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Sex and Environmental Effects on Chemical Signals of Gryllus rubens

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Abstract

Many animals communicate with one another in the context of reproduction, utilizing different modalities. In some cases, more than one modality is used by the sender and receiver. Each modality can provide different sets of information, or function in a different context. Importantly, no matter the modality, the signals should be clearly distinguishable between males and females and need to be reliable even in the face of environmental changes.

In field crickets, there are two major modes of communication. For long-range communication, the males produce acoustic signals to attract females. At short-range, chemical communication involving cuticular hydrocarbons (CHCs) in males and females are added as a communication modality to acoustic signals. The cricket *Gryllus rubens* has a spring and a fall generation in Kentucky and the long-range acoustic signal shows substantial differences between the generations as the result of seasonal temperatures during development (phenotypic plasticity). Even though much is known about acoustic signals and their plasticity, very little is known about chemical communication in crickets and if these short-range signals display phenotypic plasticity related to seasonal temperatures.

I hypothesized that CHCs differ between males and females to allow for distinction between the sexes and that the CHC signature is also affected by environmental changes. I collected CHCs from the body surface of male and female *Gryllus rubens* crickets and analyzed the chemical composition of each individual. My results showed substantial differences in chemical composition of CHCs of males and females and between generations, indicating phenotypic plasticity. More specifically, I detected differences in the range of CHC compounds as well as peak abundances in my sex and generation specific comparisons. I discuss potential explanations and ramifications of this plasticity in the context of natural and sexual selection.

Table of Contents

Introduction	1-3
Methods	4-6
Results	6-9
Discussion	9-12
References	13-17
Appendix	18-48

Introduction

Communication is ubiquitous throughout the animal kingdom. Communication is used to send information from one organism to another, such as ground squirrels using alarm calls to signal danger (Green and Marler, 1979). Communication is important in many different contexts of animal behavior including the establishment of social relationships, social hierarchies, mating behavior, territory allocation, and caring for young (Demartsev et al., 2022).

There are different modalities for communication, which are used on a contextual basis. Typically, there is a long-range mode of communication, and a short-range mode of communication (Simmons et al., 2016). Both are used in the contexts of aggression and mating (Nagamoto et al., 2005). Long-range communication can often be seen in the form of acoustic signals, such as in birds and insects (Richards and Wiley, 1980; Schmidt and Balakrishnan, 2015), whereas in short-range communication chemical signals become more important, which can be seen in many insects (Maroja et al., 2014).

Communication is especially important in the context of reproduction. One sex usually produces the signal, and the other sex receives the signal (Ryan, 1990). In most cases the male is the one that signals, while the female receives the signal and uses it to identify the correct species, sex, location, and quality of the signaler (Tyler et al., 2015). In some instances, both sexes communicate with each other (Robinson et al., 1986) either during long-range, short-range, or both types of communication.

The long-range signal attracts the females from a distance while the short-range signal gives the female more information about the male (Harrison et al., 2013). Long-range signals are necessary because individuals are scattered in a given environment and the female will not always be near the male. These two signal types can use different sensory modalities, such as acoustic, chemical, vibrational, or visual ones (Leonhardt and Menzel et al., 2016). Many insects use acoustic signals to communicate over long distances (Balakrishnan, 2016). Certain species of *Drosophila* females use powerful pheromones that function as long-range communication to males (Lebreton et al., 2017). Short-range signals provide more detailed information to the female once she approaches the male. In crickets, a long-range call is followed by courtship calls at close proximity that provide more detailed information on the quality of the male (Simmons et al., 2013). The brown-winged stink bug, (*Edessa meditabunda*), utilizes vibrations to communicate at close distances (Silva and Cleonor et al., 2012). This additional information is used by the female for mate choice.

Environmental conditions can affect mating signals (Whitesell and Walker, 1978) as a result of phenotypic plasticity. Phenotypic plasticity is defined as the change of the phenotype without changing the genotype as the result of changing environmental conditions (Dewitt and Andrew et al., 1998). In insects, phenotypic plasticity of communication signals is documented in only a few organisms (*Gryllus rubens*, *Neoconocephalus triops*; Beckers, 2020; Beckers and Schul, 2008; Grace and Shaw, 2004). Even though most of the information on signal plasticity is related to long-range signals, short-range signals can be affected by the environment as well. However, very little is known about phenotypic plasticity of short-range signals in insects.

In crickets specifically, there are three demonstrated male signals: a long-range call, a courtship call, and a chemical signal (Simmons et al., 2016). The long-range call is used to bring the female to the male, while the courtship call and the chemical signals can play a role for female mate choice (Steiger et al., 2013). These chemical signals are also prone to phenotypic plasticity, with the diet affecting these signals in crickets (Rapkin et al., 2016). Also, the social environment can affect the chemical composition of the crickets. For example, male crickets who lose fights with other males will change their chemical profiles to match those of subordinate males (Thomas and Simmons, 2011).

In crickets, this chemical signal is based on cuticular hydrocarbons (CHCs). Cuticular hydrocarbons are chains of carbons and hydrogen that coat the cuticles of insects. Insects synthesize these CHCs via specialized cells called oenocytes (Chung and Carroll, 2015). Insects are able to adjust their CHCs based on biotic and abiotic factors (Otte et al., 2018). These CHCs have a range of functions. One of the main functions of these hydrocarbons is the prevention of desiccation (Thomas and Simmons, 2011). The second function of these compounds is the passing of information. Females use these signals to determine sex, species, quality of mate, and genetic compatibility (Steiger et al., 2013; Simmons et al., 2013; Tyler et al., 2015; Mullen et al., 2006). These signals also allow the female to identify previously encountered males. Females can detect their own CHC signatures on males and prefer to mate with novel ones to diversify the genetic make-up of her offspring (Weddle et al., 2013).

In my study, I focused on the field cricket *Gryllus rubens* that displays long- and short-range communication. These crickets exhibit phenotypic plasticity in their long-range calls (Beckers, 2020). However, not much is known of phenotypic plasticity of the short-range CHCs in this species. Crickets use their antennae and maxillary palpi as sensory organs to receive these chemical signals (Nagamoto et al., 2005). I hypothesized that the sex and rearing environment (season) affect the CHC composition of the cricket generations. I predicted that males and females differ primarily in the length of hydrocarbons present and that the CHC composition differs between spring and fall generations that experience substantially different conditions.

Methods

Animals

I collected male and female crickets on the campus of Murray State University in the spring of 2019 (May 8) and 2020 (April 8 and April 30) and fall of 2019 (August 13 and September 4 and 11). I kept the animals in a collection vial (50ml; Falcon brand) overnight and extracted the CHCs on the next day.

CHC extraction

I placed each cricket into a 20 mL glass vial and added a small piece of frozen CO_2 to kill the cricket. After euthanasia, I added 2 mL of ACS-grade heptane (Pharmco brand) to the vial and allowed it to sit for 7 minutes. I then pipetted the supernatant liquid into a round bottom flask (25 mL; Ace Glass). I then placed the flask into a rotary evaporator (Heidolph brand) at 38ºC until the fluid evaporated. I added 0.5 mL of heptane back into the round bottom flask and transferred this mixture of the CHCs and heptane into a 2 mL screw cap vial (Agilent Technologies brand). I placed the vial into a freezer until analysis of the CHCs.

CHC analysis protocol

For analysis of the hydrocarbons, I placed 1 mL of each sample into a GC-MS vial (2 mL; Agilent Technologies brand). Gas Chromatography-Mass Spectrometry was carried out with electron impact spectra of 70 eV detected with a mass selective detector (Agilent, 5975 C), a gas chromatograph (Agilent 7890A), and a DB-1 mass column. For analysis, a constant flow mode of 1.1 mL per minute was used with a temperature program that started at 100°C for one minute and increased in increments of 20°C each minute until it reached 250°C. Then, it increased in 5°C increments until it reached the maximum temperature of 320°C, which was sustained for 2 minutes. The transfer line was held at 300°C (Tyler et al., 2015). The hydrocarbon peaks were identified based on their respective retention times (RT) and the mass spectra of the compounds. The retention time indicates how long it takes from when the compound is injected into the chromatography column until it is detected. I used a cutoff of 16 minutes and a level of 600,000 for retention time and peak abundance level, respectively. I describe the CHC composition of the crickets using retention times and peak abundance levels.

Data analysis

This study is descriptive in nature, and for compound identification, I used the RI library from the National Institute of Standards and Technology (NIST) database. This is a library of known compound mass spectra. The program takes the mass spectrum of each individual signal and matches it to spectra from the library. Specifically for the results, I used the relative peak area of the compounds. This percentage is standardized from the peak area of each compound. To standardize, the area of each compound was divided by the sum of the area of the other compounds for a specific animal. I then recorded the relative percent area of each compound that correlated to each specific chain length (e.g., C_{20}, C_{21}, C_{22}, etc.) for each animal. I averaged these numbers to get an average relative abundance percentage of all chain lengths for each cricket. I then took these averages and calculated a grand average across all the animals for each chain length; this grand average is shown in all figures. I then compared fall males and fall females, spring males and spring females, fall males and spring males, and fall females and spring females. I described the presence and absence of compounds between males, females, and treatments to identify differences in sex and environmental effects. I focused the descriptive analysis on compounds that all (n-2) animals had for a representative comparison. For example, the fall females had a sample size of 8, carbon chains with 6 or more animals were used for comparison in the Results section. For a complete list of all identified compounds see appendix (Tables 1-40).

Results

Sex specific differences in CHC profiles

The CHC profile of fall males (Fig. 1) and females (Fig. 2) included compounds with chain lengths ranging from C_{20} to C_{36}. For fall males (Fig. 1), almost all individuals had peaks at each carbon chain length across the whole range, whereas fall females had fewer compounds that were shared across most individuals (Fig. 2). Almost all fall females had peaks at C_{22} and C_{23}, C_{27} to C_{31}, and C_{35}, whereas almost all males had peaks for chain length ranging from C_{20} to C_{35}. Thus, in the fall generation, males had a more complex range of CHCs than females.

In the spring generation, males and females (Fig. 3 and 4) had compounds that ranged from C_{21} to C_{25}. Almost all females had peaks at C_{21}, C_{22}, and C_{24}, while most of the males only had a peak at C_{21} (Fig. 3). The relative abundance of the compounds of males was almost double that of the females for the C_{21} compounds. In the spring generation, females showed a more complex range of CHCs, but at a lower relative abundance (Fig. 4).

Treatment-specific differences in CHC profiles

The CHC profile of fall females (Fig. 2) was more complex than that of spring females (Fig. 4). Fall females shared more compounds (8) across most individuals than spring females (3) and the overall range of chain lengths was much wider in fall females (C_{20} to C_{36}) compared to spring females (C_{21} to C_{24}). The spring females (Fig. 4) also had higher abundances when compared to the fall females (Fig. 2). The highest abundance for the fall females was 4.4% while the highest for the spring females was 23.8% (Fig. 2 and 4).

Fall males (Fig. 1) had a much more complex CHC profile compared to the spring males (Fig. 3). Fall males had peaks ranging from C_{20} to C_{34} while the spring males only had a peak at a chain length of C_{21}. The spring males had a much higher average abundance in C_{21}, 48% (Fig. 3) compared to the fall males, 1.7% (Fig. 1). Fall males showed a greater level of complexity in CHC composition while the spring males showed a higher abundance.

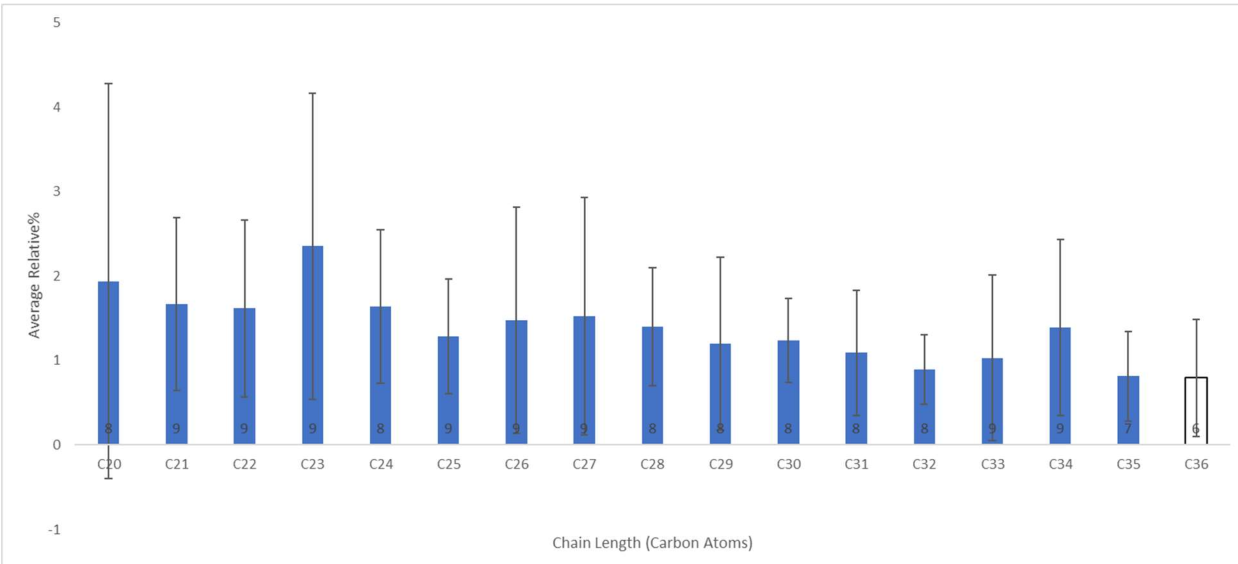

Figure 1: Average relative abundance (%; ± st. dev.) of CHCs of different carbon chain lengths of nine fall-collected males. Sample size for each compound is indicated at the bottom of each bar. Blue bars represent chain lengths that all (n-2) animals had.

