-----	2
"	8	-----	85
"	11	-----	9
"	12	-----	79
"	13	-----	2
"	14	-----	33
"	15	-----	39
"	16	-----	32
"	17	-----	9
"	19	-----	1
	Total	-----	394
	Total	-----	402

Apidae:

Xylocopa virginica:

May	4	-----	1
	Total	-----	1

Bombus virginicus:

May	3	-----	1
"	12	-----	1
	Total	-----	2

Apis mellifica:

May	3	-----	1
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Apis mellifica (cont.)

May	4	-----9
"	5	-----12
"	6	-----16
"	7	-----7
"	8	-----18
"	9	-----4
"	11	-----21
"	12	-----9
"	13	-----3
"	14	-----12
"	15	-----1
"	16	-----3

Total-----116

Total-----119

Grand Total-----547

Table IX.

Summary of Table VIII.

Hemiptera:	27	2.6%
Acanthiidae-----1		
Capsidae-----17		
Pentatomidae-----7		
Corimelaenidae-----2		
Neuroptera-----1	1	
Tricoptera-----1	1	
Diptera	304	30%

Chironomidae-----	2	
Mycetophilidae-----	10	
Bibionidae-----	3	
Tabanidae-----	1	
Stratiomyidae-----	64	
Empididae-----	105	
Syrphidae-----	60	
Conopidae-----	4	
Muscidae-----	55	
Coleoptera-----	144	14%
Coccinellidae-----	48	
Dermestidae-----	75	
Elateridae-----	2	
Lampyridae-----	1	
Cerambycidae-----	13	
Chrysomelidae-----	4	
Curculionidae-----	1	
Hymenoptera-----	547	53.4%
Ichneumonidae-----	2	
Formicidae-----	10	
Vespidae-----	14	
Andrenidae-----	402	
Apidae-----	119	

This summary shows a total of 1024 specimens collected, representing six orders and twenty-seven families; but of these only thirteen families are represented by as many as ten specimens each and these thirteen

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families contain 97% of the insects collected. 61% of the insects belong to the three families Empididae, Andrenidae and Apidae and 39.2% belong to the Andrenidae alone. 2.6% belong to the Hemiptera, 30% to the Diptera, 14% to the Coleoptera, and 53.4% to the Hymenoptera. We would say from observation that these figures represent about the proportional number of the different insects working.

In conclusion it may be said that the greater proportion of the insects that work on pears belong to the Diptera and Hymenoptera and of these the Hymenoptera are far the more important.

Table X.
Kinds and dates of
insects collected on Apples in 1902.

Hemiptera:-

Acanthiidae:

May 13-----	1
" 14-----	1
" 17-----	1
Total-----	3

Capsidae:

May 6-----	2
" 12-----	5
" 15-----	2
" 17-----	2
" 19-----	2
" 21-----	2
Total-----	15

Lygaeidae:

May 7-----	1
Total-----	1

Pentatomidae:

May 6-----	1
Total-----	1

Grand Total-----20

Tricoptera:

May 8-----	1
" 12-----	1
Total-----	2

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Grand Total-----2

Lepidoptera:

May 20-----1

Total-----1

Grand Total-----1

Diptera:

Chironomidae:

May 6-----1

" 12-----1

Total-----2

Mycetophilidae:

May 12-----1

" 13-----1

" 14-----2

" 15-----2

" 16-----1

" 17-----1

Total-----8

Bibionidae:

May 12-----3

" 13-----1

" 14-----1

" 15-----2

" 16-----1

" 17-----4

" 21-----1

Total-----13

1870-1871

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1872-1873

1874-1875

1876-1877

:

:

1878-1879

1880-1881

1882-1883

:

1884-1885

1886-1887

18

1888-1889

19

1890-1891

20

1892-1893

21

1894-1895

22

1896-1897

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1898-1899

1900-1901

23

1902-1903

24

1904-1905

25

1906-1907

1908-1909

26

1910-1911

27

1912-1913

Stratiomyidae:

