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The Trèmols Herbarium: A European Herbarium from the End of the 19th Century

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Abstract: The herbarium Trèmols, preserved in the Botanical Institute of Barcelona (IBB), was created during the second half of the 19th century by the Catalan chemist and botanist Frederic Trèmols Borrell (Cadaqués 1831–1900). He was a member of important scientific institutions, including the *Real Acadèmia de Ciències i Arts de Barcelona*, the *Societat Botànica Barcelonesa*, the *Société Botanique de France*, and the *Société Helvétique pour l'Échange des Plantes*. The value of this herbarium lies in the large volume of specimens that it preserves (12,953) and the high percentage (61.9%) of material of foreign origin that it contains. The Trèmols herbarium was completely digitised in 2019 as part of a wider study that is aimed to classify, digitise, document, review, and, finally, make the IBB historical herbaria available to the scientific community. Herein, we provide a general overview of the almost 13,000 specimens of this collection, which can give valuable insight into the flora that existed more than 100 years ago.

Keywords: historical herbaria; Trèmols; plant exchange society; taxonomy; botany in 19th century

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1. Introduction

The Botanical Institute of Barcelona herbarium (BC) preserves several historical collections in a segregated manner from the general herbarium. One of them is the herbarium of Frederic Trèmols from the 19th century, which is very valuable because of the large volume of specimens that it preserves and the high percentage of material from foreign origin that it contains. Several studies have described and documented this herbarium [1–5], but only partially.

Frederic Trèmols (Cadaqués 1831–1900) graduated in Pharmacy at the University of Barcelona and received his PhD in Madrid in 1856. In 1860, he began to work as a professor at the University of Granada, and in 1862, he returned to Barcelona to become the chair of inorganic chemistry at the Faculty of Pharmacy, where he was the dean from 1894 until his death [6]. He was a member of important scientific institutions, including the *Reial Acadèmia de Ciències i Arts de Barcelona* (hereafter RACAB), the *Societat Botànica Barcelonesa* (of which he was secretary since its creation in 1872 until the cessation of activities in 1878), the *Société Botanique de France* (of which he was also president from 1880 to 1885), and the *Société Helvétique pour l'Échange des Plantes* [7,8].

As a botanist, he published only a floristic catalogue of the mountain of Requesens in the eastern Pyrenees [9], a study on the genus *Hieracium* in Catalonia [10], and a report on U.S. strains of phylloxera-resistant *Vitis vinifera* L. [11], leaving his results and findings to other botanical colleagues such as Antoni Cebrià Costa (1817–1886) or Joan Cadevall (1846–1921) [6]. His masterpiece, however, was the herbarium that he established through his collections and the contributions of the botanical societies and the Spanish and foreign botanists with whom he collaborated. Among the latter, it is worth mentioning the work with the hieraciologists Casimir Arvet-Touvet (1841–1913) and Gaston Gautier (1841–1911),

with whom Trèmols explored several natural areas in Catalonia [3,10] in 1897, collecting specimens for this complex genus and *Hieraciotheca gallica et hispanica*.

Today, the Trèmols herbarium is physically very different from the one that his widow Maria Borrell donated to the RACAB in 1908, after his death. In 1925, it was transferred, along with all the other RACAB herbaria, to the Department of Botany of the Museum of Natural Sciences of Barcelona (hereafter MCNB), the origin of the current Botanical Institute of Barcelona (hereafter IBB) [3,12]. From 1931 to 1965 (A.M. Romo, pers. comm.), thorough arrangement of specimens in the Trèmols herbarium was performed by Antoni Marcos (1900–1977), first under the supervision of Pius Font Quer (1888–1964) and then, under the supervision of Antoni de Bolòs (1889–1975). Similar to other historical herbaria of the IBB, it followed a well-defined protocol that consisted of arrangement, identification, assembly, disinsection, and creation of a nomenclature file [5]. Such deep transformation of the Trèmols herbarium included the transfer of many specimens to the general herbarium; this situation, though unusual, also occurred in other historical herbaria kept in the IBB, such as the Vayreda and Costa herbaria as a result of the policy of the successive managers of the IBB to enrich the general collection.