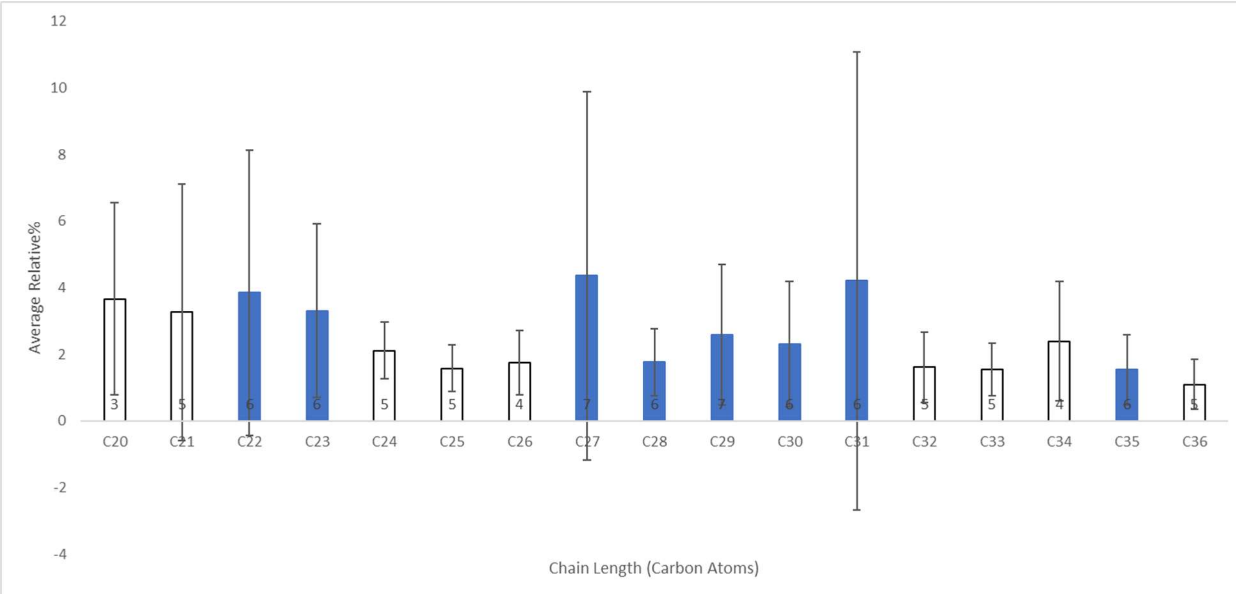

Figure 2: Average relative abundance (%; ± st. dev.) of CHCs of different carbon chain lengths of eight fall-collected females. Sample size for each compound is indicated at the bottom of each bar. Blue bars represent chain lengths that all (n-2) animals had.

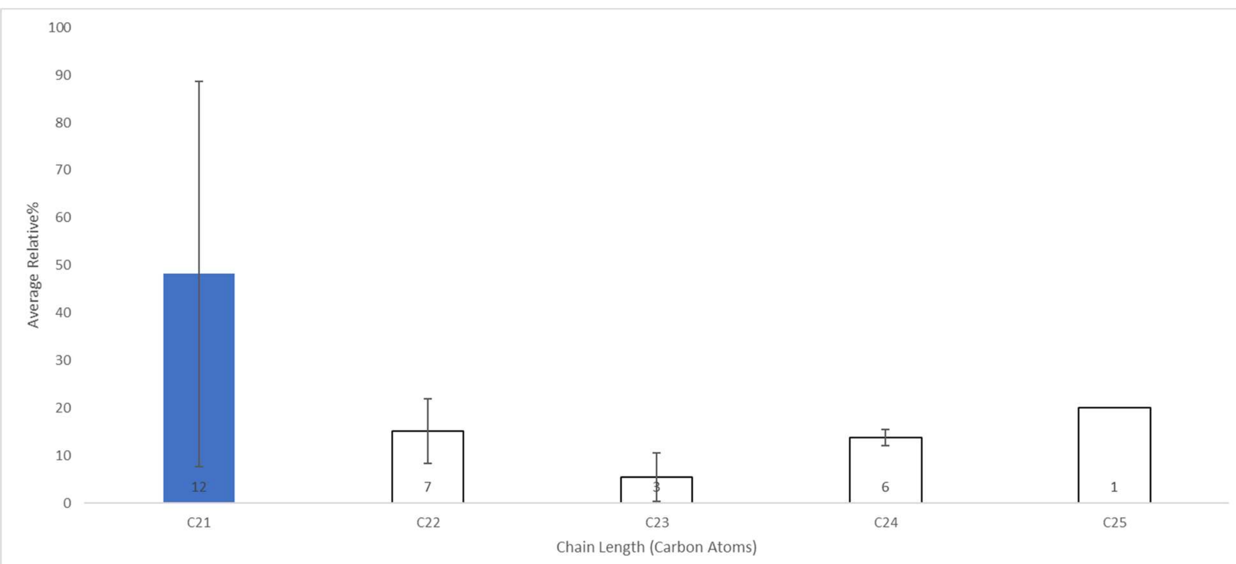

Figure 3: Average relative abundance (%; ± st. dev.) of CHCs of different carbon chain lengths of twelve spring-collected males. Sample size for each compound is indicated at the bottom of each bar. Blue bars represent chain lengths that all (n-2) animals had.

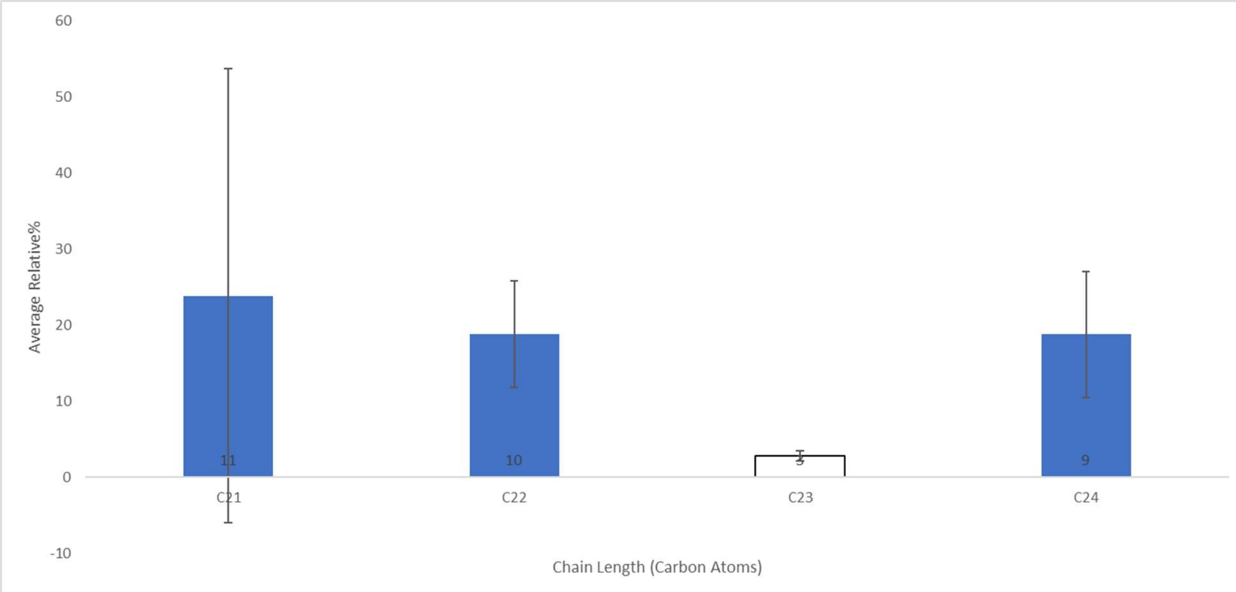

Figure 4: Average relative abundance (%; ± st. dev.) of CHCs of different carbon chain lengths of eleven spring-collected females. Sample size for each compound is indicated at the bottom of each bar. Blue bars represent chain lengths that all (n-2) animals had.

Discussion

I found that male and female crickets differed in both CHC range and representative peak chain lengths, i.e., there were sex-specific differences in the CHC profiles. I also found differences in the CHC range and peak chain length between generations, i.e., CHC profiles showed phenotypic plasticity. Thus, both of my hypotheses were supported by the data.

Phenotypic plasticity in CHCs

Long-range acoustic signals display phenotypic plasticity in *G. rubens* (Beckers, 2020), and my results suggest that there is plasticity in the short-range, chemical communication as well. Phenotypic plasticity of CHCs in crickets can be caused by different environmental inputs.

For example, CHCs of male *Teleogryllus oceanicus* can change in conjunction with, or because of the change in the acoustic environment (Pascoal et al., 2015). In this study (Pascoal et al., 2015), males were exposed to calling or not calling males. Males that were exposed to calling males changed their CHC composition compared to males not exposed to calling males. The CHCs were shown to change in their overall variation in terms of peaks. In another study, (Thomas et al., 2011), male *Teleogryllus oceanicus* crickets changed their CHCs in the absence of calls, with males changing their CHCs to match those that previously led to successful mating. Specifically, their CHCs changed to those that were shown to lessen the length of a courtship song and still lead to mating (Thomas et al., 2011).

Dietary environment can also affect the CHCs of crickets, particularly when it comes to carbohydrates and proteins as shown in a study of *Gryllodes sigillatus* (Rapkin et al., 2016). Similarly, the food resources available in the spring and the fall likely differed as well, possibly may have resulted in changes in the CHC compositions of *G. rubens* between generations. The overall temperature could also have induced CHC plasticity. The crickets that developed in the fall experienced much warmer conditions than the ones in the spring and temperature relates to one of the CHC's main purposes across the insects: prevention of desiccation (Thomas and Simmons, 2011). CHCs are typically long chain hydrocarbons, which are very stable compounds with high boiling points (Kudchadker and Zwolinski, 1996). This makes sense when comparing the chain lengths of the spring and fall animals: the fall animals that experience warmer temperatures, had longer chain lengths (more carbons) than the spring animals. Thus, CHC plasticity could be the result of experienced environmental conditions related to desiccation rather than an evolved difference in the context of communication. Besides this phenotypic plasticity, there must be some sex-specific differences in CHCs that can be used to differentiate males from females.

Plasticity could pose a problem in communication. Signals should not change, since this could interfere with species identification, which could disrupt matings with conspecifics or cause mating with heterospecifics. Communication could break down if there is too much difference between male signals and female signal recognition or signal preferences. However, in long-range communication that does exhibit substantial signal plasticity, spring females prefer spring signals and fall females prefer fall signals, allowing communication to happen (Beckers, 2020). Thus, parallel plasticity in signals and preferences allows for it to work and future experiments could test if females also display preference plasticity for CHCs.

Sex specific differences in CHCs

I found sex-specific differences in CHCs, with males tending to have a greater variety of chain lengths compared to females (fall) and vice versa in the spring. Other cricket species display sex-specific differences in their CHC composition as well. For example, several *Laupala* cricket species showed significant differences in gas-chromatography peaks between the sexes (Mullen et al., 2006).

More identifying carbon chains, i.e., a more complex CHC composition, especially in the fall males could allow for a much greater range of information to be passed to the females. For example, relatedness between females and potential mates could be identified and mating between siblings prevented, which would reduce inbreeding (Thomas and Simmons, 2011). Also, cricket females mate with multiple males and identifying males that the female has already mated with could be beneficial for widening the genetic diversity of offspring (Ivy et al., 2005). Females also base their mate choice on signals carrying information about the quality of a given male (Steiger et al., 2013). In *Teleogryllus oceanicus*, females prefer shorter CHC chains (Simmons et al., 2016; Steiger et al., 2013) because they have been found to be expressed more often in males (Thomas and Simmons, 2009), which also suggests that short chain hydrocarbons could be sexually dimorphic. These studies also suggest that there may be a tradeoff between desiccation protection (longer chains) and attractiveness to females (shorter chains). If preferences in *G. rubens* females for particular CHCs exist, this needs to be tested as a next step in the future. Thus, even though CHC plasticity in *G. rubens* exists as shown in my thesis, more research is needed to determine if this is based on sexual selection (female choice), natural selection (environmental pressures such as desiccation), or both.

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Appendix

Raw data of all analyzed *Gryllus rubens* crickets. In all tables, '%Area' indicates the percentage of the total abundance of each peak of the mass spectrum, '%Relative area' indicates the area of each compound, 'Cmpd RI' indicates the retention index, 'Library RI' indicates the matched library index, and 'CHC' indicates the name of the cuticular hydrocarbon indicated by the library index.

Table 1: CHC composition of fall collected female #1.

WF1SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.12	1%	21.908	2178.59733	2174	3-methylheneicosane
0.18	1%	22.513	2234.591652	2239	11-methyldocosane
0.06	0%	22.62	2244.701755	2245	7-methyldocosane
0.49	4%	22.741	2256.072904	2260	4-methyldocosane
0.34	3%	22.923	2273.054726	2273	(Z)-9-tricosene
0.4	3%	23.095	2288.970887	2284	5-tricosene
0.39	3%	23.184	2297.156685	2296	1-tricosene
0.33	3%	23.309	2307.635349	2308	(E)-2-tricosene
0.41	3%	23.361	2311.844979	2308	(E)-2-tricosene
0.45	4%	23.449	2318.946122	2317	2,2-dimethyldocosane
0.35	3%	23.803	2347.226251	2348	6-methyltricosane
0.15	1%	23.896	2354.581054	2352	5-methyltricosane
0.54	4%	23.97	2360.411395	2360	4-methyltricosane
0.63	5%	24.361	2390.90122	2396	1-tetracosene
0.1	1%	24.501	2402.309976	2403	tetracosane
0.16	1%	24.562	2408.70333	2410	3,9-dimethyltricosane
0.14	1%	24.729	2426.119991	2424	(Z)-2-tetracosene
0.16	1%	24.79	2432.450449	2437	11-methyltetracosane
0.2	2%	24.85	2438.660917	2438	10-methyltetracosane
0.38	3%	24.995	2453.603672	2459	4-methyltetracosane
0.31	3%	25.148	2469.27084	2465	2-methyltetracosane
0.21	2%	25.246	2479.252664	2479	7-pentacosene
0.14	1%	25.656	2522.256391	2520	4,8,12-trimethyltetracosane
0.17	1%	25.781	2535.73453	2537	11-methylpentacosane
0.09	1%	25.944	2553.205811	2553	5-methylpentacosane
0.08	1%	25.986	2557.688672	2561	4-methylpentacosane
0.07	1%	26.331	2594.222824	2593	1-hexacosene

0.41	3%	26.508	2612.769233	2610	5,9,13-trimethylpentacosane
0.15	1%	26.596	2621.941085	2626	3,21-dimethylpentacosane
0.38	3%	26.773	2640.291692	2641	8-methylhexacosane
0.11	1%	26.824	2645.55523	2644	7-methylhexacosane
0.59	5%	27.173	2681.291446	2681	6,13-dimethylhexacosane
0.24	2%	27.373	2701.551612	2702	2,8-dimethylhexacosane
0.24	2%	27.471	2711.421808	2718	2,2-dimethylhexacosane
0.44	4%	27.699	2734.241287	2735	13-methylheptacosane
0.2	2%	27.816	2745.874054	2748	6-methylheptacosane
0.19	2%	27.983	2762.388521	2762	11,15-dimethylheptacosane
0.12	1%	28.17	2780.757238	2782	5,11-dimethylheptacosane
0.16	1%	28.561	2818.750628	2809	3,7-dimethylheptacosane
0.09	1%	28.812	2842.851129	2844	7-methyloctacosane
0.14	1%	28.872	2848.579301	2853	5-methyloctacosane
0.1	1%	28.914	2852.581533	2853	5-methyloctacosane
0.27	2%	29.007	2861.421775	2860	2-methyloctacosane
0.21	2%	29.124	2872.500884	2873	7,13-dimethyloctacosane
0.2	2%	29.198	2879.483911	2878	13-nonacosene
0.24	2%	29.268	2886.072276	2886	4,12-dimethyloctacosane
0.38	3%	31.438	3082.453611	3082	15-hentriacontene
0.08	1%	32.21	3148.891956	3150	5-methylhentricontane
0.23	2%	32.257	3152.882521	3150	5-methylhentricontane
0.12	1%	35.301	3399.112164	3398	2,23-dimethyltritriacontane

Table 2: CHC composition of fall collected female #2.