May	6	-----	1
"	8	-----	3
"	11	-----	1
"	12	-----	2
"	13	-----	1
"	14	-----	1
"	15	-----	3
"	16	-----	2
"	17	-----	9
"	19	-----	5
"	20	-----	4
"	21	-----	3
	Total	-----	35

Empididae:

May	11	-----	1
"	12	-----	2
"	13	-----	1
"	14	-----	10
"	16	-----	15
"	17	-----	7
"	19	-----	5
"	20	-----	7
"	21	-----	5
	Total	-----	53

Syrphidae:

May	6	-----	3
"	8	-----	3

May 11	-----3
" 12	-----2
" 14	-----3
" 15	-----2
" 16	-----1
" 17	-----1
" 19	-----2
Total	-----20

Conopidae:

May 8	-----3
" 15	-----1
"	Total-----4

Muscidae:

Tachininae:

May 11	-----1
" 15	-----2
Total	-----3

Sarcophaginae:

May 6	-----1
" 9	-----1
" 11	-----1
" 14	-----1
" 17	-----1
Total	-----5

Anthomyiinae:

May	6	-----	4
"	7	-----	1
"	8	-----	2
"	9	-----	3
"	11	-----	9
"	12	-----	10
"	14	-----	4
"	15	-----	6
"	16	-----	4
"	17	-----	5
"	20	-----	5

Total-----53

Total-----61

Grand Total-----196

Coleoptera:

Carabidae:

May	12	-----	1
"	19	-----	1

Total-----2

Coccinellidae:

Megilla maculata:

May	6	-----	1
"	7	-----	1
"	8	-----	2
"	15	-----	1
"	17	-----	1
"	19	-----	2

Total-----8

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Hippodamia 13- punctata:

May 12-----1

" 14-----2

Total-----3

Hippodamia parenthesis:

May 12-----1

Total-----1

Coccinella 9-notata:

May 7-----1

" 8-----3

" 14-----1

" 15-----1

" 17-----1

" 19-----1

" 20-----4

" 21-----2

Total-----14

Adalia frigida:

May 9-----1

" 19-----1

Total-----2

Anatis 15-punctata:

May 19-----1

Total-----1

Chilocorus bivulnerus:

May 19-----1

Total-----1

Total-----30

Dermestidae:

Anthrenus scrophulariae:

May 19-----1

" 20-----6

" 21-----1

Total-----8

Total-----8

Scarabaeidae:

May 12-----1

Total-----1

Cerambycidae;

May 19-----2

" 20-----3

Total-----5-

Grand Total-----46

Hymenoptera:

Ichneumonidae:

May 16-----1

" 17-----1

Total-----2

Formicidae:

May 15-----1

" 20-----1

Total-----2

Vespidae:

Polistes:

May 7-----1

" 20-----1

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Total-----2

Total-----2

Andrenidae:

Nomada:

May 20-----3

" 21-----1

Total -----4

Agapostemon:

May 8-----1

" 12-----1

" 15-----1

" 17-----2

" 19-----9

" 20-----4

Total-----18

Unidentified:

May 6-----8

" 7-----5

" 8-----90

" 11-----7

: 1000000

: 1000000

: 1000000

: 1000000

Unidentified (cont.)

May 12-----63

" 14-----20

" 15-----46

" 16-----41

" 17-----65

" 19-----108

" 20-----71

" 21-----16

Total-----540

Total-----562

Apidae:

Xylocopa virginica:

May 8-----2

Total-----2

Bombus Virginicus:

May 6-----4

" 7-----6

" 8-----4

" 9-----5

" 11-----2

" 12-----5

" 14-----2

" 15-----2

" 16-----2

" 17-----6

Bombus Virginicus (cont.)