The Trèmols herbarium was completely digitised (the term "digitisation" refers to the transcription of the data included in the labels but not specimens imaging) in 2019 as part of a wider study aimed at classifying, digitising, documenting, reviewing, and, finally, making the IBB historical herbaria available to the scientific community [13–22]. Herein, we provide a general overview of the almost 13,000 specimens of this collection, which can give valuable insight into the flora that existed more than 100 years ago [23,24].

2. Materials and Methods

All specimens were digitised through the software HERBAR v. 3.7 [25], including some features of Elysia v. 1 [26], both created for the management of botanical collections by the *Global Biodiversity Information Facility* (GBIF) unit in Spain with the support of the *Asociación de Herbarios Ibero-Macaronésicos* (AHIM). Both programmes allow the recording of all information included on the label, such as the taxon's name and author, identification of the reviewer and date (if reported), collector, locality, habitat, and collection date. During the digitisation process, all specimens were labelled with a unique barcode within the institution and, if necessary, were properly conditioned from a conservation point of view.

Each locality was georeferenced by indicating the current country, the lower administrative level (usually province), and, wherever possible, the geographic coordinates. To do so, it was first necessary to update the toponyms used during the second half of the 19th century (when the Trèmols herbarium was compiled), many of which have been forgotten or are missing. The web portals used were different according to the geographical area: (1) those of the *Institut Cartogràfic i Geològic de Catalunya* [27], the *Enciclopèdia Catalana* [28], and Wikipedia in Catalan [29] were specifically used for NE Spain; (2) *Flora iberica* [30] and *Anthos* [31] were used for all of Spain; (3) the *Géoportal* [32] was used for France; and (4) the *Geocatalog* [33] was used for Switzerland. Other web portals such as *Arcanum Maps* [34] and *Old Maps Online* [35] provided contemporary maps of the collection period of the specimens. The *Wikiloc–Trails of the World* [36] was also used for very specific cases. We were able to assign geographic coordinates to 98.3% of all the 3239 localities identified in the herbarium (in the WGS8 geographical coordinate system); the rest of the localities (only 56) were too vague to be georeferenced due to the names of the locations being too general, such as "Jura", "Dalmatia", "Pyrenees", and "Austrian Alps" or even names of entire countries. The uncertainty radius (in meters) around the geographic coordinates was calculated for generic locations such as cities, towns, or small (or relatively small) geographic areas (among all georeferenced specimens, the largest radius assigned by us was 38 km). To georeference a site located between two locations (e.g., when the collector indicated that the plant was located between town A and town B), the coordinates were assigned to the intermediate point, with the uncertainty radius being the distance between this point and any of the two locations.

All scientific names were updated following the taxonomic criteria of *Plants of the World Online* (POWO) [37] for vascular plants, *MycoBank* [38] for lichens and fungi, and *AlgaeBase* [39] for algae. For names not included in POWO, we used *Flora iberica* [40] for specimens collected in the Iberian Peninsula, *Flora d'Italia* [41] for specimens from Italy, *Tela Botanica* [42] for specimens from France, *Euro + Med Plantbase* [43] for specimens from other parts of Europe, and *African Plant Database* [44] for specimens from Africa. In cases where updating the nomenclature was not possible because the original taxon could be assigned to more than one entity (*pro parte*), the original name was not found, or the specimen had no identification, the plant was identified using different dichotomous keys that were chosen according to the geographic origin of the specimen, i.e., *Flora dels Països Catalans* [45] and *Flora Manual dels Països Catalans* [46] for Catalonia, *Flora iberica* [40] for the Iberian Peninsula, or *Flora Europaea* [47] for the rest of Europe. Finally, families were assigned following APG IV [48].