WF2LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.23	2%	20.097	2020.453998	2022	(Z)-2-eicosene
0.23	2%	20.209	2030.111104	2022	(Z)-2-eicosene
0.08	1%	20.344	2041.674477	2042	9-methyleicosane
0.19	2%	20.81	2080.95983	2071	(Z)-9-heneicosene
0.12	1%	20.987	2095.632515	2099	heneicosane
0.08	1%	21.759	2165.346957	2164	2-methylheneicosane
0.23	2%	22.099	2195.441349	2194	1-docosene
0.11	1%	22.253	2209.808044	2211	3,11-dimethylheneicosane
0.07	1%	22.472	2230.703984	2223	(Z)-2-docosene
0.16	1%	22.546	2237.715223	2239	11-methyldocosane
0.12	1%	22.667	2249.126398	2248	6-methyldocosane
0.1	1%	22.765	2258.320608	2260	4-methyldocosane
0.06	0%	22.858	2267.006473	2267	8,12-dimethyldocosane
0.16	1%	23.263	2303.903038	2302	tricosane

0.16	1%	23.403	2315.237733	2317	2,2-dimethyldocosane
0.14	1%	23.468	2320.475572	2317	2,2-dimethyldocosane
0.38	3%	23.654	2335.378337	2335	9-methyltricosane
0.27	2%	23.85	2350.947034	2352	5-methyltricosane
0.26	2%	23.994	2362.298179	2360	4-methyltricosane
0.04	0%	24.11	2371.38924	2375	3-methyltricosane
0.27	2%	24.25	2382.299069	2380	5,11-dimethyltricosane
0.11	1%	24.366	2391.287717	2396	1-tetracosene
0.12	1%	24.478	2399.923089	2403	tetracosane
0.11	1%	24.813	2434.833024	2437	11-methyltetracosane
0.02	0%	24.925	2446.401518	2448	6-methyltetracosane
0.28	2%	25.111	2465.491393	2465	2-methyltetracosane
0.11	1%	25.754	2532.829157	2534	13-methylpentacosane
0.05	0%	25.847	2542.822929	2544	7-methylpentacosane
0.15	1%	26.014	2560.672962	2561	4-methylpentacosane
0.21	2%	26.084	2568.118748	2565	2-methylpentacosane
0.18	1%	26.219	2582.418595	2582	5,11-dimethylpentacosane
0.1	1%	26.564	2618.609605	2626	3,21-dimethylpentacosane
0.15	1%	27.173	2681.291446	2681	6,13-dimethylhexacosane
0.05	0%	27.639	2728.255534	2733	11-methylheptacosane
0.06	0%	27.988	2762.881354	2763	2-methylheptacosane
0.14	1%	28.314	2794.814295	2794	1-octacosene
0.09	1%	28.593	2821.835644	2834	14-methyloctacosane
0.03	0%	28.631	2825.494357	2834	14-methyloctacosane
0.1	1%	28.672	2829.436155	2834	14-methyloctacosane
0.35	3%	28.747	2836.631347	2837	10-methyloctacosane
0.41	3%	28.891	2850.390597	2853	5-methyloctacosane
0.04	0%	29.236	2883.062522	2882	5,15-dimethyloctacosane
0.01	0%	29.329	2891.799996	2895	4,10-dimethyloctacosane
0.02	0%	29.427	2900.975593	2899	2,10-dimethyloctacosane
0.05	0%	29.487	2906.57738	2905	2,6-dimethyloctacosane
0.06	0%	30.227	2974.692521	2974	3-methylnonacosane
0.14	1%	30.474	2997.037081	2995	1-triacontene
0.05	0%	30.604	3008.720765	3008	3,7-dimethylnonacosane
0.03	0%	30.735	3020.441499	3025	15-methyltriacontane
0.18	1%	30.888	3034.064103	3035	12-methyltriacontane
0.06	0%	30.968	3041.158743	3040	8-methyltriacontane
0.09	1%	31.042	3047.704109	3045	6-methyltriacontane
0.04	0%	31.247	3065.751038	3065	4-methyltriacontane
0.02	0%	31.605	3096.970103	3096	1-hentriacontene
0.14	1%	31.815	3115.110185	3108	3,7-dimethyltriacontane
0.06	0%	32.02	3132.697224	3131	13-methylhentricontane
0.07	1%	32.648	3185.845537	3188	1-dotriacontene

0.35	3%	32.75	3194.376356	3198	2,15-dimethylhentriacontane
0.42	3%	32.834	3201.380799	3204	3,13-dimethylhentriacontane
0.29	2%	32.965	3212.266906	3210	3,11-dimethylhentriacontane
0.68	6%	33.114	3224.593712	3225	7-methyldotriacontane
0.3	2%	33.3	3239.900049	3240	8-methyldotriacontane
0.28	2%	33.453	3252.423607	3252	11,19-dimethyldotriacontane
0.25	2%	33.547	3260.088038	3262	9,21-dimethyldotriacontane
0.11	1%	33.654	3268.78506	3265	4-methyldotriacontane
0.05	0%	33.835	3283.430999	3288	1-tritriacontene
0.3	2%	34.184	3311.440365	3318	16-methyltritriacontane
0.13	1%	34.371	3326.325124	3328	13-methyltritriacontane
0.2	2%	34.506	3337.018134	3335	9-methyltritriacontane
0.04	0%	34.65	3348.37579	3350	5-methyltritriacontane
0.1	1%	34.78	3358.586829	3358	4-methyltritriacontane
0.2	2%	35.046	3379.356147	3380	5,17-dimethyltritriacontane
0.05	0%	35.199	3391.227746	3398	2,23-dimethyltritriacontane
0.04	0%	35.516	3415.65345	3410	3,7-dimethyltritriacontane
0.04	0%	35.846	3440.839609	3440	8-methyltetratriacontane
0.08	1%	35.911	3445.771913	3440	8-methyltetratriacontane
0.06	0%	36.055	3456.665682	3458	4-methyltetratriacontane
0.07	1%	36.102	3460.211439	3461	12,22-dimethyltetratriacontane
0.09	1%	36.163	3464.806187	3465	11,21-dimethyltetratriacontane
0.07	1%	36.233	3470.068871	3470	6,16-dimethyltetratriacontane
0.06	0%	36.526	3491.982185	3490	1-pentatriacontene
0.17	1%	36.647	3500.97815	3494	2,10-dimethyltetratriacontane
0.07	1%	36.703	3505.131068	3494	2,10-dimethyltetratriacontane
0.12	1%	36.81	3513.047727	3526	9-methylpentatriacontane
0.14	1%	36.87	3517.476459	3526	9-methylpentatriacontane

Table 3: CHC composition of fall collected female #3.

WF3LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.1	1%	20.786	2078.959921	2071	(Z)-9-heneicosene
0.06	1%	22.895	2270.451586	2273	(Z)-9-tricosene
0.07	1%	23.221	2300.488353	2302	tricosane
0.22	2%	23.277	2305.039796	2308	(E)-2-tricosene
0.28	3%	26.694	2632.117293	2632	12-methylhexacosane
0.12	1%	26.801	2643.182796	2643	3,5-dimethylpentacosane
0.24	2%	27.513	2715.640459	2718	2,2-dimethylhexacosane
0.14	1%	27.69	2733.344302	2733	11-methylheptacosane
0.06	1%	27.779	2742.200934	2743	7-methylheptacosane

0.08	1%	27.839	2748.154734	2748	6-methylheptacosane
0.29	3%	28.039	2767.902926	2767	7,11-dimethylheptacosane
0.08	1%	28.309	2794.327473	2794	1-octacosene
0.18	2%	28.43	2806.083074	2805	3,15-dimethylheptacosane
0.22	2%	28.468	2809.763985	2809	3,7-dimethylheptacosane
0.15	2%	28.677	2829.916454	2834	14-methyloctacosane
0.7	7%	28.854	2846.862173	2844	7-methyloctacosane
0.49	5%	29.003	2861.042167	2860	2-methyloctacosane
0.12	1%	29.171	2876.93822	2877	7-nonacosene
0.76	8%	29.385	2897.047155	2899	2,10-dimethyloctacosane
0.57	6%	29.748	2930.80581	2932	11-methylnonacosane
0.19	2%	29.85	2940.213427	2941	8-methylnonacosane
0.29	3%	29.915	2946.190784	2948	6-methylnonacosane
0.18	2%	29.985	2952.61262	2953	5-methylnonacosane
0.03	0%	30.344	2985.300706	2982	5,9-dimethylnonacosane
0.05	1%	31.298	3070.221389	3070	9-heniatriacontene
0.18	2%	31.447	3083.238005	3082	15-hentriacontene
0.09	1%	31.508	3088.548228	3094	4,10-dimethyltriacontane
0.6	6%	31.726	3107.437679	3108	3,7-dimethyltriacontane
0.4	4%	31.894	3121.901712	3130	11-methylhentricontane
0.4	4%	32.015	3132.269683	3131	13-methylhentricontane
0.21	2%	32.08	3137.822246	3140	7-methylhentricontane
0.17	2%	32.453	3169.458371	3170	7,11-dimethylhentriacontane
0.28	3%	34.71	3353.093556	3354	11,15-dimethyltritriacontane
0.44	5%	34.966	3373.127147	3374	3-methyltritriacontane
0.2	2%	35.213	3392.311336	3398	2,23-dimethyltritriacontane
0.1	1%	35.325	3400.963855	3403	3,9-dimethyltritriacontane
0.13	1%	35.404	3407.049715	3409	3,15-dimethyltritriacontane
0.09	1%	35.474	3412.430382	3410	3,7-dimethyltritriacontane
0.36	4%	35.651	3425.986358	3426	17-methyltetratriacontane
0.15	2%	36.302	3475.245979	3475	3-methyltetratriacontane
0.16	2%	36.703	3505.131068	3494	2,10-dimethyltetratriacontane

Table 4: CHC composition of fall collected female #4.

WF4LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.08	2%	20.179	2027.530085	2022	(Z)-2-eicosene
0.12	3%	21.068	2102.589678	2099	heneicosane
0.31	7%	21.599	2151.008965	2151	5-methylheneicosane
0.18	4%	21.765	2165.882417	2164	2-methylheneicosane
0.11	3%	22.071	2192.981902	2194	1-docosene
0.18	4%	22.168	2201.638047	2201	n-docosane

0.16	4%	22.628	2245.455584	2245	7-methyldocosane
0.41	9%	22.751	2257.009757	2260	4-methyldocosane
0.32	7%	22.839	2265.235032	2265	2-methyldocosane
0.1	2%	23.335	2309.741422	2308	(E)-2-tricosene
0.07	2%	23.396	2314.672728	2317	2,2-dimethyldocosane
0.06	1%	25.431	2497.98373	2496	1-pentacosene
0.01	0%	25.524	2507.947286	2506	(E)-2-pentacosene
0.58	13%	26.73	2635.84552	2636	10-methylhexacosane
0.25	6%	26.863	2649.573118	2648	6-methylhexacosane
0.07	2%	26.863	2649.573118	2648	6-methylhexacosane
0.25	6%	26.977	2661.282268	2661	4-methylhexacosane
0.34	8%	27.095	2673.34703	2673	9-heptacosene
0.05	1%	27.341	2698.320567	2695	4,8-dimethylhexacosane
0.01	0%	28.021	2766.131713	2767	7,11-dimethylheptacosane
0.04	1%	28.465	2809.473576	2809	3,7-dimethylheptacosane
0.06	1%	32.21	3148.891956	3150	5-methylhentricontane
0.08	2%	32.486	3172.238847	3174	3-methylhentricontane
0.06	1%	32.621	3183.58269	3182	5,17-dimethylhentriacontane
0.05	1%	33.998	3296.550266	3297	2,10-dimethyldotriacontane
0.03	1%	34.221	3314.392242	3318	16-methyltritriacontane
0.08	2%	35.194	3390.84064	3398	2,23-dimethyltritriacontane
0.09	2%	35.458	3411.201495	3410	3,7-dimethyltritriacontane
0.11	3%	36.461	3487.136772	3490	1-pentatriacontene
0.09	2%	36.641	3500.532801	3494	2,10-dimethyltetratriacontane
0.05	1%	36.83	3514.524809	3526	9-methylpentatriacontane

Table 5: CHC composition of fall collected female #5.