May 19-----2

" 20-----2

" 21-----2

Total-----44

Bombus separatus:

May 7-----1

" 12-----1

" 14-----1

" 15-----5

" 16-----3

" 17-----1

Total-----12

Bombus pennsylvanicus:

May 8-----1

" 11-----1

" 14-----1

" 16-----3

" 17-----1

" 19-----1

" 20-----1

Total-----9

Bombus feridus:

May 15-----2

" 17-----2

" 19-----1

" 20-----1

Total-----6

Apis mellifica:

May	6	-----	6
"	7	-----	8
"	8	-----	5
"	9	-----	4
"	11	-----	20
"	12	-----	28
"	13	-----	1
"	14	-----	21
"	15	-----	40
"	16	-----	39
"	17	-----	44
"	19	-----	11
"	20	-----	10

Total-----237

Unidentified:

May	16	-----	1
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Total-----1

Total-----311

Grand Total-----879

Table XI.

Summary of Table X.

Hemiptera:-----	20	1.7%
Acanthiidae-----	3	
Capsidae-----	15	
Lygaeidae-----	1	
Pentatomidae-----	1	
Tricoptera-----	2-----2	
Lepidoptera-----	1-----1	
Diptera-----	196	17.1%
Chironomidae-----	2	
Mycetophilidae-----	8	
Bobionidae-----	13	
Stratiomyidae-----	35	
Empididae-----	53	
Syrphidae-----	20	
Conopidae-----	4	
Muscidae-----	61	
Coleoptera-----	46	4.%
Carabidae-----	2	
Coccinellidae-----	30	
Dermestidae-----	8	
Scarabaeidae-----	1	
Cerambycidae-----	5	
Hymenoptera-----	879	76.9%
Ichneumonidae-----	2	
Formicidae-----	2	

Hymenoptera-(cont.)

Vespidae-----2
Andrenidae-----562
Apidae-----3111

This summary shows a total of 1144 specimens collected representing six orders and twenty-four families; but of these only nine families are represented by as many as ten specimens each, and these nine families contain 96.1% of the insects collected. 49.1% belong to the Andrenidae and 27.2% to the Apidae. 1.7 belong to the Hemiptera 17.1% to the Diptera, 4.% to the Coleoptera and 76.9% to the Hymenoptera.

From observations we would say that these figures are inaccurate so there was apparently as many Apidae as Andrenidae working. The difference in numbers collected is probably due to difference in the habits of the two families making necessary different methods of collecting. The Andrenidae generally work high up on the trees and are easily disturbed. They were caught mainly by shaking the trees and then sweeping with a long handled net. The Apidae on the other hand work about equally on all parts of the trees but are not easily disturbed and so were collected for the most part individually.

Tables IX and XI combined showing in parallel columns the families of insects that worked on the two fruits in 1902.

Pears	No. of specimens	Apples	No. of specimens
Hemiptera 2.6%	27	Hemiptera 1.7%	20
Acanthiidae	1	Acanthiidae	3
Capsidae	17	Capsidae	15
		Lygaeidae	1
Pentatomidae	7	Pentatomidae	1
Corimelaenidae	2		
Neuroptera	1		
Tricoptera	1	Tricoptera	2
		Lepidoptera	1
Diptera 30%	304	Diptera 17.1%	196
Chironomidae	2	Chironomidae	2
Mycetophilidae	10	Mycetophilidae	8
Bibionidae	3	Bibionidae	13
Tabanidae	1		
Stratiomyidae	64	Stratiomyidae	35
Empididae	105	Empididae	53
Syrphidae	60	Syrphidae	20
Conopidae	4	Conopidae	4
Muscidae	55	Muscidae	61
Coleoptera 14%	144	Coleoptera 4%	46
		Carabidae	2
Coccinellidae	48	Coccinellidae	30

Pears	No. of specimens		Apples	No. of specimens
Dermeestidae	75	'	Dermeestidae	8
Elateridae	2	'		
Lampyridae	1	'		
		'	Scarabaeidae	1
Cerambycidae	13	'	Cerambycidae	5
Chrysomelidae	4	'		
Curculionidae	1	'		
Hymenoptera 53.4%	547	'	Hymenoptera 76.9%	879
Ichneumonidae	2	'	Ichneumonidae	2
Formicidae	10	'	Formicidae	2
Vespidae	14	'	Vespidae	2
Andrenidae	402	'	Andrenidae	562
Apidae	119	'	Apidae	311
		'		
		'		
		'		
		'		

We find nearly the same number of families on both pears and apples, but some families work on pears and not on apples and vice verse.