In order to analyse the profile of the collectors that contributed to the Trèmols herbarium (i.e., the collectors that appear on the labels of the specimens), we mainly used two databases that provide many details on botanists (such as their nationalities, dates of birth and death, or the places where they mostly collected): the Harvard University Herbaria & Libraries website [49] and that of the Zurich herbaria [50].

During the digitisation process, some specimens were detected as type material of different taxa described by contemporary authors of Trèmols. In some cases, direct detection was possible by finding the word "type", "n. sp." or "nobis" in the label; indirect detection encompassed those cases when the collector was also the author of the taxon, and the date of collection was earlier than the date of taxon publication. The type status of these specimens was checked by analysing the protologues cited in POWO [37], verifying the effective publication of each taxon according to the *International Code of Nomenclature of algae, fungi and plants* (ICN) [51], and searching previous valid typifications. The duplicated original material was searched in other collections conserved in BC and *Muséum National d'Histoire Naturelle*, Paris (P) herbaria, as well as in *JSTOR Global Plants* [52], *Recolnat* [53], and GBIF [54].

In order to identify some interesting specimens from a distributional point of view, localities attributed to Trèmols and cited by the two fundamental floristic texts that cover the Catalonian flora (i.e., *Flora dels Països Catalans* [45] and *Flora iberica* [40]) were searched. First, we looked for these specimens in the Trèmols herbarium and, if they were not found there, we also searched other collections preserved in BC herbarium and online in GBIF [54]. By exclusively focusing on conservation, all the endemic and threatened taxa that are included in the *Llibre Vermell de les Plantes Endèmiques i Amenaçades de Catalunya* [Red Book of Endemic and threatened Flora of Catalonia, hereafter RBFC] [55] were searched in the Trèmols herbarium in order to detect specimens of conservation significance. Insights on both the historical and current ranges of these species have been obtained by searching the localities of observation (or collection of specimens) of threatened and endemic taxa in the maps included in the RBFC and the *Banc de Dades de Biodiversitat de Catalunya* [Biodiversity Data Bank of Catalonia, hereafter BDBC] [56], as well as from other specific works. In addition, the localities of plant taxa included in the RBFC [55] attributed to Trèmols have also been identified, followed by the search of possible specimens using the same methodology as for the specimens of distributional interest.

Unpublished documentation related to the Trèmols herbarium has been studied in order to improve the knowledge of Frederic Trèmols and to better understand the formation and original structure of his herbarium. The studied documentation includes: (1) the RACAB catalogue with the list of species included in his herbarium, elaborated in 1918–1919, (2) the approximately 7000 cards containing information of species, localities, and collectors that were elaborated during the revision of the herbarium between 1931 and 1965 [1–3], and (3) the letters sent by Trèmols, that are preserved either in the Pau Archive of the IBB Historical Archive or the Rodríguez Femenias Archive of the *Institut Menorquí d'Estudis* [57,58].

3. Results and Discussion

3.1. Size of the Herbarium and Specimens' Arrangement

The Trèmols herbarium is made up of 153 volumes; of these, 59 were arranged by Marcos between 1931 and 1965 and form the main body of the herbarium (around 70% of the specimens), while the 94 remaining volumes were mostly unprocessed material (without taxon identification) until the 2000s, when they were reviewed and digitised by our team and kept as supplementary material (hereinafter referred to as "extra boxes").

There are 12,953 specimens mounted in 11,157 herbarium sheets as some specimens are included in the same sheet (Figure 1). Each specimen has been numbered and digitised separately (even when there were more than one specimen in the same sheet); for this reason, hereafter, we refer to herbarium specimens and if the reference is made to herbarium sheets, it will be mentioned clearly. The original specimens prepared by Trèmols are mounted with strips of paper and secured with pins. To reduce paper usage, he mounted multiple specimens with their corresponding labels on the same sheet, distinguishing one from the other by writing down the location or collector of the sample on the strips of paper on the specimens acquired by exchange.