WF5LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.11	13%	25.632	2519.660581	2520	4,8,12-trimethyltetracosane
0.17	19%	27.001	2663.740653	2665	2-methylhexacosane
0.03	3%	28.011	2765.147184	2765	9,19-dimethylheptacosane
0.09	10%	28.505	2813.343034	2809	3,7-dimethylheptacosane
0.18	20%	30.735	3020.441499	3025	15-methyltriacontane
0.2	23%	30.921	3036.992986	3035	12-methyltriacontane
0.1	11%	31.107	3053.439868	3045	6-methyltriacontane

Table 6: CHC composition of fall collected female #6.

WF6SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.46	17%	21.433	2136.011645	2140	11-methylheneicosane

0.5	18%	21.522	2144.067904	2144	7-methylheneicosane
0.33	12%	21.801	2169.09184	2172	7,11-dimethylheneicosane
0.16	6%	22.127	2197.897441	2201	n-docosane
0.22	8%	22.243	2208.848613	2208	(E)-2-docosene
0.14	5%	22.565	2239.511413	2240	10-methyldocosane
0.17	6%	22.681	2250.44247	2252	5-methyldocosane
0.18	7%	22.779	2259.630593	2260	4-methyldocosane
0.04	1%	27.201	2684.137383	2682	5,11-dimethylhexacosane
0.11	4%	27.397	2703.972267	2704	2,6-dimethylhexacosane
0.06	2%	27.63	2727.356483	2733	11-methylheptacosane
0.14	5%	29.878	2942.789972	2944	7-methylnonacosane
0.11	4%	30.125	2965.408946	2963	9,13-dimethylnonacosane
0.08	3%	30.502	2999.558003	3004	3,13-dimethylnonacosane
0.05	2%	31.2	3061.624493	3064	2-methyltriacontane

Table 7: CHC composition of fall collected female #7.

WF7SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.51	7%	20.177	2027.357869	2022	(Z)-2-eicosene
0.59	9%	20.419	2048.062671	2048	6-methyleicosane
0.64	9%	20.54	2058.315528	2060	4-methyleicosane
0.39	6%	20.614	2064.55367	2064	2-methyleicosane
0.66	10%	20.74	2075.119766	2071	(Z)-9-heneicosene
1.11	16%	21.108	2106.28277	2107	(E)-2-heneicosene
0.12	2%	21.419	2134.741081	2140	11-methylheneicosane
0.3	4%	23.472	2320.797392	2317	2,2-dimethyldocosane
0.07	1%	24.101	2370.685576	2375	3-methyltricosane
0.17	2%	24.231	2380.822408	2380	5,11-dimethyltricosane
0.34	5%	24.385	2392.755632	2396	1-tetracosene
0.23	3%	24.506	2402.834661	2403	tetracosane
0.38	6%	24.613	2414.03558	2410	3,9-dimethyltricosane
0.03	0%	24.823	2435.868191	2437	11-methyltetracosane
0.05	1%	24.953	2449.284968	2448	6-methyltetracosane
0.04	1%	25.013	2455.452174	2459	4-methyltetracosane
0.14	2%	25.204	2474.979811	2473	10-pentacosene
0.17	2%	25.321	2486.86393	2488	4,18-dimethyltetracosane
0.08	1%	25.637	2520.201588	2520	4,8,12-trimethyltetracosane
0.13	2%	25.809	2538.744088	2539	9-methylpentacosane
0.12	2%	27.118	2675.692137	2676	7-heptacosene
0.05	1%	28.342	2797.538816	2800	3,7-dimethylheptacosane
0.04	1%	28.91	2852.200633	2853	5-methyloctacosane
0.04	1%	28.952	2856.197304	2855	4-methyloctacosane

0.14	2%	29.78	2933.760882	2934	13-methylnonacosane
0.09	1%	30.018	2955.63457	2953	5-methylnonacosane
0.03	0%	33.114	3224.593712	3225	7-methyldotriacontane
0.04	1%	33.188	3230.694118	3231	16-methyldotriacontane
0.07	1%	35.721	3431.328053	3430	10-methyltetratriacontane
0.08	1%	36.223	3469.31771	3470	6,16-dimethyltetratriacontane
0.03	0%	36.321	3476.669753	3475	3-methyltetratriacontane

Table 8: CHC composition of fall collected female #8.

WF8LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.11	1%	20.935	2091.335827	2099	heneicosane
0.19	1%	21.345	2128.010311	2120	(Z)-2-heneicosene
0.25	2%	21.713	2161.236463	2160	4-methylheneicosane
0.28	2%	21.917	2179.394574	2174	3-methylheneicosane
0.3	2%	22.169	2201.734361	2201	n-docosane
0.29	2%	22.662	2248.65616	2248	6-methyldocosane
0.34	2%	23.477	2321.199584	2325	(Z)-2-tricosene
0.34	2%	23.603	2331.304629	2335	9-methyltricosane
0.25	2%	23.761	2343.894631	2342	8-methyltricosane
0.19	1%	23.868	2352.369935	2352	5-methyltricosane
0.12	1%	24.259	2382.998109	2380	5,11-dimethyltricosane
0.13	1%	24.436	2396.689785	2396	1-tetracosene
0.22	2%	24.58	2410.58665	2410	3,9-dimethyltricosane
0.11	1%	24.631	2415.914731	2410	3,9-dimethyltricosane
0.16	1%	24.678	2420.814495	2424	(Z)-2-tetracosene
0.25	2%	24.804	2433.900993	2437	11-methyltetracosane
0.54	4%	24.85	2438.660917	2438	10-methyltetracosane
0.19	1%	25.055	2459.759829	2460	3,7,11-trimethyltricosane
0.78	6%	25.577	2513.702065	2518	2,2-dimethyltetracosane
0.47	3%	25.693	2526.253198	2526	(Z)-2-pentacosene
0.29	2%	25.874	2545.717173	2544	7-methylpentacosane
0.15	1%	26.265	2587.273242	2586	5,9-dimethylpentacosane
0.32	2%	26.852	2648.440495	2648	6-methylhexacosane
0.34	2%	26.945	2658.000804	2661	4-methylhexacosane
0.13	1%	27.103	2674.162959	2675	12-heptacosene
0.26	2%	27.201	2684.137383	2682	5,11-dimethylhexacosane
0.38	3%	27.378	2702.056101	2702	2,8-dimethylhexacosane
0.28	2%	27.434	2707.699703	2704	2,6-dimethylhexacosane
0.23	2%	27.765	2740.809752	2741	8-methylheptacosane
0.53	4%	28.035	2767.509427	2767	7,11-dimethylheptacosane
0.5	4%	28.267	2790.23457	2794	1-octacosene

0.02	0%	29.887	2943.617605	2944	7-methylnonacosane
0.11	1%	30.032	2956.915549	2953	5-methylnonacosane
0.31	2%	30.39	2989.45963	2995	1-triacontene
0.06	0%	31.41	3080.011762	3082	15-hentriacontene
0.12	1%	32.62	3183.498843	3182	5,17-dimethylhentriacontane
0.12	1%	32.685	3188.943283	3188	1-dotriacontene
0.36	3%	33.062	3220.298369	3225	7-methyldotriacontane
0.1	1%	33.23	3234.150159	3235	13-methyldotriacontane
0.3	2%	33.332	3242.524344	3245	6-methyldotriacontane
0.07	0%	33.402	3248.255781	3245	6-methyldotriacontane
0.15	1%	33.481	3254.708991	3252	11,19-dimethyldotriacontane
0.23	2%	33.57	3261.959946	3262	9,21-dimethyldotriacontane
0.44	3%	33.733	3275.187626	3275	3-methyldotriacontane
0.31	2%	33.83	3283.02752	3288	1-tritriacontene
0.28	2%	33.923	3290.522007	3292	4,8-dimethyldotriacontane
0.22	2%	34.072	3302.484493	3297	2,10-dimethyldotriacontane
0.4	3%	34.226	3314.790887	3318	16-methyltritriacontane
0.28	2%	34.347	3324.419536	3328	13-methyltritriacontane
0.44	3%	34.524	3338.440555	3340	7-methyltritriacontane
0.23	2%	35.632	3424.534575	3426	17-methyltetratriacontane
0.51	4%	35.925	3446.833033	3440	8-methyltetratriacontane
0.03	0%	36.88	3518.213849	3526	9-methylpentatriacontane

Table 9: CHC composition of fall collected male #1.

WM1SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.15	0%	20.139	2024.082241	2022	(Z)-2-eicosene
0.11	0%	20.181	2027.702282	2022	(Z)-2-eicosene
0.17	0%	20.251	2033.717555	2042	9-methyleicosane
0.54	2%	20.391	2045.680726	2045	7-methyleicosane
0.51	1%	20.521	2056.709914	2060	4-methyleicosane
0.1	0%	20.824	2082.125291	2071	(Z)-9-heneicosene
0.08	0%	20.987	2095.632515	2099	heneicosane
0.04	0%	21.038	2099.835405	2099	heneicosane
0.1	0%	21.243	2118.691333	2120	(Z)-2-heneicosene
0.14	0%	21.443	2136.918642	2140	11-methylheneicosane
0.04	0%	21.494	2141.537234	2141	9-methylheneicosane
0.13	0%	21.541	2145.783122	2144	7-methylheneicosane
0.04	0%	21.811	2169.982332	2172	7,11-dimethylheneicosane
0.02	0%	22.155	2200.385545	2201	n-docosane
0.7	2%	22.607	2243.476173	2242	8-methyldocosane
0.21	1%	22.69	2251.288055	2252	5-methyldocosane

0.41	1%	22.746	2256.541386	2260	4-methyldocosane
0.14	0%	22.9	2270.916683	2273	(Z)-9-tricosene
0.15	0%	22.946	2275.190464	2274	3-methyldocosane
0.18	1%	23.002	2280.380925	2278	7-tricosene
0.16	0%	23.081	2287.680152	2284	5-tricosene
0.1	0%	23.137	2292.83806	2296	1-tricosene
0.15	0%	23.203	2298.899846	2296	1-tricosene
0.12	0%	23.254	2303.171877	2302	tricosane
0.33	1%	23.31	2307.716398	2308	(E)-2-tricosene
0.37	1%	23.417	2316.3672	2317	2,2-dimethyldocosane
0.44	1%	23.622	2332.823387	2335	9-methyltricosane
0.11	0%	23.719	2340.556696	2341	7-methyltricosane
0.4	1%	23.803	2347.226251	2348	6-methyltricosane
0.37	1%	23.957	2359.388543	2360	4-methyltricosane
0.12	0%	24.05	2366.692827	2365	2-methyltricosane
0.17	0%	24.087	2369.590428	2365	2-methyltricosane
0.29	1%	24.175	2376.462925	2375	3-methyltricosane
0.55	2%	24.297	2385.946552	2380	5,11-dimethyltricosane
0.41	1%	24.427	2395.996161	2396	1-tetracosene
0.27	1%	24.632	2416.019086	2410	3,9-dimethyltricosane
0.09	0%	24.688	2421.855711	2424	(Z)-2-tetracosene
0.38	1%	24.767	2430.065511	2424	(Z)-2-tetracosene
0.12	0%	24.93	2446.916674	2448	6-methyltetracosane
0.46	1%	25.125	2466.922153	2465	2-methyltetracosane
0.2	1%	25.251	2479.760832	2479	7-pentacosene
0.1	0%	25.391	2493.946112	2496	1-pentacosene
0.1	0%	25.446	2499.496091	2496	1-pentacosene
0.22	1%	25.526	2508.164679	2506	(E)-2-pentacosene
0.12	0%	25.633	2519.768791	2520	4,8,12-trimethyltetracosane
0.52	2%	25.73	2530.243877	2534	13-methylpentacosane
0.58	2%	26.187	2579.0361	2579	5,13-dimethylpentacosane
0.1	0%	26.354	2596.640295	2593	1-hexacosene
0.26	1%	26.494	2611.307089	2610	5,9,13-trimethylpentacosane
0.34	1%	26.545	2616.629519	2610	5,9,13-trimethylpentacosane
0.11	0%	26.736	2636.466373	2636	10-methylhexacosane
0.28	1%	26.857	2648.955385	2648	6-methylhexacosane
0.09	0%	26.969	2660.46229	2661	4-methylhexacosane
0.36	1%	27.108	2674.672785	2675	12-heptacosene
0.12	0%	27.169	2680.88463	2681	6,13-dimethylhexacosane
0.29	1%	27.295	2693.668899	2693	1-heptacosene
0.32	1%	27.406	2704.879432	2704	2,6-dimethylhexacosane
0.22	1%	27.457	2710.01407	2704	2,6-dimethylhexacosane
0.47	1%	27.537	2718.04805	2718	2,2-dimethylhexacosane

0.28	1%	27.737	2738.025155	2739	9-methylheptacosane
0.21	1%	27.788	2743.094873	2743	7-methylheptacosane
0.94	3%	28.091	2773.013003	2774	7,13-dimethylheptacosane
0.12	0%	28.249	2788.478496	2786	5,17-dimethylheptacosane
0.26	1%	28.365	2799.774683	2800	3,7-dimethylheptacosane
0.57	2%	28.468	2809.763985	2809	3,7-dimethylheptacosane
0.39	1%	28.584	2820.968353	2809	3,7-dimethylheptacosane
0.87	3%	28.756	2837.493434	2837	10-methyloctacosane
0.16	0%	28.947	2855.721832	2855	4-methyloctacosane
0.19	1%	29.012	2861.896207	2860	2-methyloctacosane
0.6	2%	29.119	2872.028381	2872	3-methyloctacosane
0.16	0%	29.222	2881.744659	2882	5,15-dimethyloctacosane
1.09	3%	29.385	2897.047155	2899	2,10-dimethyloctacosane
0.45	1%	29.669	2923.496077	2932	11-methylnonacosane
0.5	1%	29.804	2935.974986	2935	12-methylnonacosane
0.5	1%	29.967	2950.962804	2953	5-methylnonacosane
0.21	1%	30.092	2962.398332	2962	2-methylnonacosane
0.26	1%	30.134	2966.229419	2963	9,13-dimethylnonacosane
0.32	1%	30.386	2989.098249	2995	1-triacontene
0.22	1%	30.456	2995.415198	2995	1-triacontene
0.2	1%	30.563	3005.041571	3006	3,11-dimethylnonacosane
0.26	1%	30.637	3011.678294	3008	3,7-dimethylnonacosane
0.15	0%	30.726	3019.637945	3025	15-methyltriacontane
0.44	1%	30.907	3035.750832	3035	12-methyltriacontane
0.47	1%	30.954	3039.918576	3040	8-methyltriacontane
0.28	1%	31.07	3050.176448	3045	6-methyltriacontane
0.41	1%	31.131	3055.554495	3064	2-methyltriacontane
0.42	1%	31.284	3068.994998	3070	9-heniatriacontene
0.11	0%	31.531	3090.547634	3094	4,10-dimethyltriacontane
0.08	0%	31.633	3099.396099	3099	2,10-dimethyltriacontane
0.06	0%	31.82	3115.540554	3108	3,7-dimethyltriacontane
0.14	0%	31.908	3123.103428	3130	11-methylhentricontane
0.45	1%	32.164	3144.980363	3143	6-methylhentricontane
0.24	1%	32.243	3151.694482	3150	5-methylhentricontane
0.63	2%	32.439	3168.277876	3170	7,11-dimethylhentriacontane
0.22	1%	32.49	3172.575673	3174	3-methylhentricontane
0.78	2%	32.574	3179.638961	3180	5,13-dimethylhentriacontane
0.38	1%	32.848	3202.546375	3204	3,13-dimethylhentriacontane
0.15	0%	33.086	3222.281716	3225	7-methyldotriacontane
0.12	0%	33.249	3235.7121	3235	13-methyldotriacontane
0.31	1%	33.332	3242.524344	3245	6-methyldotriacontane
0.06	0%	33.556	3260.820684	3262	9,21-dimethyldotriacontane
0.05	0%	33.635	3267.24285	3265	4-methyldotriacontane

