Where does the border lie: Locally grown plants used for making tea for recreation and/or healing, 1970s–1990s Estonia

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ARTICLE INFO

Article history:
Received 12 May 2013
Received in revised form 7 July 2013
Accepted 11 August 2013
Available online 29 August 2013

Keywords:
Recreational tea
Medicinal tea
Folk nutraceuticals
Food culture
Herbal landscape

ABSTRACT

Ethnopharmacological relevance: Traditional use of local wild and cultivated plants for making recreational tea in Estonia often borders with the medicinal use of the same plants.

Aim of the study: The aim of this paper is to map the perceptions of plants used for making tea and to define the domains of recreational and medicinal teas in specific cultural settings.

Materials and methods: Between November 2011 and March 2012 the authors distributed electronic questionnaires on the use of wild food plants in childhood. The questionnaire was answered by 250 respondents. 178 of them reported the use of plants for making recreational teas. The responses were analysed according to the taxonomy of the used plants, the most frequently used taxa and families were detected, the influence of respondents’ demographic data on the number of use reports was assessed and the overlapping of medicinal and recreational uses was discussed.

Results: The study detected 69 vascular plant species, ten vascular taxa identified on the generic level only, and one lichen. The most popular families were Rosaceae, Asteraceae and Lamiaceae, and 12 taxa were used by at least 10% of the respondents, while only one of them (Tilia) was used by more than 50% and one (Rubus idaeus) by over 33% of the respondents. The next ten most used taxa were: Rosa, Mentha, Primula veris, Matricaria, Achillea millefolium, Hypericum, Carum carvi, Urtica dioica, Thymus serpyllum and Fragaria. Of the 30 most used consolidated taxa mentioned in five or more use records, only four were used exclusively in one domain.

Conclusions: The majority of the used plants were situated on the recreational-medicinal continuum, which could be divided into two domains: recreational, medicinal and the “grey” area that lies around the borderline. The predominance of the cold and cold-related diseases on the spectrum treated by plants used for making recreational tea reflects the climatic conditions of the region and suggests that they are the most commonly self-treated diseases in the region, seen from the child’s perspective.

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1. Introduction

There is growing interest in research on the chemical composition and potential health threat or positive effects of herbal teas (for example, see Kuljić et al., 2007; Desideri et al., 2011; Albayrak et al., 2012; Oh et al., 2013). Although many studies name the use of recreational tea a few times among food plants (Milliken and Bridgewater, 2004; Łuczaj and Szymanski, 2006; Turner et al., 2011; Svanberg, 2012), there are only a few regional studies with an emphasis on recreational tea in specific areas of Europe (Pardo de Santayana et al., 2005; Sõukand and Kalle, 2012a; Grassner et al., 2012). All the latter show that plants can simultaneously be used for making medicinal teas and teas drunk with meals, depending on circumstances and personal preferences.

While herbal tea or tisane is an English term used to denote a decoction or infusion made of herbs for medicinal purposes, there has not been a specific technical term in English for denoting herbal tea used without clear medicinal indications. For that purpose the technical term “recreational tea” was proposed to describe “herbal beverages prepared as infusions that are consumed in a food context for their general social and/or recreational value or for their general attributions of being “healthy” drinks (Sõukand et al., 2013). We will use this term from now on, as opposed to tisane e.g. herbal tea consumed for specific medicinal purposes.