3.2. Identifications and Reviewers

Currently, in the Trèmols herbarium, there are 3931 identifications for 3642 specimens (note that 282 have been identified more than once). In total, there are 47 botanists who have included identifications in the collection, although some of them, like Jean Odon Debeaux (1826–1910), Gyula Tauscher (1832–1882), Francisco Loscos (1823–1886), Juan Joaquín Rodríguez Femenias (1839–1905), Michel Gandoger (1850–1926), Paul Friedrich August Ascherson (1834–1913), or Jacob Jäggi (1829–1894), probably completed their identifications before the specimens were sent to Trèmols and therefore, cannot be strictly regarded as reviewers of the Trèmols herbarium [2,3]. Plausibly, this is the case for almost all 374 identifications that were carried out before Trèmols's death (Figure S1). Catalan botanists who were contemporary to Trèmols, such as Estanislao Vayreda (1848–1901), A.C. Costa and Joan Teixidor (1838–1865), who often collaborated with Trèmols (also included in these 374 identifications), may have been able to revise the identification of their samples following their donation.

According to the number of identifications completed, most of the botanists (76.6%) have less than ten and 38.3% have only one. In contrast, 11 botanists completed 10 or more identifications (Table S1). The low number of identifications that Trèmols himself completed (only in 2.7% of all the specimens), as already indicated in previous studies [2,3], can be due to the fact that, like many other botanists, when he identified a plant in his herbarium, he did not consider it necessary to indicate himself as a reviewer (given that this action is an essential part in the process of collecting and preparing the sample). Considering correct the hypothesis that Trèmols identified all the plants that he probably collected (i.e., those with labels written by him and collected in the areas he frequently visited), the percentage of Trèmols' identifications in his herbarium would go from the current 2.7% (corresponding to the 356 specimens that include the indication of Trèmols as identifier) to 37.4% (corresponding to the 4849 samples presumably collected by Trèmols); thus, Trèmols included himself as an identifier in the labels only in the 7.3% of the specimens collected by him.

Figure 1. Sheet from the Trèmols herbarium with two specimens: BC-Trèmols 865794 and BC-Trèmols 865795. The initial "T." on the central strip of paper with which the central specimen is mounted, attributes it to Nicola Terracciano https://www.ibb.csic.es/herbari/JPEG/BC865795.jpg (accessed on 26 January 2024).

Most of the identifications of the herbarium specimens, however, were completed after Trèmols' death, when the collection was modified and reordered (Figure S1). Moreover, only in a few cases (in 282 of 3642 specimens), there are identifications after the first one, i.e., these specimens have two or more identification labels. After Trèmols' death, the herbarium was transferred to the RACAB, where it remained practically unchanged for 25 years. The only two identifications during these years are: (1) by Manuel Llenas (1879–1937) in 1904, who became the first botanical collector of the MCNB in 1907 and married one of Trèmols' daughters in 1911 [59] (p. 223), and (2) by Benito Fernández Riofrío (1896–1942) in 1918, a young botanist specialised in mycology who was commissioned by the RACAB to compile the first catalogue of the Trèmols herbarium. In 1925, the herbarium was transferred to the MCNB (specifically, to the botany department which became the origin of the current IBB), where reorganisation and distribution works began, mainly by Marcos who completed nearly 1500 identifications of specimens. This phase of the great transformation of the Trèmols herbarium was finalised in the late 1960s, when the lack of specialised personnel after Marcos' retirement and the limited economic resources allocated to the general herbarium reduced the interest in the Trèmols herbarium until the middle of the 2000s. A total of 99.5% of Marcos' identifications are currently found in the main body of the herbarium (i.e., the 59 volumes), with the remaining 0.5% (17 specimens) in the extra boxes (Table S1). All these 17 specimens bear the annotation "duplicate, to exchange" on the label and certainly for this reason they were not included in the main part of the Trèmols herbarium.