0.02	0%	33.696	3272.190917	3274	6,10-dimethyldotriacontane
0.3	1%	33.789	3279.716632	3277	10-methyldotriacontane
0.16	0%	33.905	3289.073144	3288	1-tritriacontene
0.16	0%	34.045	3300.320869	3297	2,10-dimethyldotriacontane
0.09	0%	34.217	3314.073282	3318	16-methyltritriacontane
0.16	0%	34.296	3320.365523	3318	16-methyltritriacontane
0.23	1%	34.403	3328.863739	3329	11-methyltritriacontane
0.2	1%	34.534	3339.230453	3340	7-methyltritriacontane
0.19	1%	34.696	3351.993509	3350	5-methyltritriacontane
0.17	0%	34.827	3362.268673	3362	2-methyltritriacontane
0.32	1%	34.985	3374.607885	3374	3-methyltritriacontane
0.12	0%	35.078	3381.843579	3380	5,17-dimethyltritriacontane
0.15	0%	35.157	3387.974265	3380	5,17-dimethyltritriacontane
0.25	1%	35.32	3400.578195	3403	3,9-dimethyltritriacontane
0.23	1%	35.376	3404.894329	3403	3,9-dimethyltritriacontane
0.03	0%	35.679	3428.124352	3430	10-methyltetratriacontane
0.19	1%	35.832	3439.776042	3440	8-methyltetratriacontane
0.19	1%	35.912	3445.847722	3440	8-methyltetratriacontane
0.32	1%	36.019	3453.946512	3455	13,17-dimethyltetratriacontane
0.39	1%	36.168	3465.182446	3465	11,21-dimethyltetratriacontane
0.17	0%	36.358	3479.440132	3481	9-pentatriacontene
0.7	2%	36.517	3491.31182	3490	1-pentatriacontene
0.16	0%	36.652	3501.349216	3494	2,10-dimethyltetratriacontane
0.17	0%	36.81	3513.047727	3526	9-methylpentatriacontane
0.39	1%	36.884	3518.508746	3526	9-methylpentatriacontane

Table 10: CHC composition of fall collected male #2.

WM2SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.47	2%	20.004	2012.39065	2007	(E)-2-eicosene
0.68	2%	20.125	2022.87374	2022	(Z)-2-eicosene
0.34	1%	20.279	2036.11735	2042	9-methyleicosane
0.66	2%	20.433	2049.252316	2048	6-methyleicosane
0.53	2%	20.614	2064.55367	2064	2-methyleicosane
0.63	2%	21.21	2115.666015	2120	(Z)-2-heneicosene
0.44	2%	21.373	2130.560048	2140	11-methylheneicosane
0.43	1%	21.508	2142.803014	2143	8-methylheneicosane
0.34	1%	21.68	2158.28184	2160	4-methylheneicosane
0.46	2%	21.871	2175.316057	2174	3-methylheneicosane
0.34	1%	21.955	2182.756831	2174	3-methylheneicosane
0.48	2%	22.146	2199.562169	2201	n-docosane
0.89	3%	22.248	2209.328386	2208	(E)-2-docosene

0.84	3%	22.444	2228.044604	2223	(Z)-2-docosene
1.39	5%	22.681	2250.44247	2252	5-methyldocosane
0.72	2%	22.872	2268.310734	2267	8,12-dimethyldocosane
0.31	1%	22.956	2276.11833	2278	7-tricosene
0.77	3%	23.072	2286.849949	2284	5-tricosene
0.25	1%	23.179	2296.697704	2296	1-tricosene
0.55	2%	23.361	2311.844979	2308	(E)-2-tricosene
0.9	3%	23.659	2335.777214	2335	9-methyltricosane
0.3	1%	24.031	2365.203015	2365	2-methyltricosane
0.12	0%	24.729	2426.119991	2424	(Z)-2-tetracosene
0.13	0%	24.841	2437.730368	2438	10-methyltetracosane
0.13	0%	25.828	2540.784308	2541	8-methylpentacosane
0.11	0%	25.94	2552.778469	2553	5-methylpentacosane
0.06	0%	26.084	2568.118748	2565	2-methylpentacosane
0.25	1%	27.038	2667.52612	2665	2-methylhexacosane
0.16	1%	27.239	2687.994754	2687	4,10-dimethylhexacosane
0.21	1%	27.346	2698.825682	2702	2,8-dimethylhexacosane
0.27	1%	27.462	2710.516921	2704	2,6-dimethylhexacosane
0.53	2%	27.648	2729.154276	2733	11-methylheptacosane
0.35	1%	27.904	2754.589348	2757	9,13-diemethylheptacosane
0.29	1%	28.179	2781.638032	2782	5,11-dimethylheptacosane
0.27	1%	28.761	2837.972249	2838	3,7,11-trimethylheptacosane
0.23	1%	29.068	2867.203947	2867	5,9-dimethyloctacosane
0.1	0%	29.184	2878.164234	2878	13-nonacosene
0.51	2%	29.58	2915.23639	2905	2,6-dimethyloctacosane
0.73	3%	29.878	2942.789972	2944	7-methylnonacosane
0.63	2%	29.943	2948.76142	2948	6-methylnonacosane
0.95	3%	30.269	2978.505565	2982	5,9-dimethylnonacosane
0.27	1%	30.581	3006.657467	3007	3,9-dimethylnonacosane
0.14	0%	30.642	3012.126112	3008	3,7-dimethylnonacosane
0.22	1%	30.953	3039.82997	3040	8-methyltriacontane
0.7	2%	31.163	3058.371327	3064	2-methyltriacontane
0.18	1%	31.349	3074.684073	3075	3-methyltriacontane
0.22	1%	31.503	3088.113372	3094	4,10-dimethyltriacontane
0.07	0%	31.601	3096.623347	3096	1-hentriacontene
0.24	1%	31.824	3115.884799	3108	3,7-dimethyltriacontane
0.51	2%	31.899	3122.33096	3130	11-methylhentricontane
0.17	1%	32.345	3160.337802	3160	11,17-dimethylhentriacontane
0.17	1%	32.387	3163.888489	3165	9,19-dimethylhentriacontane
0.74	3%	32.485	3172.154634	3174	3-methylhentricontane
0.09	0%	32.662	3187.018091	3188	1-dotriacontene
0.5	2%	32.746	3194.04234	3198	2,15-dimethylhentriacontane
0.24	1%	32.853	3202.962526	3204	3,13-dimethylhentriacontane

0.15	1%	33.211	3232.587281	3231	16-methyldotriacontane
0.15	1%	33.276	3237.930089	3240	8-methyldotriacontane
0.09	0%	33.323	3241.786528	3240	8-methyldotriacontane
0.16	1%	33.458	3252.831859	3252	11,19-dimethyldotriacontane
0.31	1%	33.621	3266.1059	3265	4-methyldotriacontane
0.04	0%	33.7	3272.515052	3274	6,10-dimethyldotriacontane
0.24	1%	33.83	3283.02752	3288	1-tritriacontene
0.08	0%	33.933	3291.326582	3292	4,8-dimethyldotriacontane
0.11	0%	33.998	3296.550266	3297	2,10-dimethyldotriacontane
0.08	0%	34.068	3302.16407	3297	2,10-dimethyldotriacontane
0.37	1%	34.352	3324.816649	3328	13-methyltritriacontane
0.34	1%	34.529	3338.835534	3340	7-methyltritriacontane
0.49	2%	34.762	3357.17538	3358	4-methyltritriacontane
0.51	2%	34.869	3365.55443	3363	11,21-dimethyltritriacontane
0.11	0%	34.994	3375.308993	3374	3-methyltritriacontane
0.14	0%	35.05	3379.667206	3380	5,17-dimethyltritriacontane
0.21	1%	35.106	3384.018133	3380	5,17-dimethyltritriacontane
0.1	0%	35.167	3388.749272	3380	5,17-dimethyltritriacontane
0.3	1%	35.208	3391.924391	3398	2,23-dimethyltritriacontane
0.14	0%	35.679	3428.124352	3430	10-methyltetratriacontane
0.11	0%	35.781	3435.897939	3435	12-methyltetratriacontane
0.06	0%	35.958	3449.332534	3455	13,17-dimethyltetratriacontane
0.15	1%	36.191	3466.912538	3465	11,21-dimethyltetratriacontane
0.28	1%	36.261	3472.170968	3470	6,16-dimethyltetratriacontane
0.27	1%	36.484	3488.852334	3490	1-pentatriacontene
0.16	1%	36.54	3493.024633	3494	2,10-dimethyltetratriacontane
0.22	1%	36.638	3500.310098	3494	2,10-dimethyltetratriacontane
0.31	1%	36.689	3504.09346	3494	2,10-dimethyltetratriacontane

Table 11: CHC composition of fall collected male #3.

WM3SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.35	1%	20.083	2019.242754	2022	(Z)-2-eicosene
0.47	1%	20.251	2033.717555	2042	9-methyleicosane
0.98	3%	20.623	2065.310708	2064	2-methyleicosane
0.57	2%	20.712	2072.777763	2071	(Z)-9-heneicosene
0.9	2%	20.8	2080.126838	2071	(Z)-9-heneicosene
0.63	2%	20.935	2091.335827	2099	heneicosane
0.55	2%	20.991	2095.962553	2099	heneicosane
0.58	2%	21.121	2107.481395	2107	(E)-2-heneicosene
0.2	1%	21.908	2178.59733	2174	3-methylheneicosane
0.32	1%	21.95	2182.314787	2174	3-methylheneicosane

0.31	1%	22.076	2193.421335	2194	1-docosene
0.11	0%	22.15	2199.912442	2201	n-docosane
0.23	1%	22.215	2206.159735	2208	(E)-2-docosene
0.45	1%	22.392	2223.096271	2223	(Z)-2-docosene
0.35	1%	22.49	2232.411704	2239	11-methyldocosane
0.2	1%	22.593	2242.155467	2242	8-methyldocosane
0.25	1%	22.648	2247.338901	2248	6-methyldocosane
0.16	0%	22.774	2259.162841	2260	4-methyldocosane
0.34	1%	22.979	2278.250773	2278	7-tricosene
0.57	2%	23.067	2286.388575	2284	5-tricosene
0.3	1%	23.23	2301.220629	2302	tricosane
0.14	0%	23.328	2309.17465	2308	(E)-2-tricosene
0.52	1%	23.421	2316.689772	2317	2,2-dimethyldocosane
0.63	2%	23.556	2327.542065	2325	(Z)-2-tricosene
0.55	2%	23.775	2345.005872	2348	6-methyltricosane
0.23	1%	24.026	2364.810749	2365	2-methyltricosane
0.24	1%	24.124	2372.483269	2375	3-methyltricosane
0.82	2%	24.287	2385.171125	2380	5,11-dimethyltricosane
0.82	2%	24.473	2399.538483	2403	tetracosane
1.18	3%	24.613	2414.03558	2410	3,9-dimethyltricosane
0.84	2%	24.794	2432.864979	2437	11-methyltetracosane
0.34	1%	25.065	2460.784325	2460	3,7,11-trimethyltricosane
0.27	1%	25.106	2464.980201	2465	2-methyltetracosane
0.46	1%	25.181	2472.636695	2473	10-pentacosene
0.82	2%	25.376	2492.430256	2496	1-pentacosene
0.58	2%	25.567	2512.617231	2518	2,2-dimethyltetracosane
0.21	1%	25.753	2532.721488	2534	13-methylpentacosane
0.13	0%	25.8	2537.77711	2538	10-methylpentacosane
0.28	1%	25.875	2545.824305	2544	7-methylpentacosane
0.23	1%	26.084	2568.118748	2565	2-methylpentacosane
0.08	0%	26.135	2573.530152	2575	3-methylpentacosane
0.41	1%	26.247	2585.374676	2585	5,17-dimethylpentacosane
0.24	1%	26.335	2594.643415	2593	1-hexacosene
0.15	0%	26.48	2609.844124	2610	5,9,13-trimethylpentacosane
0.26	1%	26.675	2630.147462	2629	(Z)-2-hexacosene
0.2	1%	27.741	2738.423137	2739	9-methylheptacosane
0.13	0%	27.834	2747.659104	2748	6-methylheptacosane
0.16	0%	27.979	2761.994188	2762	11,15-dimethylheptacosane
0.09	0%	28.039	2767.902926	2767	7,11-dimethylheptacosane
0.12	0%	28.095	2773.405671	2774	7,13-dimethylheptacosane
0.08	0%	28.319	2795.301026	2794	1-octacosene
0.09	0%	28.561	2818.750628	2809	3,7-dimethylheptacosane
0.1	0%	28.761	2837.972249	2838	3,7,11-trimethylheptacosane