The Estonian word tee has several meanings: (1) it denotes a drink made of local or imported plants, (2) it means “a road”, a path or direction, (3) as a verb it means the imperative of tegema “to do”. The phrase tee tee means “make some tea”. Nevertheless,
<table>
<thead>
<tr>
<th>Genera</th>
<th>Species</th>
<th>Hist UR tea, n=80</th>
<th>UR n-</th>
<th>Rec tea</th>
<th>Med tea</th>
<th>Parts used</th>
<th>Folk medicinal application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asteraceae</td>
<td><em>Achillea millefolium</em> L.</td>
<td>16</td>
<td>48</td>
<td>35</td>
<td>26</td>
<td>Inflorescences (44), herb (2), leaves (2)</td>
<td>Cold (7), fever (3), anaemia (3), strengthening organism (3), cough (2), internal bleeding, sore throat Sore throat</td>
</tr>
<tr>
<td></td>
<td><em>Antennaria dioica</em> (L.) Gaertn.</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Aerial parts</td>
<td>Stomach problems</td>
</tr>
<tr>
<td></td>
<td><em>Anthemis tinctoria</em> L. Calendula officinalis L.</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>Inflorescences</td>
<td>Sore throat (2), toothache (2), cold, fever</td>
</tr>
<tr>
<td></td>
<td><em>Centaurea cyanus</em> L.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Petals</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Matricaria chamomilla</em> L. (syn Chamomilla recutita (L.) Rauschert)</td>
<td>s</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>Inflorescences (12), aerial parts</td>
<td>Cold (2), inflammation (2), calming</td>
</tr>
<tr>
<td></td>
<td><em>Arctostaphylos uva-ursi</em></td>
<td>48</td>
<td>23</td>
<td>16</td>
<td>11</td>
<td>Inflorescence (21), aerial parts (6)</td>
<td>Cold (2), sore throat (2), fever (2), cough, gastritis, allergy, stomach problems, stomach virus</td>
</tr>
<tr>
<td></td>
<td><em>Equisetum arvense</em> Equisetaceae</td>
<td>s</td>
<td>20</td>
<td>15</td>
<td>10</td>
<td>Inflorescences (23), aerial parts (3)</td>
<td>Cold, cough, inflammation, stomach-ache, toothache</td>
</tr>
<tr>
<td></td>
<td><em>Calendula officinalis</em> L.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Inflorescences</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Capsella bursa-pastoris</em> Berberis vulgaris L.</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td>Leaves</td>
<td>Stomach ache</td>
</tr>
<tr>
<td></td>
<td><em>Betula pendula Roth</em></td>
<td>1</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>Leaves (6), buds (4)</td>
<td>Cough (4), cold, fever, strengthening of the organism, throat problems</td>
</tr>
<tr>
<td></td>
<td><em>Capsella bursa-pastoris</em> (L.) Medik.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Aerial parts</td>
<td>Stones, high blood pressure</td>
</tr>
<tr>
<td></td>
<td><em>Humulus lupulus</em> L.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Aerial parts</td>
<td>Insomnia</td>
</tr>
<tr>
<td></td>
<td><em>Juniperus communis</em> L.</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>Pseudo fruits (3), twigs</td>
<td>Unspecified only</td>
</tr>
<tr>
<td></td>
<td><em>Equisetum arvense</em> L.</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Aerial parts</td>
<td>Cold, bladder and kidney problems, tuberculosis, throat diseases</td>
</tr>
<tr>
<td></td>
<td><em>Arctostaphylos uva-ursi</em> (L.) Spreng.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Aerial parts</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Galium verum</em> L.</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>Inflorescences (4), aerial parts</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Ledum palustre</em> L.</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>Aerial parts (2), shoots</td>
<td>Cold, used as antiseptic</td>
</tr>
<tr>
<td></td>
<td><em>Vaccinium myrtillus</em> L.</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>Fruits (7), leaves (3), aerial parts</td>
<td>Diarrhoea (2), high blood sugar</td>
</tr>
<tr>
<td></td>
<td>*Vaccinium oxyccos L.</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>Leaves (3), fruits (2)</td>
<td>Cold</td>
</tr>
<tr>
<td></td>
<td><em>Vaccinium uliginosum</em> L.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Fruits</td>
<td>Unspecified only</td>
</tr>
<tr>
<td></td>
<td><em>Vaccinium vitis-idaea</em> L.</td>
<td>30</td>
<td>13</td>
<td>8</td>
<td>6</td>
<td>Leaves</td>
<td>Cold, bladder and kidney problems, joint problems, high blood sugar</td>
</tr>
<tr>
<td></td>
<td><em>Trifolium montanum</em> L.</td>
<td>s</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Inflorescences</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Trifolium pratense</em> L.</td>
<td>s</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Inflorescences</td>
<td>Heart diseases</td>
</tr>
<tr>
<td></td>
<td><em>Trifolium repens</em> L.</td>
<td>s</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>Inflorescences</td>
<td>Unspecified only</td>
</tr>
<tr>
<td></td>
<td><em>Trifolium spp.</em></td>
<td>12</td>
<td>2</td>
<td>2</td>
<td></td>
<td>Inflorescences</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Quercus robur</em> L.</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td></td>
<td>Bark</td>
<td>Diarrhoea (2), stomach problems (2), stomach ache</td>
</tr>
<tr>
<td></td>
<td><em>Ribes nigrum</em> L.</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>Fruits (9), leaves (4), twigs (3)</td>
<td>Cold</td>
</tr>
<tr>
<td></td>
<td><em>Hypericum muculatum</em> Crantz</td>
<td>s</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>Aerial parts, inflorescences</td>
<td>Unspecified only</td>
</tr>
<tr>
<td></td>
<td><em>Hypericum perforatum</em> L.</td>
<td>s</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>Aerial parts (7), inflorescences</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Hypericum spp.</em></td>
<td>6</td>
<td>31</td>
<td>27</td>
<td>6</td>
<td>Aerial parts (26), inflorescences (8)</td>
<td>Flu</td>
</tr>
<tr>
<td></td>
<td><em>Lamium album</em> L.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Flowers</td>
<td>Unspecified only</td>
</tr>
<tr>
<td></td>
<td><em>Melissa officinalis</em> L.</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td></td>
<td>Aerial parts (8), leaves</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Menis x piperita</em> L.</td>
<td>s</td>
<td>17</td>
<td>16</td>
<td>2</td>
<td>Aerial parts (16), leaves (8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Menis x verticillata</em> L.</td>
<td>s</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Aerial parts</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Menis aquatica</em> L.</td>
<td>s</td>
<td>6</td>
<td>6</td>
<td></td>
<td>Aerial parts (5), leaves (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Menis arvensis</em> L.</td>
<td>s</td>
<td>5</td>
<td>5</td>
<td></td>
<td>Aerial parts (4), leaves</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Menis spp.</em></td>
<td>40</td>
<td>25</td>
<td>24</td>
<td>7</td>
<td>Aerial parts (23), leaves (9)</td>
<td>Cough (2), cold</td>
</tr>
<tr>
<td></td>
<td><em>Nepeta cataria</em> L.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Aerial parts</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Origanum vulgare</em> L.</td>
<td>17</td>
<td>17</td>
<td>14</td>
<td>4</td>
<td>Aerial parts (12), inflorescence (7)</td>
<td>Cough, anxiety, insomnia</td>
</tr>
<tr>
<td></td>
<td><em>Thymus serpyllum</em> L.</td>
<td>28</td>
<td>28</td>
<td>20</td>
<td>15</td>
<td>Aerial parts (26), inflorescences (10), leaves (3)</td>
<td>Cold (5), cough (3), noseuse, fever, throat problems, bladder diseases, coughs (expectorant action)</td>
</tr>
</tbody>
</table>
the word denoting the drink tea in Estonian originates from the German Tee or the archaic Thee which in turn originate from the Chinese isha, the name given to Camellia sinensis (L.) Kunze (Theaceae).

Although Baltic Germans and the Russian elite in Estonia were already using oriental tea at the beginning of the 19th century, Estonian peasants and later even urban citizens did not adopt this custom and used a great number of local plants instead, to make a drink they nonetheless called tee (Sõukand and Kalle, 2012a). It is difficult to ascertain what the name of the herbal drink was before the adoption of the German Tee, but the practice of soaking herbs in hot water was certainly already common as a way of making medicinal drinks from local plants, as shown by the long list of medicinal plants used in the 19th–20th centuries, many of them used in the form of infusions (Sõukand and Kalle, 2011; Sõukand and Kalle, 2012b). As in English, the category of “recreational tea” hardly exists in modern Estonian everyday life, instead the term tee is used to denote both recreational and medicinal tea, although the specific terms rohutee (herb tea) or ravitee (medicinal tea) are occasionally used to specify the medicinal use of the infusion.