Three families of Hemiptera were found on both pears and apples. One family represented by two specimens was found on pears and not on apples. One family represented by one specimen was found on apples and not on pears.

One specimen of Neuroptera was collected on pears and none on apples.

Tricoptera were found on both pears and apples.

One specimen of Lepidoptera was collected on apples and a few others were seen, but none were observed on pears

Nine families of Diptera were collected on pears, only one of which was not found on apples.

Seven families of Coleoptera were collected on pears, only one of which was found on apples. One family represented by one specimen was found on apples and not on pears. The families of Coleoptera not common to both pears and apples were not abundant.

Five families of Hymenoptera were collected on both fruits.

By a further comparison of these summaries we find that the percent of Hemiptera is about one-half greater on pears than on apples. The proportion of Diptera is considerably greater on pears than on apples. There were three and one-half times as many Coleoptera on pears as on apples. The Hymenoptera however, were far more abundant on apples than on pears.

A classification of the insects on the two
fruits in 1902 according to character
of work done in pollination.

A. Insects that carry pollen only accidentally.

I. Those that get on the flowers only accidentally.

	Pears	Apples.
Hemiptera		
Acanthiidae	1	3
Lygaeidae		1
Pentatomidae	7	1
Neuroptera	1	
Tricoptera	1	2
Diptera		
Chironomidae	2	2
Mycetophilidae	10	8
Tabanidae	1	
Coleoptera		
Carabidae		2
Coccinellidae	48	30
Elateridae	2	
Lampyridae	1	
Scarabaeidae		1
Cerambycidae	13	5
Chrysomelidae	4	
Curculionidae	1	
Hymenoptera		
Ichneumonidae	<u>2</u>	<u>2</u>
	94 9.1%	57 5.1%

II. Those that visit the flowers systematically
but carry pollen only accidentally.

	Pears	Apples
Hemiptera		
Capsidae	17	15
Corimilaenidae	2	
Lepidoptera		1
Diptera		
Bibionidae	3	13
Stratiomyidae	64	35
Empididae	105	53
Syrphidae	60	20
Conopidae	4	4
Muscidae	55	61
Coleoptera		
Dermestidae	75	8
Hymenoptera		
Formicidae	10	2
Vespidæ	<u>14</u>	<u>2</u>
Total	409 39.9%	214 18.7%

B. Those that visit flowers and carry pollen systematically.

	Pear	Apple
Hymenoptera		
Andrenidae	402	562
Apidae	<u>119</u>	<u>311</u>
	521 50.8%	873 76.3%

From this table we see that the only insects that are of any practical value to the orchardist in assisting in pollination are the Andrenidae and Apidae.
The proportion of the different classes can readily be seen from the table.

Table XIV.

Dates and families of insects collected together
with weather reports for 1902.

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 2			9	62.3°	25%	7-9 A.M.	W.15
						.09	
	Diptera	Syrphidae	3				
		Syrphidae	3				
	Hymenoptera		6				
		Andrenidae	6			night	S.E.14
May 3			66	61.°	100%	.54	
	Hemiptera		2				
		Capsidae	1				
		Pentatomidae	1				
	Neuroptera		1				
	Diptera		3				
		Stratiomyidae	1				
		Empididae	1				
		Syrphidae	1				
	Coleoptera		23				
		Coccinellidae	1				
		Dermetidae	22				
	Hymenoptera		38				
		Ichneumonidae	1				
		Formicidae	1				
		Vespidae	1				
		Andrenidae	33				
		Apidae	2				