0.07	0%	29.017	2862.370553	2860	2-methyloctacosane
0.06	0%	29.073	2867.677327	2867	5,9-dimethyloctacosane
0.09	0%	29.231	2882.591933	2882	5,15-dimethyloctacosane
0.17	0%	29.329	2891.799996	2895	4,10-dimethyloctacosane
0.15	0%	29.454	2903.49789	2905	2,6-dimethyloctacosane
0.02	0%	29.571	2914.399679	2905	2,6-dimethyloctacosane
0.06	0%	29.622	2919.137487	2932	11-methylnonacosane
0.58	2%	29.729	2929.049647	2932	11-methylnonacosane
0.11	0%	29.92	2946.650012	2948	6-methylnonacosane
0.05	0%	30.055	2959.018648	2961	4-methylnonacosane
0.67	2%	30.292	2980.591295	2982	5,9-dimethylnonacosane
0.26	1%	30.367	2987.380999	2982	5,9-dimethylnonacosane
0.26	1%	30.474	2997.037081	2995	1-triacontene
0.1	0%	30.562	3004.951769	3004	3,13-dimethylnonacosane
0.42	1%	30.697	3017.047024	3025	15-methyltriacontane
0.04	0%	30.842	3029.97591	3032	14-methyltriacontane
0.07	0%	30.898	3034.951992	3035	12-methyltriacontane
0.08	0%	31.005	3044.433484	3045	6-methyltriacontane
0.13	0%	31.102	3052.999104	3045	6-methyltriacontane
0.11	0%	31.196	3061.272996	3064	2-methyltriacontane
0.07	0%	31.428	3081.581785	3082	15-hentriacontene
0.17	0%	31.475	3085.67683	3082	15-hentriacontene
0.22	1%	31.675	3103.030858	3104	2,4-dimethyltriacontane
0.25	1%	31.764	3110.716348	3108	3,7-dimethyltriacontane
0.44	1%	31.931	3125.07647	3130	11-methylhentricontane
0.45	1%	32.047	3135.004733	3131	13-methylhentricontane
0.28	1%	32.196	3147.702093	3150	5-methylhentricontane
0.18	0%	32.587	3180.730377	3181	5,9-dimethylhentriacontane
0.06	0%	32.718	3191.70303	3188	1-dotriacontene
0.12	0%	32.764	3195.545073	3198	2,15-dimethylhentriacontane
0.32	1%	32.834	3201.380799	3204	3,13-dimethylhentriacontane
0.23	1%	32.969	3212.598591	3210	3,11-dimethylhentriacontane
0.23	1%	33.104	3223.768235	3225	7-methyldotriacontane
0.63	2%	33.281	3238.34062	3240	8-methyldotriacontane
0.18	0%	33.37	3245.637262	3245	6-methyldotriacontane
0.29	1%	33.453	3252.423607	3252	11,19-dimethyldotriacontane
0.26	1%	33.509	3256.992369	3258	14,18-dimethyldotriacontane
0.45	1%	33.584	3263.098709	3264	2-methyldotriacontane
0.17	0%	33.686	3271.380403	3274	6,10-dimethyldotriacontane
0.39	1%	33.761	3277.453114	3277	10-methyldotriacontane
0.62	2%	33.891	3287.945693	3288	1-tritriacontene
0.21	1%	33.984	3295.42605	3297	2,10-dimethyldotriacontane
0.3	1%	34.049	3300.64152	3297	2,10-dimethyldotriacontane

0.46	1%	34.161	3309.603726	3318	16-methyltritriacontane
0.24	1%	34.277	3318.853588	3318	16-methyltritriacontane
0.2	1%	34.37	3326.245752	3328	13-methyltritriacontane
0.05	0%	35.297	3398.803421	3398	2,23-dimethyltritriacontane
0.14	0%	35.381	3405.27935	3403	3,9-dimethyltritriacontane
1.32	4%	35.432	3409.203317	3409	3,15-dimethyltritriacontane
0.15	0%	35.767	3434.83235	3435	12-methyltetratriacontane
0.29	1%	35.818	3438.71204	3440	8-methyltetratriacontane
0.35	1%	35.967	3450.0138	3455	13,17-dimethyltetratriacontane
0.49	1%	36.037	3455.306453	3455	13,17-dimethyltetratriacontane
0.51	1%	36.158	3464.429873	3465	11,21-dimethyltetratriacontane
0.23	1%	36.214	3468.64148	3470	6,16-dimethyltetratriacontane
0.43	1%	36.27	3472.846282	3475	3-methyltetratriacontane
0.54	1%	36.405	3482.955015	3481	9-pentatriacontene
0.05	0%	36.61	3498.230617	3494	2,10-dimethyltetratriacontane
0.62	2%	36.703	3505.131068	3494	2,10-dimethyltetratriacontane

Table 12: CHC composition of fall collected male #4.

WM4SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.09	0%	20.065	2017.684092	2022	(Z)-2-eicosene
0.2	1%	20.27	2035.34638	2042	9-methyleicosane
0.03	0%	20.358	2042.868876	2043	8-methyleicosane
0.03	0%	20.693	2071.186593	2071	(Z)-9-heneicosene
0.16	1%	21	2096.704888	2099	heneicosane
0.13	0%	21.215	2116.124723	2120	(Z)-2-heneicosene
0.14	1%	21.289	2122.89998	2120	(Z)-2-heneicosene
0.08	0%	21.336	2127.189985	2120	(Z)-2-heneicosene
0.09	0%	21.531	2144.880579	2144	7-methylheneicosane
0.14	1%	21.587	2149.929	2151	5-methylheneicosane
0.04	0%	21.703	2160.341635	2160	4-methylheneicosane
0.24	1%	21.829	2171.584109	2172	7,11-dimethylheneicosane
0.23	1%	21.885	2176.558323	2174	3-methylheneicosane
0.09	0%	22.011	2187.700321	2194	1-docosene
0.24	1%	22.108	2196.231172	2194	1-docosene
0.15	1%	22.178	2202.600972	2204	5,17-dimethylheneicosane
0.6	2%	22.388	2222.715117	2223	(Z)-2-docosene
0.31	1%	22.462	2229.754615	2223	(Z)-2-docosene
0.19	1%	22.537	2236.863828	2239	11-methyldocosane
0.26	1%	22.597	2242.532901	2242	8-methyldocosane
0.62	2%	22.69	2251.288055	2252	5-methyldocosane
0.07	0%	22.937	2274.355015	2274	3-methyldocosane

0.04	0%	22.979	2278.250773	2278	7-tricosene
0.07	0%	23.04	2283.8953	2284	5-tricosene
0.04	0%	23.1	2289.431661	2284	5-tricosene
0.16	1%	23.207	2299.266632	2302	tricosane
0.51	2%	23.552	2327.221475	2325	(Z)-2-tricosene
0.09	0%	23.612	2332.024204	2335	9-methyltricosane
0.31	1%	23.659	2335.777214	2335	9-methyltricosane
0.08	0%	23.952	2358.99498	2360	4-methyltricosane
0.17	1%	24.455	2398.153205	2396	1-tetracosene
0.32	1%	24.539	2406.294716	2406	(E)-2-tetracosene
0.36	1%	24.739	2427.158914	2424	(Z)-2-tetracosene
0.87	3%	25.069	2461.194001	2460	3,7,11-trimethyltricosane
0.32	1%	25.521	2507.621163	2506	(E)-2-pentacosene
0.27	1%	25.805	2538.314364	2538	10-methylpentacosane
0.11	0%	26.005	2559.714099	2561	4-methylpentacosane
0.32	1%	26.186	2578.930326	2579	5,13-dimethylpentacosane
0.19	1%	26.289	2589.802511	2593	1-hexacosene
0.3	1%	26.438	2605.450287	2605	3,15-dimethylpentacosane
0.32	1%	26.522	2614.230555	2610	5,9,13-trimethylpentacosane
0.12	0%	26.568	2619.026273	2626	3,21-dimethylpentacosane
0.2	1%	26.61	2623.397268	2626	3,21-dimethylpentacosane
0.4	2%	26.675	2630.147462	2629	(Z)-2-hexacosene
0.38	1%	26.768	2639.775086	2639	9-methylhexacosane
0.46	2%	26.843	2647.513437	2648	6-methylhexacosane
0.73	3%	27.038	2667.52612	2665	2-methylhexacosane
0.47	2%	27.159	2679.86731	2681	6,13-dimethylhexacosane
0.78	3%	27.439	2708.203002	2704	2,6-dimethylhexacosane
0.72	3%	27.56	2720.353237	2720	(Z)-2-heptacosene
0.54	2%	27.802	2744.484834	2743	7-methylheptacosane
0.43	2%	28.058	2769.771233	2767	7,11-dimethylheptacosane
0.3	1%	28.277	2791.209654	2794	1-octacosene
0.2	1%	28.402	2803.367488	2805	3,15-dimethylheptacosane
0.67	3%	28.672	2829.436155	2834	14-methyloctacosane
0.27	1%	28.775	2839.31246	2839	9-methyloctacosane
0.59	2%	28.873	2848.674664	2853	5-methyloctacosane
0.31	1%	29.157	2875.617252	2875	9-nonacosene
0.3	1%	29.301	2889.172444	2886	4,12-dimethyloctacosane
0.24	1%	29.408	2899.199177	2899	2,10-dimethyloctacosane
0.26	1%	29.496	2907.416609	2905	2,6-dimethyloctacosane
0.12	0%	29.571	2914.399679	2905	2,6-dimethyloctacosane
0.6	2%	29.683	2924.79297	2932	11-methylnonacosane
0.54	2%	29.776	2933.391682	2933	9-methylnonacosane
1.42	5%	29.957	2950.045787	2948	6-methylnonacosane

0.96	4%	30.148	2967.505195	2963	9,13-dimethylnonacosane
0.35	1%	30.628	3010.872029	3008	3,7-dimethylnonacosane
0.4	2%	30.8	3026.237595	3025	15-methyltriacontane
0.75	3%	31.172	3059.163012	3064	2-methyltriacontane
0.32	1%	31.293	3069.783458	3070	9-heniatriacontene
0.16	1%	31.508	3088.548228	3094	4,10-dimethyltriacontane
0.07	0%	32.308	3157.205797	3158	4-methylhentricontane
0.05	0%	32.42	3166.67492	3165	9,19-dimethylhentriacontane
0.14	1%	32.955	3211.437509	3210	3,11-dimethylhentriacontane
0.23	1%	33.151	3227.645703	3228	11-methyldotriacontane
0.27	1%	33.393	3247.519588	3245	6-methyldotriacontane
0.3	1%	33.672	3270.245259	3274	6,10-dimethyldotriacontane
0.32	1%	34.543	3339.941156	3340	7-methyltritriacontane
0.29	1%	34.803	3360.389233	3362	2-methyltritriacontane
0.24	1%	34.952	3372.035537	3374	3-methyltritriacontane
0.11	0%	35.218	3392.698224	3398	2,23-dimethyltritriacontane
0.65	2%	35.842	3440.535777	3440	8-methyltetratriacontane
0.12	0%	35.995	3452.132153	3455	13,17-dimethyltetratriacontane
0.36	1%	36.102	3460.211439	3461	12,22-dimethyltetratriacontane
0.13	0%	36.521	3491.609781	3490	1-pentatriacontene
0.03	0%	36.61	3498.230617	3494	2,10-dimethyltetratriacontane

Table 13: CHC composition of fall collected male #5.

WM5SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
1.16	5%	20.069	2018.030593	2022	(Z)-2-eicosene
0.38	2%	20.214	2030.540869	2022	(Z)-2-eicosene
0.32	1%	20.442	2050.016622	2052	5-methyleicosane
0.3	1%	20.693	2071.186593	2071	(Z)-9-heneicosene
0.43	2%	21.256	2119.88173	2120	(Z)-2-heneicosene
0.31	1%	21.387	2131.833564	2140	11-methylheneicosane
0.75	3%	21.764	2165.793185	2164	2-methylheneicosane
1.03	4%	22.565	2239.511413	2240	10-methyldocosane
1.29	5%	22.751	2257.009757	2260	4-methyldocosane
0.89	4%	23.077	2287.311216	2284	5-tricosene
0.42	2%	23.314	2308.040559	2308	(E)-2-tricosene
0.44	2%	23.416	2316.286548	2317	2,2-dimethyldocosane
0.49	2%	23.593	2330.504757	2335	9-methyltricosane
0.51	2%	23.756	2343.497589	2342	8-methyltricosane
0.71	3%	23.942	2358.20759	2360	4-methyltricosane
0.78	3%	24.091	2369.903397	2365	2-methyltricosane
0.4	2%	24.24	2381.522034	2380	5,11-dimethyltricosane

1.49	6%	24.45	2397.768213	2396	1-tetracosene
1.11	5%	24.725	2425.704296	2424	(Z)-2-tetracosene
0.31	1%	25.134	2467.841478	2465	2-methyltetracosane
0.33	1%	25.502	2505.554768	2506	(E)-2-pentacosene
0.26	1%	25.59	2515.111673	2518	2,2-dimethyltetracosane
0.74	3%	25.805	2538.314364	2538	10-methylpentacosane
0.88	4%	26.061	2565.674625	2565	2-methylpentacosane
0.7	3%	26.242	2584.847051	2585	5,17-dimethylpentacosane
0.68	3%	26.387	2600.104921	2604	3,11-dimethylpentacosane
0.12	1%	26.554	2617.567642	2610	5,9,13-trimethylpentacosane
2.2	9%	27.089	2672.734916	2673	9-heptacosene
0.65	3%	27.359	2700.138524	2702	2,8-dimethylhexacosane
0.28	1%	29.999	2953.895088	2953	5-methylnonacosane
0.4	2%	30.404	2990.724072	2995	1-triacontene
0.35	1%	30.525	3001.626935	3004	3,13-dimethylnonacosane
0.09	0%	32.839	3201.797136	3204	3,13-dimethylhentriacontane
0.08	0%	33.258	3236.45164	3235	13-methyldotriacontane
0.43	2%	33.509	3256.992369	3258	14,18-dimethyldotriacontane
0.26	1%	33.891	3287.945693	3288	1-tritriacontene
0.65	3%	34.515	3337.729442	3340	7-methyltritriacontane
0.51	2%	34.985	3374.607885	3374	3-methyltritriacontane
0.4	2%	36.065	3457.420504	3458	4-methyltetratriacontane
0.15	1%	36.288	3474.196384	3475	3-methyltetratriacontane

Table 14: CHC composition of fall collected male #6.

