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The use of the local flora in Switzerland: A comparison of past and recent medicinal plant knowledge

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ABSTRACT

Ethnopharmacological relevance: This analysis of documented medicinal plants of the Swiss Flora over the last two millennia provides a rich source of knowledge on earlier uses of plants and use patterns of the local flora. We ask which local plant species were used during different time periods of the last 2000 years and how the numbers of species and the use intensity of specific plant families, growth forms and habitats changed over time.

Materials and methods: Totally 25 herbals from the antiquity, monastic medicine, Renaissance, early modern era and the contemporary time as well as five recent ethnobotanical studies were considered. Use patterns were analysed with the Bayesian approach.

Results: A total of 768 species, i.e. 32% of the vascular plants of the Swiss Flora have been documented as medicinal plants. Numbers increase until the monastic period (366 spp.) and the Renaissance (476) and remain relatively stable since then (modern and contemporary era: 477). But, 465 formerly documented species do not occur in the ethnobotanical studies and thus seem not to be used any more. Overall, 104 species are documented through all time periods. Archeophytes, trees and forest plants are generally overrepresented in herbals from all time periods while plants from above the timberline are generally underrepresented. Most widely used are the Lamiaceae and Apiaceae.

Conclusion: A constant body of medicinal plant knowledge in Switzerland exists since ancient time. This knowledge was always influenced by knowledge from neighboring countries and no “typical Swiss specialties” seem to exist. Medicinal plants are not randomly chosen from the available flora. Certain species are deliberately introduced others are neglected. This process, which is still ongoing, can be traced back with the help of herbals to the antiquity.

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1. Introduction

Main periods of medicinal history in Europe are classical antiquity, followed by the period of monastic medicine, Renaissance, and finally the modern era shaped by natural sciences (Porter, 1997).

The written tradition on herbal medicine of the classical antiquity (ca. 500 BC until the 5th century CE) is characterized by the Greek natural philosophy. The documented medicinal plant knowledge is based on personal experience of the authors but is also influenced by earlier written sources such as the Egyptian papyri and the Babylonian clay tables (Leonti et al., 2010; Leonti, 2011). As a late exponent of classical antiquity Pedanius Dioscorides (ca. 40–90 CE) laid the foundation for herbals and pharmacopeias in later periods (Leonti et al., 2010). In his “Materia Medica”, Dioscorides compiled ancient medicinal plant knowledge

in a short and compact way as it is done in scientific and popular herbals until today (Berendes, 1902). For Switzerland, the written history begins with the Roman invasion (e.g., descriptions from Julius Caesar 100–44 BC, Strabo the Geographer, 64 BC–19 CE, or Plinius the Elder, 23–79 CE). Romans conquered today's area of Switzerland between the 2nd century BC and 13 BC. Their transalpine roads lead to an increased trade and cultural exchange, also on medicinal plant knowledge (Bätzing, 2003).

After the collapse of the Roman Empire in the 5th century CE political, economic and social instability prevailed in Europe. This period ends with the establishment of the early Universities around 1400 CE. During that time the ancient written tradition on herbal medicine was preserved in Christian monasteries. Spreading out from Italy, they were founded during Early Middle Ages even in remote alpine areas and were the intellectual centers of education and medicine (Stoll, 1992). The Benedictines were especially prominent due to their explicit observance to care for the sick (Rule of Saint Benedict) and their establishment of libraries (Stoll, 1992; Mayer and Goehl, 2001). In Switzerland, the first library was established 747 CE by the expanding Benedictine

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monastery in St. Gallen. Important for the monastic medicine were the magnificently illustrated codices that compiled, reedited and adapted ancient medicinal knowledge in order to pass it on (Niederer, 2005). Adaptation to local conditions was necessary as Dioscorides' *Materia Medica* contained many Mediterranean species that were scarcely available north of the Alps and thus expensive. The "Lorscher Pharmacopoeia" from the 8th century, for example, compiles medicinal and herbal recipes based on ancient Greek medicine, but influenced by Arabic and Byzantine knowledge as well as local folk practices (Stoll, 1992).

The Renaissance period brought a new general interest in antique Greek literature including the classic writings on herbal medicine and *materia medica* in general (Porter, 1997). The invention of letterpress printing allowed for a wide distribution of compiled medicinal plant knowledge, and new exotic species from the Americas were incorporated as medicine (Porter, 1997).

The modern era began in the 16th century when Enlightenment and evolving natural sciences started to influence medicine. Subsequently, humoral pathology was largely abandoned as prevailing medicinal concept and the use of medicinal plants was related to specific organs (Hoefer and Uehleke, 2009). In the 19th century scholarly medicine became strongly linked with natural sciences. The scientific achievement of isolating single plant compounds triggered the development of new pharmaceuticals. In the same century the term folk medicine was coined by medical doctors to distinguish the practices of traditional healers from their own knowledge and therapies (Wolff, 2008). Naturopathy arose as a counter movement to scholarly medicine including new fields such as Homeopathy, beside traditional and magical medicinal practices. In Switzerland Künzle (1857–1945) and Vogel (1902–1996) were among the most influential and popular herbalists in the late 19th and early 20th century (Melzer, 2003). Johann Künzle's "Chrut und Uchrut" (Herbs and weeds; first published in 1911), and Alfred Vogel's "Der Kleine Doktor" (The little doctor; first published in 1952) became best and long sellers and reached editions of over 2 million each.