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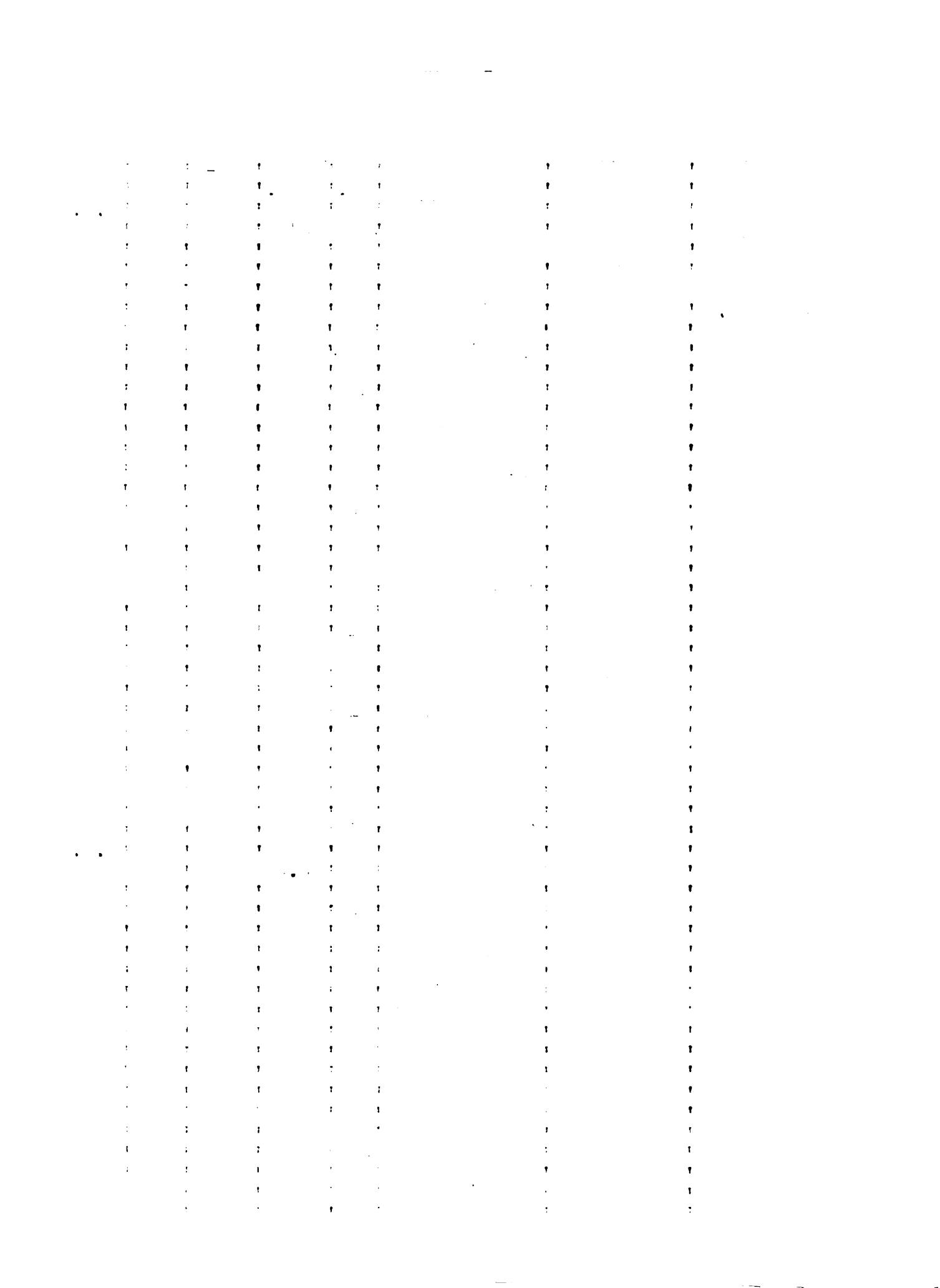
[illegible]

Date	Order	Family	No.	Temp.	Sun-shine	Rain	Wind
May 4			44	62.3°	100%	.08	W.6
	Hemiptera		2				
		Pentatomidae	1				
		Corimelaenidae	1				
	Diptera		4				
		Mycetophilidae	2				
		Syrphidae	2				
	Coleoptera		2				
		Coccinellidae	1				
		Chrysomelidae	1				
	Hymenoptera		36				
		Formicidae	1				
		Vespidae	2				
		Andrenidae	24				
		Apidae	9				
May 5			78	58.1°	50%	0	N.5
	Hemiptera		4				
		Capsidae	3				
		Pentatomidae	1				
	Diptera		19				
		Stratiomyidae	6				
		Empididae	3				
		Syrphidae	7				
		Conopidae	1				
		Muscidae	2				