All of the plants historically used for making tea in Estonia were in fact also well-known and used medicinal plants (Sõukand and Kalle, 2012a). Nevertheless, when asking people to name food plants, many plants are usually listed as teetaimed. After further
questioning the researcher realizes that although many of them are really used as recreational teas, quite a large proportion of them is known and used for specific medicinal purposes. Moreover, people often drink tea as a preventive measure for mild diseases; a phenomenon recorded internationally and named “folk nutraceuticals” denoting the “grey” area between the domains of food and medicine (Pieroni and Quave, 2006).

Hence the question is: if there is a border between recreational tea and herbal tea and if so where does it lie? Our working hypothesis is that while all plants used for making recreational tea can be also used for medicinal purpose, the intensity of use in either category depends on the specific characteristics of the plant and its position within the culture. We also argue that recreational use of plants is derived from their medicinal use or is closely related to it. This is our next step in analysing the domains of medicinal and wild edible plants in Estonia.

2. Methodology

The data on the use of plants for making recreational tea originates from wider data collection on the use of wild edible plants in the childhood of the respondents. A detailed description of the collection method, methodology of plant identification and ethical concerns are provided in our previous publication (Kalle and Sõukand, 2013). The specific dataset selected for this article covers only a group of people and relays greatly on authors’ feedback to the respondents. The second contact activated the passive “mental herbaria” (e.g. the whole body of skills and knowledge associated with plants Kołodziejska-Dęgór ska, 2012) as a fairly many respondents added more plants to the tea domain (both recreational and medicinal). While generally the first response contained only the word tea, and just a few ravitee, it was easy to misinterpret it. Along with other respondent-specific comments, the follow-up question addressed the clarification of the domain of the plants listed as tea or if the person was not listed any tea, and if such was made and in which domain the plants belong. The additional clarifications added new plants and specific medicinal use to many tea’s, but also revealed that some plants were in fact used only for medicinal purposes.

2.1. Data analysis

All the questionnaire responses were entered into a Microsoft Excel spread sheet, and all records regarding the use of plants for making tea were extracted from it. All the Use Reports (UR, Tardìo and Pardo-de-Santayana, 2008) referring to tea were structured according to purpose of use (e.g. medicinal or recreational). Plant synonyms were unified according to The Plant List (2010). As some respondents used several parts of the plant (e.g. fruits, leaves, aerial parts, flowers etc.) in different forms (fresh, dried, frozen, cooked (jam)), the frequency of used parts was calculated separately from UR’s (Table 1, column “parts used”). The mean and median numbers of plants used per person were calculated. Statistical significance of the demographic data was evaluated using (a) Welch Two Sample t-test for comparing two groups; (b) Kruskal–Wallis chi-squared test in data package MASS in R (R Development Core Team, 2012) for comparing more than two groups.

Results of the present study were compared with the list of the plants used for making recreational tea based on historical data (Kalle and Sõukand, 2013). Following advice given in some recent publications (Luzcjay and Kujawska, 2012; Menendez-Baceta et al., 2012), the authors also decided to include uses mentioned by only one respondent, as some of those plants were quite popular in earlier data. We also decided to include those few species used for medicinal purposes only, as they were initially mentioned by respondents as recreational teas. Newly mentioned flora was identified and the changes were further discussed.

To evaluate the relative importance of the plants in either domain (food or medicine), the use reports from both domains were compared and the plants belonging to two different domains (recreational or medicinal) were detected among the plants whose use was reported by at least five persons. The species of commonly used genera were combined, if the species were generally perceived as one taxa by lay people. Nevertheless we did not combine the clearly distinguishable Vaccinium species.

2.2. Respondents

The use of plants for making tea was reported by 178 out of 250 respondents. Of them, 39 were men and 139 women. This corresponds to the general proportion of men and women in the whole survey – 70/180 respectively.

Of the selected correspondents, 45 had advanced knowledge in botany (at least some botanical training at graduate or vocational level).

The educational level of the respondents and the area of competence of those respondents who had graduated (134) are provided in Figs. 1 and 2 respectively. Of the post-graduate respon-
The high proportion of the respondents from Lääne County is due to a collective answer from one school. This is also the reason for the high number of younger respondents (born in 1990s), while almost half of the respondents were born in 1960s–1970s (Fig. 5).

2.3. Cultural and socio-economic background

Estonia is the northern of three Baltic countries that were annexed by the Soviet regime in the period 1944–1991, where the childhood of the majority of the respondents took place. Even then, Estonians remained the dominant population regardless of deportations and numerous influxes of Russian speaking workers. Although post-war times were hard and full of Soviet terror, there was no memory of serious collective hunger and hardship after the 1960s. While it was dangerous to express political opinions, every person had the right (and obligation) to work and regardless of unilateral selections in retail systems, the basic needs of the population were met. Black tea, a popular drink among the Russian

![Fig. 3. Origin of the respondents: V – village, T – town, C – city (Tallinn), combination of V, C and T indicates that respondents spent some time during their childhood in several locations.](image1)

![Fig. 4. Distribution of the respondents within counties in Estonia. In addition, 34 respondents were linked to at least two counties and two spent their childhood outside the administrative borders of the present Estonia.](image2)

![Fig. 5. Division of respondents according to decades of birth.](image3)
speaking population, was cheap and available in every shop, although not very often used by Estonian speaking population. As food-shops were poorly supplied, everyone had to take care of their own food, so having a strip of land outside the town was very popular. Although extensive, small farm agriculture was forcibly abandoned after WW II in favour of Soviet intensive collective farming, people still had better access to natural resources compared to the present population, as a very large proportion of them still lived in the countryside. Botanical education at school also reached a very high level, and all pupils had to collect a specific amount of medicinal plants, so general knowledge about the most common plants is relatively good among the population born until 1990s.