In recent years, there has been a resurgence in the study and reorganisation works of the Trèmols herbarium (Figure S1). In 2006, the two curators of the BC herbarium (Neus Ibáñez and Neus Nualart) began to digitise the first volumes of the Trèmols herbarium. Since 2010, Laura Gavioli, who joined the BC herbarium as a technician, continued the digitisation, finishing all the volumes while conditioning and digitising all the material. Since 2006, the number of identifications has also been notable; in addition to the nearly 1600 identifications made by Gavioli, the first author of the present manuscript, some researchers have contributed to the identification of specific groups of plants (Table S1), e.g., Poaceae (Samuel Pyke), lichens (Esteve Llop), or plants from Cuba (Pablo González).

3.3. Plant Collectors and Exchange Activities

The Trèmols herbarium is mainly composed of samples from exchanges with other botanists, as already noted in previous studies [2,3]; indeed, 61.9% of the material (8013 specimens) reached the Catalan botanist thanks to exchanges, 37.4% (4849 specimens) were collected directly by Trèmols, and the remaining 0.7% (91 specimens) did not include enough data to be classified into one of the two categories. The increase in the percentage of Trèmols's plants compared to the data provided in previous studies [2,3] is mainly due to the digitisation of the material present in the extra boxes, which were the last ones that were processed; these contained much of the material collected by Trèmols that was never revised.

It was possible to assign a collector to 97.8% of the specimens (only 282 did not show the name of the collector, or either the exsiccata or the handwriting was not attributable to a collector). Having such a complete picture of the provenance of individual specimens, it was possible to make an exhaustive examination of these data. First, we should note the high number of collectors who contributed to the formation of the Trèmols herbarium (538), which can be explained by the very high percentage of specimens coming from exchanges. Unfortunately, we have not been able to find any study of a personal herbarium of the 19th century in Europe to which to compare the Trèmols herbarium, probably because most of them have been included in the general collection of the institution where they are preserved or because they have not been digitised yet. However, we can compare our herbarium to that of Isaac C. Martindale (1842–1893), an American botanist contemporary of Trèmols, who also increased his herbarium through exchanges or purchases. Although Martindale's herbarium includes over 900 collectors, they harvested a total of

80,000 specimens [60], which equals a ratio of 0.011 collectors by specimen, much smaller than the 0.041 collectors by specimen for the Trèmols herbarium. In contrast, the herbarium of the *Societat Botànica Barcelonesa* has a ratio of 0.051 (54 collectors per 1080 specimens [15]), meaning that the Trèmols herbarium is closer to a herbarium of an exchange society than a personal herbarium.

Despite the high number of collectors, most of them contributed a modest number of specimens: 73.9% of all collectors (398 out of 538) provided between one and nine samples, 18.4% (99 collectors) between 10 and 49, 3.1% (17 collectors) between 50 and 100, and only 4.5% (24 collectors) contributed more than 100 specimens. The collector who contributed the most to the Trèmols herbarium, with 2.5% of the total number of specimens (Figure 2), was the Belgian botanist Henri Ferdinand van Heurck (1838–1909), who created one of the largest herbaria of the world in the 19th century [61,62] with 300,000 specimens [63]. The second largest contributor (2.3%) was Joseph Whipple Congdon (1834–1910) from the USA, who collected mainly in Rhode Island and California and generously and widely distributed his duplicates [64]. The first Spanish collector (5th position in Figure 2, with 1.6%) was Vayreda, who was a member of a very prominent family from Olot (province of Girona). Vayreda had a good personal relationship with Trèmols, which turned into a fruitful collaboration for plant exchanges and the *Societat Botànica Barcelonesa* [8] (pp. 285–286). It should be noted that Trèmols did not contact all collectors; some of the specimens may have arrived through exsiccatae of other botanists or exchange societies. A more detailed study of the historical documents and letters between Trèmols and other contemporary botanists is underway and will allow us to better understand the role of personal relationships and botanical societies in the creation of this herbarium.