[illegible]

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 6	Coleoptera		4				
		Coccinellidae	2				
		Cerambycidae	2				
	Hymenoptera		51				
		Formicidae	2				
		Vespidae	3				
		Andrenidae	32				
		Apidae	12				
			75	60.6°	15%	Day .65	S.9
	Hemiptera		6				
		Capsidae	4				
		Pentatomidae	2				
	Tricoptera		1				
	Diptera		16				
		Chironomidae	2				
		Stratiomyiidae	2				
		Empididae	1				
		Syrphidae	6				
		Muscidae	5				
	Coleoptera		7				
		Coccinellidae	7				
	Hymenoptera		46				
		Andrenidae	20				
		Apidae	26				

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 7			58	53°		.80	N.W. 10
	Hemiptera		3				
		Capsidae	2				
		Lygaeidae	1				
	Diptera		10				
		Stratiomyidae	5				
		Syrphidae	2				
		Muscidae	3				
	Coleoptera		14				
		Coccinellidae	13				
		Elateridae	1				
	Hymenoptera		31				
		Ichneumonidae	1				
		Vespidae	1				
		Andrenidae	7				
		Apidae	22				
May 8			273	63.3°	100%	0	S.W. 16
	Hemiptera		3				
		Capsidae	2				
		Pentatomidae	1				
	Tricoptera		1				
	Diptera		54				
		Mycetophilidae	1				
		Stratiomyidae	14				
		Syrphidae	23				
		Conopidae	3				



Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 8		Muscidae	13				
	Coleoptera		8				
		Coccinellidae	8				
	Hymenoptera		207				
		Andrenidae	177				
		Apidae	30				
May 9			25	43.3°	90%	0	N.W.4
	Hemiptera		2				
		Capsidae	2				
	Diptera		8				
		Stratiomyidae	1				
		Empididae	1				
		Syrphidae	1				
		Muscidae	5				
	Coleoptera		2				
		Coccinellidae	2				
	Hymenoptera		13				
		Apidae	13				
May 10				36.3°	0	.35	N.E.6
May 11			96	48.3°	100%	0	N.4
	Hemiptera		1				
		Capsidae	1				
	Diptera		34				
		Stratiomyidae	1				
		Empididae	3				
		Syrphidae	12				
		Muscidae	18				

1. The first part of the document is a list of names and addresses, which are arranged in a table-like format. The names are listed in the first column, and the addresses are listed in the second column. The names are: John Doe, Jane Smith, and Bob Johnson. The addresses are: 123 Main St, 456 Elm St, and 789 Oak St.

2. The second part of the document is a list of names and addresses, which are arranged in a table-like format. The names are listed in the first column, and the addresses are listed in the second column. The names are: John Doe, Jane Smith, and Bob Johnson. The addresses are: 123 Main St, 456 Elm St, and 789 Oak St.

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Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 11	Coleoptera		1				
		Coccinellidae	1				
	Hymenoptera		60				
		Andrenidae	16				
		Apidae	44				
May 12			278	59°	100%	Night .37	S.E.3
	Hemiptera		8				
		Capsidae	8				
	Tricoptera		1				
	Diptera		58				
		Chironomidae	1				
		Mycetophilidae	4				
		Bibionidae	3				
		Stratiomyidae	5				
		Empididae	21				
		Syrphidae	7				
		Conopidae	2				
		Muscidae	15				
	Coleoptera		18				
		Carabidae	1				
		Coccinellidae	9				
		Dermestidae	5				
		Lampyridae	1				
		Scarabaeidae	1				
		Cerambycidae	1				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 12	Hymenoptera		193				
		Formicidae	3				
		Vespidae	2				
		Andrenidae	145				
		Apidae	43				
May 13			39	53°	12%	0	N.E.4
	Hemiptera		1				
		Acanthiidae	1				
	Diptera		29				
		Mycetophilidae	4				
		Bibionidae	2				
		Stratiomyidae	3				
		Empididae	16				
		Syrphidae	1				
		Muscidae	3				
	Coleoptera		2				
		Coccinellidae	1				
		Dermeestidae	1				
	Hymenoptera		6				
		Andrenidae	2				
		Apidae	4				
May 14			175	52°	100%	0	N4
	Hemiptera		2				
		Acanthiidae	2				