2.4. Limitations

The methodology of the data collection sets specific limits to the results:

1. The questionnaire asked specifically for the wild edible plans and did not attract the attention of those who used plants mostly for medicinal purposes.
2. There were up to 30% of all respondents whom the authors could not contact for the additional questions, including all pupils.
3. The responses reflected the child’s view on the use of plants and may not reflect the actual use of plants in the household. Still, majority of the respondents were adults while answering the questionnaire. Many of them were continuing the practice in their adulthood; some had chance to “refresh” their memory on the use of plants with their parents or siblings.
4. Respondents do not correspond to a general cross-section of the population of Estonia due to the high proportion of people with higher education (especially respondents with a PhD) and an inadequate distribution of age and place of origin, so the results could not be carried over to the whole population.

Nevertheless, this is the best available data from the given period of time and the sample is representative enough to cover the best known food and medicinal plants used for making tea in the childhood of the respondents.

3. Results and discussion

Table 1 shows all species listed as recreational and/or medicinal tea (ordered by family). It contains 69 vascular plants species, ten vascular taxa identified on the genera level only, and one lichen. This is a larger number than was found in the results of our previous research based on historical data (Sõukand and Kalle, 2012a), even after counting out those 12 species that (after closer examination) were proven to be used for medicinal purposes only. Moreover, it contained 17 newly mentioned species used for making recreational tea and a few of them (Calendula officinalis, Vaccinium oxyccocos, Taraxacum officinale and Melissa officinalis) were used by at least five people. Two species previously reported as used more than once (Acer platanoides L. and Prunus domestica L.) were missing. Surprisingly, there was a considerable decrease in the use of two species from Rosaceae, the previously extremely popular Malus domestica and Sorbus aucuparia. This could be explained by the workload associated with peeling the apple, but this does not give a full explanation as leaves and flowers were also historically used. It may be associated with the ascribing of apples to the “cultivated” domain, although there are numbers of reports on the use of “wild” apples (either Malus domestica, which run wild, or Malus sylvestris Mill., which is rare in Estonia) as a snack; nevertheless, Sorbus aucuparia is still perceived in Estonia as “wild” and its fruits are used widely for making jams and wine with apples and other fruits (Kalle and Sõukand, 2013).

Among the taxa listed, nine species were cultivated-only (among them the often used Matricaria chamomilla, Melissa officinalis, Calendula officinalis and Mentha × piperita), three genera contained cultivars and wild-growing species (Matricaria, Mentha and Tilia), one (Ribes nigrum) is a native wild species that was also widely cultivated and the rest were wild local species. The low number of cultivated plants could be predictable, as the research was focused on wild food plants. Nevertheless, the follow-up question asked for all (incl. cultivated) plants used for making recreational and medicinal tea, and (based on the responses of the focus group) the number of cultivated plants included in the responses was quite considerable, (Kalle and Sõukand, 2013).

The taxa corresponded to 25 families and 56 genera, among them:

- The greatest number of species (17) belongs to Rosaceae, containing 191 UR of the species and genera of the family.
- The next frequently used families are Asteraceae and Lamia-ceae: 11 taxa 133 UR and ten taxa 110 UR respectively.
- 12 taxa were used by at least 10% of the respondents, but only one of them (Tilia spp) was used by more than 50% of the respondents, while one more (Rubus idaeus) was used by at least 33% of the respondents (Fig. 6).
- Over half (13) of the families are represented by only one species, and only 24% (six) families are represented by more than two species.

The mean and median numbers of plants used per respondent were respectively 5.4 and 4, while the division of UR per respondent is provided in Fig. 7. There was no statistically significant difference in the number of plants listed based on the sex of the informant.

The difference among the number of plants listed by 133 lay respondents and those 45 people with advanced botanical knowledge was not statistically significant (p = 0.05171), with the mean being respectively 5 and 6.6. This was rather surprising, as the number of listed taxa differed significantly based on present education level (p = 1.043e-07) (Fig. 8) and area of competence (p = 1.408e-06) (Fig. 9).

In fact, there was only one group that contributed to statistical significance, supplying the smallest number of plants used for making tea. This was a group of schoolchildren, whose childhood is in modern Estonia and whose knowledge about plant use (in particular medicinal) is limited due to age, despite a deep interest in nature (the school has an ecological focus). The division
of the UR in relation to the respondent’s year of birth is provided in Fig. 10.

Also, there was a statistically significant, although not linear, influence of level of urbanisation of the place of origin of the respondent \((p = 0.03084)\) (Fig. 11). It could be coincidental, that a greater knowledge of plant use \((\text{mean } 7)\) was held by the 10% of the respondents who happened to spend their childhood combining city and village life (which usually meant that they lived in the city, but spent summers in the countryside with their grandparents). Urban families visiting the countryside had a better appreciation for natural resources and also visited distant parts of the community herbal landscape \((\text{cf. } \text{Sõukand and Kalle, 2010a, b})\). They (or more often their parents) had better access to and supposedly more interest in popular literature on the use of (medicinal) plants. Nevertheless, the relatively low mean number of plants used \((4.4)\) by village-only dwellers could partly be due to the high percentage of the overall number of respondents who belonged to this group, including a large number of pupils.

3.1. Most frequently used taxa for making recreational tea

The first two popular families are also popular wild food plants in Estonia \((\text{Kalle and Sõukand, 2012, 2013})\), while Lamiaceae is the most popular family of plants used for recreational tea in Europe \((\text{Sõukand et al., 2013})\). The proportion of URs of the Rosaceae family, to the sum of 845 URs, could be explained simply by the great number of popular species in the family containing two out of four of the most popular species or genera. Nevertheless, there are different reasons behind the popularity of specific highly used species or genera. The following paragraphs present the use of the nine most frequently used taxa in order of extent of use, searching for an explanation for the popularity of the plants in the recreational domain. We also analyse their medicinal use among the respondents and beyond, based on their historical uses \((\text{Sõukand and Kalle, 2008})\).