WM6SF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.14	1%	20.013	2013.172751	2007	(E)-2-eicosene
0.15	1%	20.125	2022.87374	2022	(Z)-2-eicosene
0.22	1%	20.204	2029.681223	2022	(Z)-2-eicosene
0.16	1%	20.269	2035.260693	2042	9-methyleicosane
0.7	4%	20.423	2048.40266	2048	6-methyleicosane
0.82	5%	20.619	2064.974291	2064	2-methyleicosane
0.84	5%	20.81	2080.95983	2071	(Z)-9-heneicosene
0.74	4%	21.154	2110.520483	2107	(E)-2-heneicosene
0.41	2%	21.238	2118.233278	2120	(Z)-2-heneicosene
0.78	5%	21.424	2135.194957	2140	11-methylheneicosane
0.72	4%	21.657	2156.219687	2160	4-methylheneicosane
0.25	2%	21.81	2169.893302	2172	7,11-dimethylheneicosane
0.34	2%	21.899	2177.799732	2174	3-methylheneicosane
0.14	1%	22.113	2196.669814	2194	1-docosene
0.28	2%	22.211	2205.775312	2204	5,17-dimethylheneicosane

0.25	2%	22.267	2211.150467	2211	3,11-dimethylheneicosane
0.4	2%	22.42	2225.762292	2223	(Z)-2-docosene
0.23	1%	22.546	2237.715223	2239	11-methyldocosane
0.38	2%	22.658	2248.27989	2248	6-methyldocosane
0.37	2%	22.755	2257.384375	2260	4-methyldocosane
0.59	4%	22.844	2265.701354	2265	2-methyldocosane
0.59	4%	23.058	2285.557832	2284	5-tricosene
0.61	4%	23.412	2315.963902	2317	2,2-dimethyldocosane
0.37	2%	23.524	2324.975711	2325	(Z)-2-tricosene
0.57	3%	23.835	2349.760404	2348	6-methyltricosane
0.26	2%	24.04	2365.908872	2365	2-methyltricosane
0.16	1%	24.087	2369.590428	2365	2-methyltricosane
0.14	1%	24.161	2375.371366	2375	3-methyltricosane
0.19	1%	24.413	2394.916647	2396	1-tetracosene
0.21	1%	24.487	2400.840248	2403	tetracosane
0.11	1%	24.669	2419.877014	2424	(Z)-2-tetracosene
0.13	1%	24.794	2432.864979	2437	11-methyltetracosane
0.1	1%	24.841	2437.730368	2438	10-methyltetracosane
0.14	1%	24.915	2445.370876	2444	7-methyltetracosane
0.16	1%	24.981	2452.164966	2448	6-methyltetracosane
0.14	1%	25.432	2498.084584	2496	1-pentacosene
0.03	0%	28.837	2845.2394	2844	7-methyloctacosane
0.02	0%	25.954	2554.27386	2553	5-methylpentacosane
0.14	1%	26.009	2560.140304	2561	4-methylpentacosane
0.12	1%	26.093	2569.07452	2565	2-methylpentacosane
0.21	1%	26.21	2581.467713	2582	5,11-dimethylpentacosane
0.45	3%	26.549	2617.046504	2610	5,9,13-trimethylpentacosane
0.16	1%	26.624	2624.852636	2626	3,21-dimethylpentacosane
0.58	4%	26.782	2641.221326	2641	8-methylhexacosane
0.44	3%	27.001	2663.740653	2665	2-methylhexacosane
0.08	0%	27.113	2675.182511	2675	12-heptacosene
0.26	2%	27.657	2730.052706	2733	11-methylheptacosane
0.05	0%	27.792	2743.492081	2743	7-methylheptacosane
0.14	1%	27.988	2762.881354	2763	2-methylheptacosane
0.22	1%	28.589	2821.450217	2809	3,7-dimethylheptacosane
0.07	0%	28.635	2825.879185	2834	14-methyloctacosane
0.03	0%	28.705	2832.60449	2834	14-methyloctacosane
0.02	0%	31.501	3087.939409	3082	15-hentriacontene
0.14	1%	31.768	3111.061231	3108	3,7-dimethyltriacontane
0.05	0%	32.136	3142.596511	3143	6-methylhentricontane
0.02	0%	32.387	3163.888489	3165	9,19-dimethylhentriacontane
0.05	0%	33.83	3283.02752	3288	1-tritriacontene
0.11	1%	34.389	3327.7534	3328	13-methyltritriacontane

0.03	0%	34.557	3341.046309	3340	7-methyltritriacontane
0.06	0%	34.654	3348.690574	3350	5-methyltritriacontane
0.02	0%	34.859	3364.772483	3363	11,21-dimethyltritriacontane
0.12	1%	35.064	3380.75562	3380	5,17-dimethyltritriacontane
0.04	0%	36.195	3467.213306	3465	11,21-dimethyltetratriacontane
0.07	0%	36.26	3472.095923	3470	6,16-dimethyltetratriacontane

Table 15: CHC composition of fall collected male #7.

WM7LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.12	1%	20.004	2012.39065	2007	(E)-2-eicosene
0.28	2%	20.591	2062.61739	2064	2-methyleicosane
0.5	3%	20.744	2075.454058	2071	(Z)-9-heneicosene
0.28	2%	21.201	2114.840045	2120	(Z)-2-heneicosene
0.29	2%	21.471	2139.455806	2140	11-methylheneicosane
0.21	1%	21.643	2154.963307	2151	5-methylheneicosane
0.35	2%	21.987	2185.583344	2194	1-docosene
0.49	3%	22.132	2198.335677	2201	n-docosane
0.37	2%	22.257	2210.191686	2211	3,11-dimethylheneicosane
1.21	8%	22.728	2254.854333	2252	5-methyldocosane
1.2	8%	22.974	2277.787393	2278	7-tricosene
0.58	4%	23.472	2320.797392	2317	2,2-dimethyldocosane
0.22	1%	23.677	2337.212421	2338	11-methyltricosane
0.14	1%	23.873	2352.764981	2352	5-methyltricosane
0.77	5%	24.096	2370.29453	2375	3-methyltricosane
0.24	2%	24.203	2378.644016	2378	9-tetracosene
0.33	2%	25.032	2457.401831	2459	4-methyltetracosane
0.16	1%	25.162	2470.699354	2474	3-methyltetracosane
0.08	1%	25.307	2485.444987	2485	5,9-dimethyltetracosane
0.14	1%	27.159	2679.86731	2681	6,13-dimethylhexacosane
0.04	0%	27.294	2693.567683	2693	1-heptacosene
0.21	1%	28.607	2823.184189	2834	14-methyloctacosane
0.16	1%	28.821	2843.711159	2844	7-methyloctacosane
0.16	1%	28.924	2853.533539	2854	6-methyloctacosane
0.1	1%	29.766	2932.468451	2932	11-methylnonacosane
0.29	2%	29.962	2950.504336	2953	5-methylnonacosane
0.14	1%	30.213	2973.420264	2973	7,17-dimethylnonacosane
0.37	2%	30.981	3042.309797	3040	8-methyltriacontane
0.26	2%	31.14	3056.347037	3064	2-methyltriacontane
0.44	3%	31.466	3084.893171	3082	15-hentriacontene
0.34	2%	31.801	3113.904772	3108	3,7-dimethyltriacontane
0.15	1%	31.954	3127.048018	3130	11-methylhentricontane

0.29	2%	32.164	3144.980363	3143	6-methylhentricontane
0.2	1%	32.48	3171.733527	3170	7,11-dimethylhentriacontane
0.14	1%	32.695	3189.779879	3188	1-dotriacontene
0.15	1%	32.83	3201.047681	3204	3,13-dimethylhentriacontane
0.48	3%	33.365	3245.22788	3245	6-methyldotriacontane
0.56	4%	33.719	3274.054142	3274	6,10-dimethyldotriacontane
0.23	2%	34.017	3298.07521	3297	2,10-dimethyldotriacontane
0.49	3%	34.198	3312.557685	3318	16-methyltritriacontane
0.29	2%	34.371	3326.325124	3328	13-methyltritriacontane
0.4	3%	34.608	3345.068258	3344	6-methyltritriacontane
0.46	3%	34.887	3366.961343	3370	7,17-dimethyltritriacontane
0.17	1%	35.134	3386.190871	3380	5,17-dimethyltritriacontane
0.13	1%	35.669	3427.360984	3426	17-methyltetratriacontane
0.17	1%	35.851	3441.219349	3440	8-methyltetratriacontane
0.22	1%	36.275	3473.221381	3475	3-methyltetratriacontane
0.32	2%	36.614	3498.527787	3494	2,10-dimethyltetratriacontane

Table 16: CHC composition of fall collected male #8.

WM8LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.37	7%	20.088	2019.675446	2022	(Z)-2-eicosene
0.02	0%	20.363	2043.295232	2043	8-methyleicosane
0.13	2%	20.577	2061.437637	2060	4-methyleicosane
0.08	1%	20.628	2065.73113	2064	2-methyleicosane
0.11	2%	20.716	2073.112545	2071	(Z)-9-heneicosene
0.1	2%	20.861	2085.20136	2099	heneicosane
0.03	1%	21.014	2097.858949	2099	heneicosane
0.48	9%	21.359	2129.285631	2120	(Z)-2-heneicosene
0.19	4%	21.452	2137.734549	2140	11-methylheneicosane
0.18	3%	21.983	2185.230272	2194	1-docosene
0.14	3%	22.122	2197.459099	2194	1-docosene
0.05	1%	22.281	2212.491982	2211	3,11-dimethylheneicosane
0.14	3%	22.471	2230.609067	2223	(Z)-2-docosene
0.06	1%	22.523	2235.538708	2239	11-methyldocosane
0.43	8%	22.979	2278.250773	2278	7-tricosene
0.19	4%	23.025	2282.508791	2284	5-tricosene
0.14	3%	24.604	2413.095453	2410	3,9-dimethyltricosane
0.1	2%	24.841	2437.730368	2438	10-methyltetracosane
0.05	1%	24.943	2448.255561	2448	6-methyltetracosane
0.37	7%	25.837	2541.750169	2541	8-methylpentacosane
0.11	2%	26.07	2566.631294	2565	2-methylpentacosane
0.06	1%	26.936	2657.077146	2661	4-methylhexacosane

0.05	1%	26.982	2661.794623	2661	4-methylhexacosane
0.12	2%	27.029	2666.605837	2665	2-methylhexacosane
0.17	3%	28.225	2786.135219	2786	5,17-dimethylheptacosane
0.22	4%	28.36	2799.288789	2800	3,7-dimethylheptacosane
0.17	3%	28.793	2841.034576	2841	8-methyloctacosane
0.04	1%	29.445	2902.657396	2905	2,6-dimethyloctacosane
0.05	1%	29.515	2909.187427	2905	2,6-dimethyloctacosane
0.06	1%	32.662	3187.018091	3188	1-dotriacontene
0.17	3%	32.871	3204.460118	3204	3,13-dimethylhentriacontane
0.13	2%	33.155	3227.975433	3228	11-methyldotriacontane
0.34	6%	33.332	3242.524344	3245	6-methyldotriacontane
0.08	1%	33.593	3263.830507	3264	2-methyldotriacontane
0.24	4%	34.487	3335.515846	3335	9-methyltritriacontane

Table 17: CHC composition of fall collected male #9.

WM9LF					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.03	0%	20.265	2034.917902	2042	9-methyleicosane
0.08	0%	20.339	2041.24769	2042	9-methyleicosane
0.27	2%	20.586	2062.196149	2064	2-methyleicosane
0.22	1%	20.856	2084.78602	2071	(Z)-9-heneicosene
0.13	1%	21.257	2119.973267	2120	(Z)-2-heneicosene
0.25	1%	21.983	2185.230272	2194	1-docosene
0.24	1%	22.183	2203.08226	2204	5,17-dimethylheneicosane
0.38	2%	22.532	2236.390673	2239	11-methyldocosane
0.28	2%	22.625	2245.172932	2245	7-methyldocosane
0.15	1%	22.835	2264.861895	2265	2-methyldocosane
0.07	0%	23.002	2280.380925	2278	7-tricosene
0.22	1%	23.053	2285.096157	2284	5-tricosene
0.07	0%	23.314	2308.040559	2308	(E)-2-tricosene
0.23	1%	23.403	2315.237733	2317	2,2-dimethyldocosane
0.04	0%	23.496	2322.727079	2325	(Z)-2-tricosene
0.35	2%	23.607	2331.624477	2335	9-methyltricosane
0.12	1%	23.789	2346.116411	2348	6-methyltricosane
0.2	1%	23.919	2356.395256	2360	4-methyltricosane
0.24	1%	24.026	2364.810749	2365	2-methyltricosane
0.39	2%	24.147	2374.27913	2375	3-methyltricosane
0.42	2%	24.32	2387.728741	2380	5,11-dimethyltricosane
0.35	2%	24.455	2398.153205	2396	1-tetracosene
0.22	1%	24.641	2416.95807	2410	3,9-dimethyltricosane
0.17	1%	24.743	2427.574357	2424	(Z)-2-tetracosene
0.53	3%	25.116	2466.002477	2465	2-methyltetracosane