In contemporary times medicinal plant books with popular, scientific and/or spiritual emphasis abound, including popular herb books focusing on the local Swiss flora (e.g. Vonarburg, 1988; Kalbermatten, 2002; Dal Cero, 2009). Recent ethnobotanical studies in Switzerland demonstrate that medicinal plant knowledge and use still plays a role among the rural population, but has lost importance even in remote alpine regions during the second half of the 20th century (Poncet, 2005, for the Napf-Region in Central Switzerland; Broquet, 2006, for the French-speaking Jura; Brühshweiler, 2008, for the inner alpine region; Poretti, 2009, for the Italian-speaking southern part of Switzerland; Wegmann 2013, for the Grisons).

This paper deals with the question, how the flora of Central Europe equalling the area of nowadays Switzerland was

medicinally used over the last 2000 years. We ask (1) what local plant species were used during different time periods, and (2) how the diversity of species changed over time. We also analyse use intensity of specific plant families, growth forms and habitats during different time periods.

This study provides a basis for the analysis of medicinal plant knowledge and use in today's Switzerland. It gives a framework for the interpretation of recent ethnobotanical studies and at the same time points out a rich source of historically documented medicinal plants no longer in use today.

2. Study site and methods

2.1. Geography of Switzerland

Switzerland, with an area of 41 285 km², is located in the southeastern part of Central Europe (6–11°E, 46–48°N). Elevations range from around 200 m in southern Ticino to over 4600 m in the Central Alps (Lauber and Wagner, 2012). The landscapes are topographically and geologically very diverse due to the formation of the Alps and the impact of glaciations during the last ice ages. Three major biogeographic areas can be distinguished: The Jura Mountains, the Central Plateau and the Alps (Fig. 1). The Jura, with mountain ranges of up to 1700 m, forms the north-western boundary of Switzerland. The ranges mainly consist of sediments such as limestone and marl. The Central Plateau, a molasse basin, stretches from the Jura Mountains in the northwest to the alpine foothills (Prealps) in the south with an elevation from 400 to 600 m. This hilly to flat area covers ca. 30% of Switzerland. The Alps are characterized by high geological and climatic diversity and with 65% of surface make up the largest part of Switzerland (Lauber and Wagner, 2012). In the north they are separated from the Central Plateau by the Prealps and in the south they are bordered by the Plain of the Po.

The four languages German, French, Italian, and Romansh with their countless vernaculars characterize the four culturally distinct regions of Switzerland.

2.2. Climate

The climate ranges from almost Mediterranean in southern Switzerland to Arctic in the high mountains. The Alps act as barrier between the warmer South and the North with cooler average temperatures. In the west humid and mild sea air from the Atlantic Ocean causes a relatively mild climate whereas the east is more continental. Most of Switzerland has annual precipitations

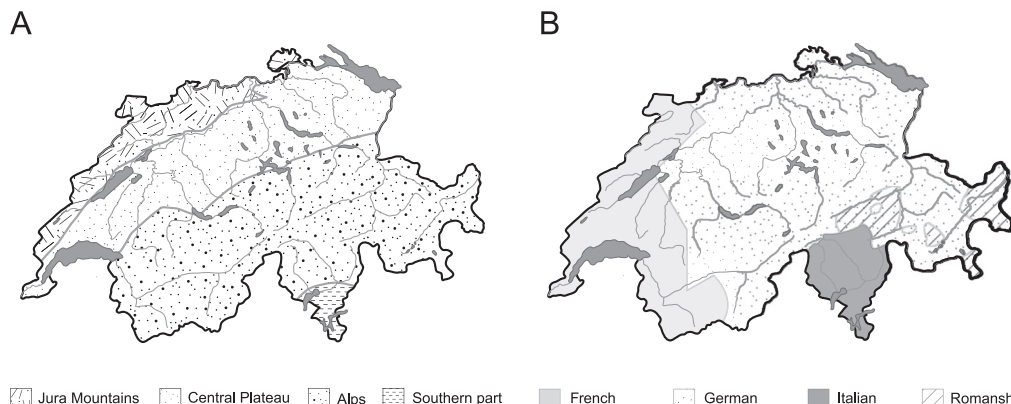


Fig. 1. Switzerland with the major biogeographic and cultural areas; (A) the three major biogeographic regions: Jura Mountains, Central Plateau and Alps; (B) the four languages: German, French, Italian, Romansh.

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