3.1.1. Tilia

A tall deciduous tree, native to Europe, represented in Estonia \((\text{Kalle and Sõukand, 2012, 2013})\), while Lamiaceae is the most popular family of plants used for recreational tea in Europe \((\text{Sõukand et al., 2013})\). The former is usually a home-yard tree in the countryside, recognised by lay people through its late flowering and smaller leaves and flowers. Although it was one of two of the most popular teetaimel, based on historical data as well, its first mention as an element of infusions dates back to the third decade of the 20th century \((\text{Sõukand and Kalle, 2012a})\), while the use of the inner bark of
*Tilia* species to cure burn wounds was already reported in the first folklore records (in the 1890s) (Sõukand and Kalle, 2008). Later, the frequency of use of the inner bark decreased, but the use of inflorescences increased: they were used more or less against everything, but mostly coughs, tuberculosis and colds, being one of the most popular medicinal plants of the 20th century (Sõukand and Kalle, 2008, 2011, 2012b), when inflorescences became the symbol of the *Tilia* tree (Sõukand and Kalle, 2010a). The only popular herbal published during the Soviet regime advertised the infusion of inflorescences as popular medicine against cold, cough, kidney and respiratory diseases, also to be used to promote sweating (Tammeorg et al., 1972). The use of inflorescences for making recreational tea was promoted in numerous articles, but voices were also raised against their use because of the high healing potential of the resulting tea, deemed unsuitable for recreational use (Sõukand and Kalle, 2012a). The leaves and buds of *Tilia* species were also used as snacks (Kalle and Sõukand, 2013), and its sap was tapped for drinking (Svanberg et al., 2012).

The international use of *Tilia* is quite similar. *Tilia* is the third most popular genera for making recreational tea in Europe (Sõukand et al., 2013). Therapeutic uses of *Tilia* cordata infusions against colds and cold-related coughs and for the induction of sweating, as well as hypertension and restlesslessness, have been proven by several international commissions with no contra-indications or side effects known (Blumenthal et al., 2000).

### 3.1.2. *Rubus idaeus*

*Rubus idaeus* is a perennial plant with biennial stems, which start flowering and bear red fruits in the second year; native to Europe. The one year old stems are predominantly collected in winter and used, usually instantly, for making recreational tea. The use of leafless stems is quite unique as no other known international reference support it, while the recreational use of leaves and leaved stems is common (Rediki, 2006, 2010; Lučzaj, 2008, 2010, 2012; Dénes et al., 2012; Grasser et al., 2012). The plant is common in forest clearings, but also under tree canopies. Although *Rubus idaeus* is often cultivated in Estonia, stems of the cultivars are rarely used, as no-one wanted to destroy the plantation, and also because it was believed that the taste of tea made of wild plants is more intense. Many respondents recalled memories of pots of raspberry stem tea remaining at the edge of the stove all day in winter, with the liquid acquiring a more intense colour and taste at the end of the day. Leaves were also usually used fresh, making this one of the few dominantly freshly used plants, although fruits were often used in the form of jam (prepared by adding hot water to jam, still called *tee*). *Rubus idaeus* was one of the first plants mentioned in folklore for making recreational tea, being one of the six most popular plants, based on folklore data, and the second most promoted *teetaim* in the literature (Sõukand and Kalle, 2012a). Its folk medicinal use is diverse, still it is mostly used against colds and other related illnesses such as coughs and fever, with quite modest use continuing until the end of the 20th century (Sõukand and Kalle, 2008, 2011). The infusion of dried fruits was prized in the popular herbal (Tammeorg et al., 1972) for inducing sweating in cold and fever, so the results of the recent study conducted in Estonia among visitors to pharmacies were not surprising: *Rubus idaeus* proved to be the most popular local wild plant for the complementary treatment of colds and flu, although mostly among Russian speaking population (Raal et al., 2013), its international use against cold is also well-documented (Leporatti and Ivancheva, 2003, Mustafa et al., 2012a). Food use of raspberry plants was also diverse, although aggregate fruit was mostly eaten as a snack, it was also used for making jams, compotes, and wines; stems and leaves were also added to lacto fermented cucumbers (Kalle and Sõukand 2012, 2013).

### 3.1.3. *Primula veris*

This perennial plant was well recognised by its yellow flowers, abundantly appearing in early summer, and appreciated by children as one of the first flowers suitable for sucking nectar. Its inflorescences were among the eight most popular components of recreational tea, based on historical data, although not mentioned in the literature until the second part of the 20th century, besides one argument against their use (Sõukand and Kalle, 2012a). Its folk medicinal use has also been quite diverse, although in form of infusions it was drunk mostly against colds (supported also by international traditional use (Leporatti and Ivancheva, 2003; Allen and Hatfield, 2004; Mustafa et al., 2012b) and as a source of vitamins (Sõukand and Kalle, 2008), its folk use against rheumatic diseases may have roots in old European herbas (Adams et al., 2009). The use of a decoction of roots (which can be substituted by leaves and inflorescences) as an expectorant and relaxing was advertised in a popular herbal (Tammeorg et al., 1972). Nevertheless, the roots were rarely used. Different aerial parts of the plant were used for making food (snacks, wine, salads, beer-like products) (Kalle and Sõukand 2012, 2013).

The inflorescences of *Primula* species contain small quantities of essential oils, flavonoids (apigenin and luteolin), carotenoids, saponines, kaempferol and quercetin glycosides (Adams et al., 2009).

### 3.1.4. *Rosa*

There are 11 native wild species of *Rosa* growing in Estonia, those referred to by respondents with an advanced level of botanical education were *Rosa vosagiaca*, *Rosa rugosa* and *Rosa magalis*, but other species could be used as well. Its bushes are common on seashores and other dryer places, like forests and meadows. Its cultivated relatives, counted in their thousands, have also been planted in parks, but they are not normally used for making tea. The fruits of *Rosa* are either used for tea, dried (most commonly), fresh or cooked in jam. It was not very popular according to folklore sources, few uses of flowers and fruits are mentioned only since the 1930s, and suggested by very few literary sources (Sõukand and Kalle, 2012a). Nevertheless, its medicinal use is very diverse, ranging from mythological diseases to vitamin supplementation (Sõukand and Kalle, 2008), the latter being advertised by a popular herbal (Tammeorg et al., 1972). Rose hips and flowers have been used as snacks and for making jams and syrups, but also as a bread ingredient in famine times (Kalle and Sõukand, 2012, 2013).