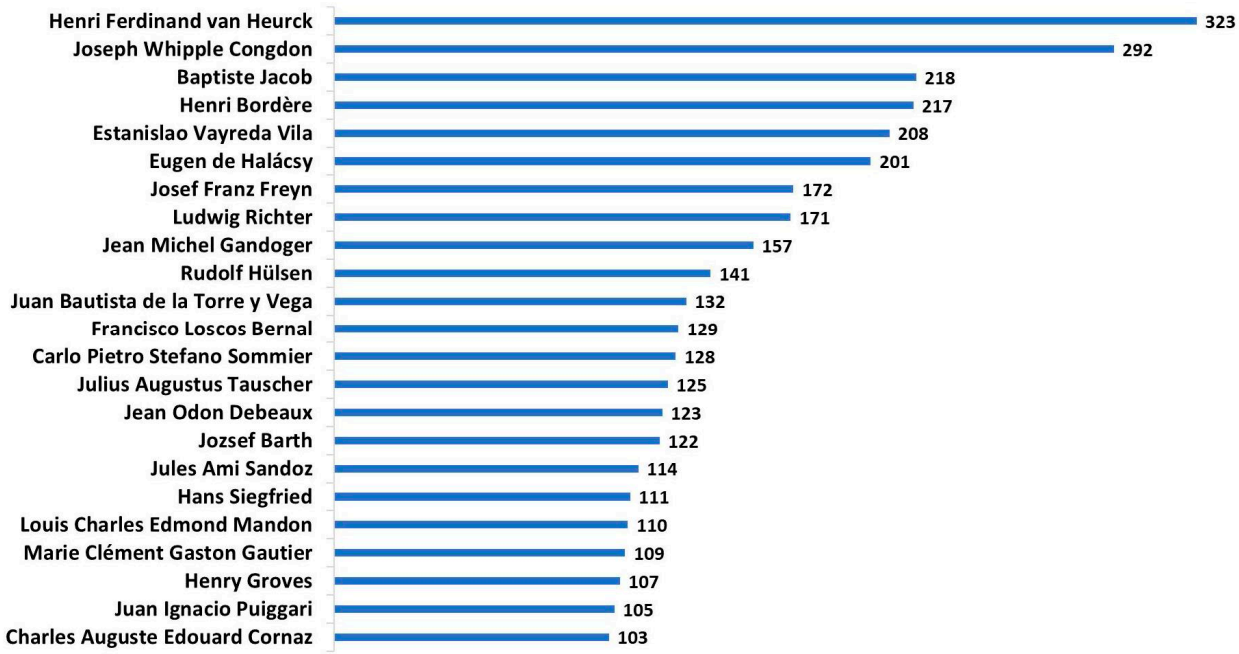

Figure 2. Collectors with more than 100 specimens included in the Trèmols herbarium (excluding Trèmols himself).

By analysing the interval of the gathering of the specimens according to each collector (Table S2), it was found that the vast majority of them (494 or 91.8%) collected over a period of no more than 20 years; for 40 collectors (7.4%), the collection period was between 20 and 40 years and only four collectors (0.7%)—which include Trèmols himself—collected plants for a period of over 40 years. In the case of Trèmols, he gathered specimens for his own herbarium for up to 52 years (between 1848 and 1899), with a mean of 92 plants per year. The other three collectors who collected specimens for over 40 years are Charles

Auguste Edouard Cornaz (1825–1911) (103 specimens in 49 years), Debeaux (123 specimens in 45 years), and Alexander Carl Heinrich Braun (1805–1877) (10 specimens in 44 years). Cornaz, with most of his specimens in the Trèmols herbarium (66.0%) corresponding to the *Flore de Bormio* exsiccata, was a very active collector; according to Crépin [65] (p. 192), Cornaz was able to collect plants during long days of field trips when he was over 60 years old. Debeaux lived in Algeria, Corsica, and Perpignan thanks to the French Army, which permitted him to collect and distribute a large number of exsiccatae [66] (pp. 33–34) [67] (pp. 124–125). Braun, who was a professor at the University of Berlin and director of the Berlin Botanical Garden, started collecting plants in 1816 when he was only 11 years old. Unfortunately, his herbarium, transferred to Berlin and Leipzig herbaria, was partially destroyed during the Second World War [68] (pp. 23–24).