[illegible]

Date	Order	Family	No.	Temp	Sun- shine	Rain	Wind
May 14	Diptera		69				
		Mycetophilidae	3				
		Bibionidae	3				
		Stratiomyidae	9				
		Empididae	36				
		Syrphidae	6				
		Muscidae	12				
	Coleoptera		13				
		Coccinellidae	8				
		Dermestidae	2				
		Cerambycidae	2				
		Chrysomelidae	1				
	Hymenoptera		91				
		Formicidae	1				
		Andrenidae	53				
		Apidae	37				
May 15			208	55.6°	100%	0	N.E. 4
	Hemiptera		2				
		Capsidae	2				
	Diptera		54				
		Mycetophilidae	2				
		Bibionidae	2				
		Tabanidae	1				
		Stratiomyidae	8				
		Empididae	18				
		Syrphidae	5				
		Conopidae	2				
		Muscidae	16				

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Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 15	Coleoptera		13				
		Coccinellidae	4				
		Dermestidae	8				
		Cerambycidae	1				
	Hymenoptera		139				
		Formicidae	1				
		Vespididae	2				
		Andrenidae	86				
		Apidae	50				
May 16			216	58°	100%	0	S.2
	Hemiptera		3				
		Capsidae	1				
		Pentatomidae	2				
	Diptera		62				
		Mycetophilidae	1				
		Bibionidae	1				
		Stratiomyidae	17				
		Empididae	18				
		Syrphidae	1				
		Muscidae	24				
	Coleoptera		26				
		Coccinellidae	21				
		Elateridae	1				
		Cerambycidae	3				
		Chrysomelidae	1				
	Hymenoptera		125				

[illegible]

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 16							
		Formicidae	1				
		Vespidae	1				
		Andrenidae	73				
		Apidae	50				
May 17			215	66.3°	95%	0	S.W.4
	Hemiptera		4				
		Acanthiidae	1				
		Capsidae	2				
		Corimelaenidae	1				
	Diptera		50				
		Mycetophilidae	1				
		Bibionidae	4				
		Stratiomyidae	15				
		Empididae	20				
		Syrphidae	1				
		Muscidae	9				
	Coleoptera		27				
		Coccinellidae	3				
		Dermeestidae	20				
		Cerambycidae	2				
		Chrysomelidae	1				
		Curculionidae	1				
	Hymenoptera		134				
		Ichneumonidae	1				

Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 17							
		Formicidae	1				
		Andrenidae	78				
		Apidae	54				
May 18				69°	0	Day .93	S.3
May 19			163	76.3°	100%	0	S.6
	Hemiptera		2				
		Capsidae	2				
	Diptera		15				
		Stratiomyiidae	5				
		Empididae	8				
		Syrphidae	2				
	Coleoptera		13				
		Carabidae	1				
		Coccinellidae	6				
		Dermostidae	2				
		Cerambycidae	4				
	Hymenoptera		133				
		Andrenidae	118				
		Apidae	15				
May 20			124	73.3		0	N.E.4
	Lepidoptera		1				
	Diptera		16				
		Stratiomyiidae	4				
		Empididae	7				
		Muscidae	5				

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Date	Order	Family	No.	Temp.	Sun- shine	Rain	Wind
May 20	Coleoptera		13				
		Coccinellidae	4				
		Dermostidae	6				
		Cerambycidae	3				
	Hymenoptera		94				
		Formicidae	1				
		Vespidae	1				
		Andrenidae	78				
		Apidae	14				
May 21			30	70.3	80%	1-2 P.M. S.W.9 .13	
	Diptera		8				
		Stratiomyidae	3				
		Empididae	5				
	Coleoptera		3				
		Coccinellidae	2				
		Dermostidae	1				
	Hymenoptera		19				
		Andrenidae	17				
		Apidae	2				

Figure 1

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Conclusions.