The hips of *Rosa* family plants were and still are widely used in North America and Eurasia for making tea (Turner et al., 2011). Hips of *Rosa* species contain a high amount of vitamin C (which gives the tea a sour taste), but also other vitamins, flavonoids, sugars, pectin and organic acids.

### 3.1.5. *Mentha*

There are several species of *Mentha* growing in Estonia, the most well-known (named) and used for making tea are *Mentha xiphiura*, *Mentha aquatica*, *Mentha arvensis*, *Mentha xverticillata*, but *Malva crispa* L. and several hybrids can also be used. All specifications on the species level are provided by respondents with an advanced level of botanical education, as lay people rarely differentiate between different *Mentha* species: for example one can talk about peppermint growing in the river (referring actually to *Mentha aquatica*), as the latter was used long ago before peppermint was even introduced into rural gardening. Although *Mentha xiphiura* is very popular now, its use is of quite recent origin as *Mentha arvensis* and *Mentha aquatica* were traditionally used instead (Sõukand and Kalle, 2011). The tea made of *Mentha* species is appreciated for its specific taste and, according to historical data
was a very popular recreational tea, regardless of the fact that it was almost never suggested in popular literature (Sõukand and Kalle, 2012a). As folk medicinal plants, Mentha species were not highly appreciated and although they were used quite multifariously (from insect repellents, and specific diagnoses to cold related diseases and dyspepsia) (Sõukand and Kalle, 2008, 2012b; Sõukand et al., 2010), it is rather difficult to detect a specific use area. In folk cuisine it was also widely used as a spice for various foods (Kalle and Sõukand, 2012, 2013). Mentha species are also an internationally popular component of recreational tea (Luczaj, 2008, 2010; Redzik, 2010; Turner et al., 2011), in fact they are the most popular genera for recreational tea in Europe (Sõukand et al., 2013). The high popularity of Mentha species in Europe may have its roots in the Dioscoridean tradition and its duplications throughout the 19th century (De Vos, 2010).

Not all Mentha species are thoroughly researched, and only essential oil of M. arvensis and Mentha xpiperita, as well as the leaves of the former, have of official approval from Commission E for use in human treatment of the gastrointestinal and upper respiratory tract as well as other related ailments; although it must be not used in the case of gallstone (Blumenthal et al., 2000). Mentha spicata contains essential oil with terpenes, which show AChE activity, affecting memory disorders (Adersen et al., 2006).

3.1.6. Matricaria

There are two species of Matricaria growing in Estonia: Matricaria matricariodes, introduced at the beginning of the 19th century, naturalised widely, and common on every well-trodden path, and Matricaria chamomilla, introduced earlier (mid-18th century), but mostly cultivated and not surviving in the wild for more than a few years. They are difficult to differentiate on the name level, and people without special botanical education do not pay attention to the particular species they are using, so the more popularly used was Matricaria matricariodes, as it was more available. Nevertheless, the “right” Matricaria was considered to be Matricaria chamomilla, as it was the one sold in pharmacies and suggested by doctors as an official medicinal plant. Comparing historical sources, the high popularity of the recreational tea made of Matricaria species is quite strongly related to their medicinal use, proportionally more than of any other previously mentioned taxa (Sõukand and Kalle, 2012a). Although it was mentioned in folklore just a few times, at the end of the 19th century, it became the most popular medicinal plant by the end of the 20th century, used for literally every ailment (Sõukand and Kalle, 2008, 2011), most of its popularity probably coming from books. The only food use of the taxa was recreational tea (Kalle and Sõukand, 2012, 2013). The use of recreational tea made of Matricaria species is quite common in Europe (Sõukand et al., 2012), although the majority of uses originate in Eastern Europe (Luczaj, 2008, 2012; Dènes et al., 2012; Luczaj et al., 2013). The international medicinal use of Matricaria recutita seems to be much more focused (Jarić et al., 2007; Motti et al., 2009, Grasser et al., 2012), not as diverse as it was in Estonia, probably owing its focus to medieval herbalists (Leonti et al., 2010; De Vos, 2010).

Indeed, only Matricaria recutita flowers are approved by Commission E for internal use against inflammatory diseases and gastrointestinal tract ailments; it contains flavonoids sesquiterpen lactones, mucilage, amino acids, fatty acids, phenolic acids, choline and coumarins and does not have any known contradictions or side-effects (Blumenthal et al., 2000).

3.1.7. Achillea millefolium

A perennial herb native to Europe, it is well known among Estonians for its white inflorescences, specific smell and the popular use of its bruised leaves to stop bleeding. It was also a rather popular teetaim, based on folklore, but had little use as a food plant (Sõukand and Kalle, 2012a; Kalle and Sõukand 2012, 2013). Folk medicinal use of yarrow has also been quite diverse as it is believed to be used against 99 diseases, but still the use of infusions is mostly targeted against colds and their symptoms and stomach problems, as well as anaemia and other blood-related diseases (Sõukand and Kalle, 2008, 2012b). The plant has been the most used apophyte (plant preferring human activity in its habitat) in Estonian folk medicine since the end of the 19th century (Sõukand and Kalle, 2011). In popular herbal it has been declared to work as an appetiser and against digestion problems, but mostly as a tea used against bleeding (from nose, lungs and wounds), haemorrhoids and irregular menstruations (Tammegoj et al., 1972).