0.29	2%	25.293	2484.025207	2485	5,9-dimethyltetracosane
0.4	2%	25.353	2490.104087	2488	4,18-dimethyltetracosane
0.64	4%	25.549	2510.66339	2506	(E)-2-pentacosene
0.18	1%	25.712	2528.30323	2526	(Z)-2-pentacosene
0.08	0%	25.851	2543.251909	2544	7-methylpentacosane
0.19	1%	25.944	2553.205811	2553	5-methylpentacosane
0.13	1%	26.042	2563.653833	2565	2-methylpentacosane
0.27	2%	26.159	2576.072806	2577	7,11-dimethylpentacosane
0.22	1%	26.224	2582.946713	2582	5,11-dimethylpentacosane
0.37	2%	26.326	2593.69699	2593	1-hexacosene
0.23	1%	26.475	2609.321437	2609	(E)-2-hexacosene
0.18	1%	26.559	2618.088676	2626	3,21-dimethylpentacosane
0.31	2%	26.661	2628.695052	2629	(Z)-2-hexacosene
0.14	1%	26.708	2633.567794	2635	13-methylhexacosane
0.43	2%	26.852	2648.440495	2648	6-methylhexacosane
0.25	1%	26.959	2659.436954	2661	4-methylhexacosane
0.23	1%	27.02	2665.685229	2665	2-methylhexacosane
0.31	2%	27.108	2674.672785	2675	12-heptacosene
0.93	5%	27.402	2704.476287	2704	2,6-dimethylhexacosane
0.11	1%	27.942	2758.343767	2757	9,13-diemethylheptacosane
0.23	1%	27.993	2763.374094	2763	2-methylheptacosane
0.27	2%	28.17	2780.757238	2782	5,11-dimethylheptacosane
0.09	1%	28.328	2796.176912	2794	1-octacosene
0.1	1%	28.672	2829.436155	2834	14-methyloctacosane
0.24	1%	28.779	2839.695251	2839	9-methyloctacosane
0.16	1%	28.873	2848.674664	2853	5-methyloctacosane
0.13	1%	28.956	2856.577619	2855	4-methyloctacosane
0.23	1%	29.203	2879.955062	2878	13-nonacosene
0.14	1%	29.333	2892.175144	2895	4,10-dimethyloctacosane
0.19	1%	29.482	2906.111025	2905	2,6-dimethyloctacosane
0.19	1%	29.557	2913.097595	2905	2,6-dimethyloctacosane
0.12	1%	29.641	2920.900349	2932	11-methylnonacosane
0.25	1%	29.841	2939.38471	2941	8-methylnonacosane
0.23	1%	30.009	2954.810749	2953	5-methylnonacosane
0.14	1%	30.111	2964.132141	2963	9,13-dimethylnonacosane
0.17	1%	30.255	2977.235171	2974	3-methylnonacosane
0.17	1%	30.348	2985.662615	2982	5,9-dimethylnonacosane
0.15	1%	30.427	2992.800036	2995	1-triacontene
0.18	1%	30.576	3006.208708	3006	3,11-dimethylnonacosane
0.33	2%	30.781	3024.544686	3025	15-methyltriacontane
0.25	1%	30.912	3036.194527	3035	12-methyltriacontane
0.13	1%	31.219	3063.293459	3064	2-methyltriacontane
0.16	1%	31.829	3116.31504	3108	3,7-dimethyltriacontane

0.07	0%	31.903	3122.674307	3130	11-methylhentricontane
0.35	2%	31.94	3125.848123	3130	11-methylhentricontane
0.32	2%	32.21	3148.891956	3150	5-methylhentricontane
0.05	0%	32.462	3170.216977	3170	7,11-dimethylhentriacontane
0.11	1%	32.62	3183.498843	3182	5,17-dimethylhentriacontane
0.03	0%	32.704	3190.532585	3188	1-dotriacontene
0.13	1%	33.328	3242.196452	3240	8-methyldotriacontane
0.06	0%	33.737	3275.511388	3275	3-methyldotriacontane
0.17	1%	34.217	3314.073282	3318	16-methyltritriacontane
0.2	1%	34.575	3342.46653	3344	6-methyltritriacontane

Table 18: CHC composition of spring collected female #1.

FSS1					
%Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
0.03879373373	46%	20.69	2070.935212	2072	3-methyleicosane
0.01806413925	21%	20.825	2082.208506	2071	(Z)-9-heneicosene
0.02815211024	33%	21.723	2162.130847	2164	2-methylheneicosane

Table 19: CHC composition of spring collected female #2.

FSS2					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
6300053	8%	20.68	2070.096987	2072	3-methyleicosane
15510737	19%	20.742	2075.286921	2071	(Z)-9-heneicosene
7874487	10%	20.82	2081.792388	2071	(Z)-9-heneicosene
10395543	13%	21.437	2136.374498	2140	11-methylheneicosane
19600730	24%	21.728	2162.577873	2164	2-methylheneicosane
21055294	26%	24.161	2375.371366	2375	3-methyltricosane

Table 20: CHC composition of spring collected female #3.

FSS3					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
2606175	3%	20.571	2060.931763	2060	4-methyleicosane
8908034	11%	20.68	2070.096987	2072	3-methyleicosane
9799752	12%	21.437	2136.374498	2140	11-methylheneicosane
21674899	26%	21.728	2162.577873	2164	2-methylheneicosane
2411007	3%	22.003	2186.994939	2194	1-docosene
4902798	6%	22.864	2267.565547	2267	8,12-dimethyldocosane
4297448	5%	23.803	2347.226251	2348	6-methyltricosane
27493674	33%	24.166	2375.761286	2375	3-methyltricosane

Table 21: CHC composition of spring collected female #4.

FSS4					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
28961440	54%	20.69	2070.935212	2072	3-methyleicosane
6543920	12%	21.427	2135.467227	2140	11-methylheneicosane
18004766	34%	23.653	2335.298551	2335	9-methyltricosane

Table 22: CHC composition of spring collected female #5.

FSS5					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
11738988	13%	20.68	2070.096987	2072	3-methyleicosane
7955430	9%	20.742	2075.286921	2071	(Z)-9-heneicosene
12176494	14%	21.437	2136.374498	2140	11-methylheneicosane
31580192	36%	21.733	2163.024787	2164	2-methylheneicosane
23534577	27%	24.141	2373.810821	2375	3-methyltricosane

Table 23: CHC composition of spring collected female #6.

FSS6					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
21758393	23%	20.685	2070.516154	2072	3-methyleicosane
8273705	9%	21.427	2135.467227	2140	11-methylheneicosane
24167905	26%	21.723	2162.130847	2164	2-methylheneicosane
6174079	7%	22.859	2267.099663	2267	8,12-dimethyldocosane
4503607	5%	23.793	2346.43358	2348	6-methyltricosane
28030689	30%	24.12	2372.170759	2375	3-methyltricosane

Table 24: CHC composition of spring collected female #7.

FSS7					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
904964	100%	21.09	2104.621816	2107	(E)-2-heneicosene

Table 25: CHC composition of spring collected female #8.

FSS8					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
3384700	2%	20.28	2036.202991	2042	9-methyleicosane
5068765	3%	20.571	2060.931763	2060	4-methyleicosane
21246102	12%	21.437	2136.374498	2140	11-methylheneicosane
65833655	37%	21.748	2164.364866	2164	2-methylheneicosane
13170815	7%	22.008	2187.435835	2194	1-docosene
4270484	2%	22.573	2240.267217	2240	10-methyldocosane
12842261	7%	22.859	2267.099663	2267	8,12-dimethyldocosane

7678574	4%	23.803	2347.226251	2348	6-methyltricosane
41920656	23%	24.161	2375.371366	2375	3-methyltricosane
4883873	3%	24.421	2395.533593	2396	1-tetracosene

Table 26: CHC composition of spring collected female #9.

FSS9					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
3405075	1%	20.285	2036.631125	2042	9-methyleicosane
6212299	2%	20.669	2069.174432	2072	3-methyleicosane
17425722	5%	20.742	2075.286921	2071	(Z)-9-heneicosene
10737299	3%	20.82	2081.792388	2071	(Z)-9-heneicosene
35906591	11%	21.448	2137.371969	2140	11-methylheneicosane
63294229	19%	21.754	2164.900618	2164	2-methylheneicosane
16803197	5%	22.013	2187.876624	2194	1-docosene
8367576	3%	22.579	2240.833881	2241	9-methyldocosane
19157502	6%	22.875	2268.590106	2267	8,12-dimethyldocosane
32335502	10%	23.824	2348.8897	2348	6-methyltricosane
109243732	33%	24.177	2376.618807	2378	9-tetracosene
10493242	3%	24.442	2397.152049	2396	1-tetracosene

Table 27: CHC composition of spring collected female #10.

FSS10					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
8894214	15%	20.674	2069.593841	2072	3-methyleicosane
9187779	16%	21.427	2135.467227	2140	11-methylheneicosane
19624940	34%	21.717	2161.59427	2160	4-methylheneicosane
3865169	7%	23.788	2346.03711	2348	6-methyltricosane
16543472	28%	24.135	2373.342388	2375	3-methyltricosane

Table 28: CHC composition of spring collected female #11.

FSL12					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
4515213	1%	20.28	2036.202991	2042	9-methyleicosane
5642831	1%	20.571	2060.931763	2060	4-methyleicosane
34698992	9%	21.442	2136.827963	2140	11-methylheneicosane
87430588	23%	21.759	2165.346957	2164	2-methylheneicosane
27904375	7%	22.018	2188.317304	2194	1-docosene
13282376	3%	22.589	2241.777961	2242	8-methyldocosane
30330749	8%	22.88	2269.05564	2267	8,12-dimethyldocosane
17841104	5%	22.994	2279.640262	2278	7-tricosene
9236572	2%	23.144	2293.481856	2296	1-tricosene

27341118	7%	23.819	2348.493783	2348	6-methyltricosane
115641646	30%	24.177	2376.618807	2378	9-tetracosene
12184010	3%	24.441	2397.075013	2396	1-tetracosene

Table 29: CHC composition of spring collected male #1.

Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
3580226	1%	20.323	2039.881206	2042	9-methyleicosane
3877200	1%	20.619	2064.974291	2064	2-methyleicosane
8646160	3%	20.707	2072.359187	2071	(Z)-9-heneicosene
59979550	18%	21.496	2141.718115	2141	9-methylheneicosane
94677397	28%	21.797	2168.735519	2172	7,11-dimethylheneicosane
6725733	2%	22.051	2191.223096	2194	1-docosene
5366022	2%	22.622	2244.890239	2245	7-methyldocosane
13116315	4%	22.912	2272.032471	2273	(Z)-9-tricosene
48909776	14%	23.722	2340.79533	2341	7-methyltricosane
27435494	8%	23.862	2351.895762	2352	5-methyltricosane
68651671	20%	24.214	2379.500134	2380	5,11-dimethyltricosane

Table 30: CHC composition of spring collected male #2.

MSS2					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
16665864	42%	20.716	2073.112545	2071	(Z)-9-heneicosene
6559430	16%	21.453	2137.825182	2140	11-methylheneicosane
16761490	42%	21.749	2164.454169	2164	2-methylheneicosane

Table 31: CHC composition of spring collected male #3.

MSS3					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
6202125	3%	20.591	2062.61739	2064	2-methyleicosane
24088914	12%	20.716	2073.112545	2071	(Z)-9-heneicosene
16588563	8%	20.846	2083.955017	2071	(Z)-9-heneicosene
19471142	10%	21.463	2138.731267	2140	11-methylheneicosane
38236765	19%	21.759	2165.346957	2164	2-methylheneicosane
4533348	2%	22.023	2188.757877	2194	1-docosene
5281221	3%	22.605	2243.287554	2242	8-methyldocosane
13155532	7%	22.89	2269.98638	2267	8,12-dimethyldocosane
15278104	8%	23.834	2349.681267	2348	6-methyltricosane
55586726	28%	24.177	2376.618807	2378	9-tetracosene

Table 32: CHC composition of spring collected male #4.

MSS4					

Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
16907634	12%	20.591	2062.61739	2064	2-methyleicosane
79728032	55%	20.747	2075.704732	2071	(Z)-9-heneicosene
15546129	11%	21.743	2163.918284	2164	2-methylheneicosane
19012868	13%	24.172	2376.229077	2375	3-methyltricosane
13366364	9%	21.738	2163.471591	2164	2-methylheneicosane

Table 33: CHC composition of spring collected male #5.

MSS5					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
16907634	13%	20.591	2062.61739	2064	2-methyleicosane
79728032	61%	20.747	2075.704732	2071	(Z)-9-heneicosene
15546129	12%	21.743	2163.918284	2164	2-methylheneicosane
19012868	14%	24.172	2376.229077	2375	3-methyltricosane

Table 34: CHC composition of spring collected male #6.

MSS6					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
12413346	10%	20.586	2062.196149	2064	2-methyleicosane
47097681	38%	20.732	2074.450972	2071	(Z)-9-heneicosene
22558254	18%	20.851	2084.370573	2071	(Z)-9-heneicosene
21013581	17%	21.743	2163.918284	2164	2-methylheneicosane
19486111	16%	24.156	2374.981359	2375	3-methyltricosane

Table 35: CHC composition of spring collected male #7.

MSS7					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
5528870	2%	20.296	2037.572616	2042	9-methyleicosane
4208271	1%	20.586	2062.196149	2064	2-methyleicosane
5314121	2%	20.669	2069.174432	2072	3-methyleicosane
4000173	1%	20.742	2075.286921	2071	(Z)-9-heneicosene
39471311	14%	21.458	2138.278281	2140	11-methylheneicosane
83738039	29%	21.769	2166.239302	2164	2-methylheneicosane
19262752	7%	22.029	2189.286423	2194	1-docosene
6915930	2%	22.594	2242.249832	2242	8-methyldocosane
18986157	7%	22.885	2269.521065	2267	8,12-dimethyldocosane
15906037	6%	23.824	2348.8897	2348	6-methyltricosane
85584679	30%	24.197	2378.176866	2378	9-tetracosene

Table 36: CHC composition of spring collected male #8.

MSS8					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
41074337	100%	20.716	2073.112545	2071	(Z)-9-heneicosene

Table 37: CHC composition of spring collected male #9.

MSS9					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
11697705	100%	20.69	2070.935212	2071	(Z)-9-heneicosene

Table 38: CHC composition of spring collected male #10.

MSS10					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
23682430	100%	20.701	2071.856752	2071	(Z)-9-heneicosene

Table 39: CHC composition of spring collected male #11.

MSS11					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
10214261	18%	20.576	2061.353336	2060	4-methyleicosane
32421725	58%	20.716	2073.112545	2071	(Z)-9-heneicosene
13083686	23%	20.835	2083.040415	2071	(Z)-9-heneicosene

Table 40: CHC composition of spring collected male #12.

MSS12					
Area	%Relative Area	Retention Time	Cmpd RI	Library RI	CHC
13726627	100%	20.685	2071	2071	(Z)-9-heneicosene