Hemiptera.--The number of specimens is so small that no conclusions can be drawn with reference to the effect of weather on this order.

Diptera.--The higher the temperature and the greater the percent of sunshine the more Diptera found. They do not fly during rain, but begin work soon after.

Coleoptera.--The higher the temperature the more specimens found. No relation between sunshine and specimens.

Hymenoptera.--The warmer the day the more specimens found. Sunshine same as temperature. Rainfall lessens number of specimens found. The velocity of wind apparently has no effect, but its temperature has.

Other things being equal the higher the temperature and more the sunshine the greater the number of insects found.

Table XV.

Number and Families of insects collected on
pears in 1901 and 1902.

	1901		1902
Hemiptera 14%	64	2.6%	27
Acanthiidae			1
Capsidae	24		17
Pentatomidae			7
Corimelaenidae	40		2
Neuroptera			1
Tricoptera			1
Diptera 29%	125	30%	304
Tipulidae	1		
Culicidae	1		
Chironomidae	2		
Bibionidae	5		3
Tabanidae			1
Stratiomyiidae	27		64
Empididae	57		105
Syrphidae	2		60
Conopidae	9		4
Muscidae	30		55
Coleoptera 17%	78	14%	144
Pselaphidae	22		
Coccinellidae	35		48
Dermestidae	8		75

	1901		1902
Coleoptera (Cont.)			
Elateridae			2
Lampyridae	1		
Scarabaeidae	2		
Cerambycidae	1		13
Chrysomelidae	7		4
Bruchidae	1		
Curculionidae			1
Hymenoptera 40%	191	53.4%	547
Ichneumonidae			2
Braconidae	1		
Formicidae			10
Vespidae	5		14
Andrenidae 35%	164	39.2%	402
Apidae 4.5%	21	11.6%	119.
Total	458		1024

Coleoptera (cont.)	1901		1902
Coccinellidae	45		30
Dermestidae			8
Cleridae	1		
Scarabaeidae	1		1
Cerambycidae			5
Hymenoptera 61%	361	76.9%	879
Ichneumonidae			2
Formicidae	8		2
Vespidae	2		2
Andrenidae 46%	272	49.1%	562
Apidae 13%	79	27.2%	311
Total	592		1144

The proportionate number of insects collected in 1901 and 1902 on both fruits can readily be seen from the two preceeding tables.

General Conclusions.

The Hymenoptera are the most important insects in effecting cross-pollination of pears and apples.

The Hemiptera, Diptera and Coleoptera are found quite commonly on the two fruits but their work is insignificant compared with that done by the Hymenoptera.

The Apidae and Andrenidae, are the only two families of Hymenoptera that visit flowers and carry pollen systematically and hence the only ones of practical importance in this work.

In general about the same insects work on the two fruits.

The Apidae work more freely on apples than on pears.

The Diptera are found more abundantly on pears than on apples.

Insects are very sensitive to changes of temperature and rain.

General Observations.

Andrenidae were more abundant in proportion to the Apidae in 1901 than 1902.

Although the specimens captured do not show it we believe the Apidae and Andrenidae about equal in numbers on apples in 1902.

Andrenidae were more abundant than Apidae on the pears both years.

Bombus were much more abundant in 1902 than 1901.

Corimelaenidae were much more abundant in 1901 than in 1902.

Dermestidae were more abundant in 1902 than in 1901.

We believe the Andrenidae are much more abundant than is commonly supposed.

From the number of insects observed we would say that, in this locality, there are enough insects to pollinate a sufficient number of the flowers to insure a crop.

Bibliography.

In looking up the literature on this subject we find that very little work has been done directly on the topic in hand; considerable has been accomplished, however, showing the necessity of cross-pollination.

Following are the principal references:-

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1. The first group of people who are not in the labor force are those who are not in the labor force because they are not in the labor force.

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