Internationally, yarrow is used mostly for medicinal purposes only (Leporatti and Ivancheva, 2003, Jarić et al., 2007, Grasser et al., 2012, Mustafa et al., 2012a, b, Rexhepi et al., in press). Achillea millefolia contains tannins, essential oils, flavonoids, amino, phenolic and fatty acids, vitamins, alkaloids, sugars and coumarins; it has proven choleretic, antibacterial, aromatic and antispasmodic activities, while its anti-inflammatory properties are due to its high flavonoid content (Blumenthal et al., 2000).

3.1.8. Hypericum

There are four native species of Hypericum growing in Estonia, but only two are widely grown and thus mostly used: Hypericum perforatum and Hypericum maculatum. Lay people do not differentiate between the two, and even for respondents with an advanced level of botanical education it is a difficult task, as the two species can hybridise. In the 19th century they shared a vernacular name (maistepuna) with several other herbaceous plants that had a similar appearance, habitat or other features (Sõukand and Kalle, 2010a), but now the official name maistepuna is rather the fixed name for this genera only. Their food use is restricted to recreational tea, and some use as spices according to historical data (Kalle and Sõukand, 2012, 2013). Regardless of the lack of references in the popular literature, its popularity as recreational tea was already notable in historical data (Sõukand and Kalle, 2012a), and is even more important in present data. This could be related to the fact that the taxon has been quite an important universally used medicinal plant throughout the second part of the 20th century, recently used mainly against colds and related symptoms, while its earlier use was more related to women’s health problems (Sõukand and Kalle, 2008, 2011). Regardless of the fact that the use of Hypericum against depressive moods was already mentioned in the European literature in the 18th century (Leonti, 2011), a widespread red alcoholic drink made, among other choices, of Hypericum species and drunk ritually on a specific date by women to have “red chicks”, seems to be of regional origin. Nevertheless, some respondents of the present survey claimed that they did not remember or simply did not know the reasons the tea was drunk in their childhood, leaving recreational tea as the only option for its use.

Hypericum species are some of the most common plants used in SE and SW Europe (Quave et al., 2012; Šarić-Kundalic et al., 2010; Mustafa et al., 2012b; Rexhepi et al., in press), being used as recreational tea only in limited regions (Pardo de Santayana et al., 2005; Tardio et al., 2006).

Only the chemical composition of Hypericum perforatum is well studied: it contains tannins and proanthocyanidins, flavonoids, bioflavonoids, phloroglucinol derivatives, phenolic acids, essential oils, sterols, vitamins (C and A) and xanthones; although there is a risk of photosensitisation in fair-skinned individuals, its anti-depressive use has been approved by Commission E (Blumenthal et al., 2000).
3.1.9. Carum carvi

Caraway is a biennial plant common around human settlements on rarely mown meadows. It was well known in all peasant households, as seeds were used as spices and preservatives for diverse dishes, and were also collected for landlords as part of an annual payment (Kalle and Sõukand 2012, 2013; Sõukand and Kalle, 2012a). Due to its diverse use, it was also the historically most frequently used retrieved, although it was barely advertised as such in the literature, on the contrary, it was even considered unsuitable for making tea according to one reference (Sõukand and Kalle, 2012a). The medicinal use of seeds is also very diverse, covering all possible stomach problems, but also a variety of other uses such as against colds, tuberculosis, fever, sleep problems etc. (Sõukand and Kalle, 2008), probably simply because it was “at hand” in times of need. In a popular herbal, caraway seeds were declared to be an appetiser, digestive, useful for stomach pain relief, spasmylytic, diuretic and a means of promoting milk production in humans, as well as an expectorant (Tammeorg et al., 1972).

Traditional use of Carum carvi seed in the form of infusions or decoctions is scarce, internationally, mostly related to medicinal use (Leporatti and Ivancheva, 2003; Tardío et al., 2006; Grasser et al., 2012). Carum carvi contains toxic cicotoxin-like compounds, in small quantities not dangerous to humans (Panter, 2005), but also essential oils, flavonoids and tannins.

3.2. Overlapping between recreational and medicinal uses

Only 120 URs were found with reported overlapping uses of the same plant for medicinal and recreational purposes, which is slightly less than the URs of medicinal use of the selected plants (Fig. 12). Nevertheless, the structure of distribution of these overlapping uses between specific plants is quite interesting, showing that the more the plant is listed as food or as a medicinal plant, the greater the chances that it will have overlapping uses (Fig. 13).

According to the free-style answers of the respondents, there are only two differences in preparation or intake regulation of recreational or medicinal tea for the majority of plants: the intensity of the infusion and the regularity of use. The listed plants that are used predominantly as recreational tea are occasionally taken as medicine in the case of acute illness, based on their perceived medicinal properties. The first four most popularly used taxa are dominantly used against common colds and related conditions (cough, fever, etc.). While the next plants on the list add some diversity of use (digestive problems, haematopoiesis, general strengthening of the organism, etc.). The main focus point of the vast majority of the taxa at the top of the list is cold-related disease. This is very different from the results obtained in Spain, where the major problems treated with plants called té are related to digestion problems (Pardo de Santayana et al., 2005). Grasser et al. (2012) provides a wide diversity of medicinal use of plant infusions in the Austrian Alps, including modern diseases like allergies and female health, although colds and related diseases already draw attention. We believe that such differences in the selection of the plants and their perceived usefulness is related both to the climatic conditions of Estonia (long winter, little sunlight, rather cold summer), and to the strong tradition of the use of plants to self-treat colds and related diseases (see also Raa1 et al., 2013).

3.2.1. Plants used mostly for making recreational tea

While among taxa listed by at least 5 respondents only two plants (Melissa officianlis and Taraxacum officinale) have been reported as used only for making recreational tea, the number of plants used for recreational tea and for some medicinal applications is far greater. Primula veris, Rosa, Mentha, Origanum vulgare, Trifolium and Plantago major, Ribes nigrum and Sorbus aucuparia are used as recreational teas not because of their medicinal properties or perceived health benefits, but for their pleasant taste and the habit of drinking herbal teas instead of oriental teas, so their health-related uses are rather side-effects (see left upper part
of Fig. 14). They are often used fresh. In addition, there are also a few species (Carum carvi, Hypericum) that have been historically important medicinal plants, but their medicinal use is either forgotten or not emphasised by the respondents. Thus they are collected as material for recreational tea, but their perceived medicinal properties or the idea that they are good for health is kept in mind.

Moreover, there are a few species (Carum carvi, Hypericum) that have been historically important medicinal plants, but their medicinal use is either forgotten or not emphasised by the respondents. Thus they are collected as material for recreational tea, but their perceived medicinal properties or the idea that they are good for health are kept in mind.

3.2.2. Plants with dominating medicinal use

There are also some plants that are mainly used as medicinal plants, but are occasionally used as recreational tea (or were first reported as recreational tea, although after future consideration were categorised by the respondents into the domain of medicinal plants only): see upper right part of Fig. 14. Those few (Cetraria islandica, Tussilago farfara, Quercus robur, Valeriana officinalis, Filipendula ulmaria) plants with quite specific applications all have a distinct (culturally considered unpleasant) taste. The plants are stocked as medicinal plants and their recreational use, if any, is merely a “taste trial” or used because no other option was available at hand.

3.2.3. “Grey” area

In-between these two categories lay a few plants (Tilia, Rubus idaeus, Marticaria, Achillea millefolium, Thymus serpyllum, Urtica dioica, Vaccinium vitis-idaea, Betula) that are almost equally used in both domains. In the case of illness, they are routinely drunk as complementary to other remedies, or in the case of minor diseases (as fever or cold) as an addition to simple rest. Their medicinal use of Fragaria species is rather modest in folklore as well (Sõukand and Kalle, 2008), although they were also widely used for making recreational tea in earlier times (Sõukand and Kalle, 2012a). Vaccinium oxyccocos, also had a restricted medicinal use (Sõukand and Kalle, 2008), but, in contrast to Fragaria, they were not used for making tea according to historical data, regardless of the acknowledgement of their usefulness in the popular literature (Sõukand and Kalle, 2012a). Calendula officinalis is a fairly recently introduced medicinal plant with a rather universal use, while Arctostaphylos uva-ursi is a well-known and propagated local medicinal plant for specific use (kidney and bladder diseases) and its use as recreational tea by some people is most certainly derived from its attribution to the domain of medicinal plants.

Hence, although we can draw a conditional borderline between the two domains, this is still a recreational-medicinal continuum.

3.2.4. Plants used without overlapping

There are also a few plants that were used either for recreational or medicinal purposes. Two of them are mostly used for recreation (Fragaria, Alchemilla vulgaris and Vaccinium oxyccocos) and two mostly as medicinal (Calendula officinalis and Arctostaphylos uva-ursi). The medicinal use of Fragaria species is rather modest in folklore as well (Sõukand and Kalle, 2008), although they were also widely used for making recreational tea in earlier times (Sõukand and Kalle, 2012a). Vaccinium oxyccocos, also had a restricted medicinal use (Sõukand and Kalle, 2008), but, in contrast to Fragaria, they were not used for making tea according to historical data, regardless of the acknowledgement of their usefulness in the popular literature (Sõukand and Kalle, 2012a). Calendula officinalis is a fairly recently introduced medicinal plant with a rather universal use, while Arctostaphylos uva-ursi is a well-known and propagated local medicinal plant for specific use (kidney and bladder diseases) and its use as recreational tea by some people is most certainly derived from its attribution to the domain of medicinal plants.

Hence, although we can draw a conditional borderline between the two domains, this is still a recreational-medicinal continuum.

3.2.5. Personal approach

Pieroni and Quave (2006) suggested that the use of a plant as a “folk nutraceutical” strongly depends on personal preferences. It is not a widespread habit, only 74 out of 178 respondents reported the use of plants for both recreational and medicinal tea. Of them, only 43 (24%) used at least one plant for both applications (medicine and food). This indicates that the practice of simultaneous use of one plant for both recreational and medicinal infusions is not very common within the population and that the...
majority of the respondents of this particular survey hold the two domains separately. Fig. 15 shows that the more plants a person uses, the more likely it is that they use the same plants for both purposes.

4. Conclusions

Even considering the limitations of the study (see p 2.4), the research contributes to a better understanding of the dual use of plants in both medicinal and food domains by not only documenting the plants used, but also by mapping the position of specific plants between two domains. Nevertheless, drawing of a border line is rather difficult, as all, but two, taxa intensively used for making recreational tea were also used for making infusions for medicinal purposes. Instead, there is a continuum. The position of the specific plant on this continuum may differ depending on time or research settings and the use of a plant for either recreational or medicinal tea depends on two characteristics:

1. **taste** (if it is culturally considered good, it belongs to the “predominantly recreational domain”, if not, it stays on the borderline or belong to the “predominantly medicinal domain”).
2. **perceived medicinal properties** (if the medicinal use of the plant is not emphasised or is considered rather broad, multifunctional and mild, the plant goes to the “predominantly recreational” domain; if its perceived medicinal properties are considered strong and rather focused, it is placed in the “predominantly medicinal domain” or falls on the borderline).

The recreational use of plants is, either historically or based on the present study, related to the culturally established medicinal properties of the plant, and thus we can conclude that the recreational use of plants is derived from their medicinal use. The predominance of colds and cold related diseases in the spectrum of ailments treated by plants, which are also used for making recreational tea, reflects the climatic conditions of the region and suggests that they are the most commonly self-treated diseases in the region.

Future in-depth research is needed to document the exact technology that lay people use to make either recreational or medicinal tea. Also, the documentation of the modern use of plants for recreational tea will reveal changes occurring over time in respect of situating the plants on a continuum between the two domains. As use of plants for recreational tea is rather widespread in Estonia, there is also a need for future investigation of the safety of the most popular recreational tea plants for everyday use.

Acknowledgements

The research has been supported by ESF Grants ETF9419 and SF003018108. Many thanks to all our inspiring correspondents, to Sarah Łuczaj for language editing, and to anonymous reviewers for valuable suggestions.

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