In relation to the 28 nationalities of the 538 collectors who contributed to the Trèmols herbarium, the vast majority are European (24), only three are American, and one is African (Figure S2). The country that is most represented is France, with 21.2% of the collectors, Germany with 12.3%, Switzerland with 11.2%, and Spain with 10.4%. Northern European countries (Sweden, Norway, Estonia, and Denmark) are represented by 65 collectors (12.0%), while Eastern European countries (Hungary, Czech Republic, Poland, Romania, Russia, Slovenia, Croatia, Slovakia, and Serbia) are represented by 57 collectors (10.6%).

A total of 72.0% of the specimens of the Trèmols herbarium (9301) include a label with a header. We have been able to detect up to 277 different types of labels; the most represented are the labels of Trèmols, with 3464 specimens (Figure 3), which includes the original type used by Trèmols (with the header "HERBM. F. TREMOLS", Figure 4A) as well as the one used by Marcos during the revision of the herbarium (Figure 4B).

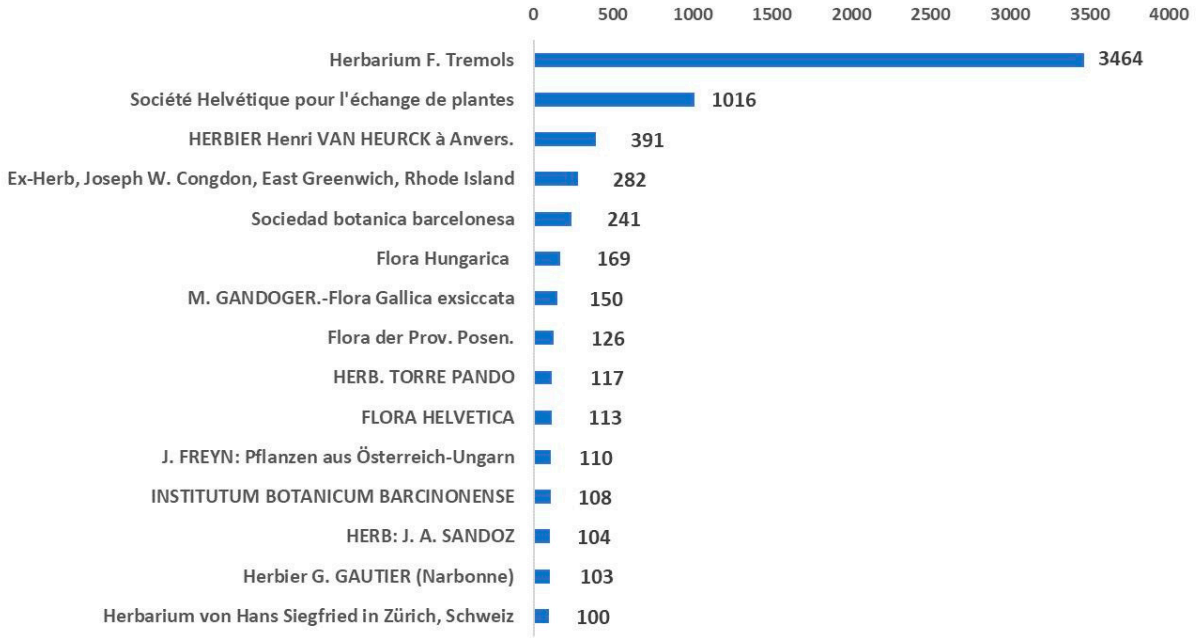

Figure 3. Label types in the Trèmols herbarium, with more than 100 specimens.

The two exchange societies already mentioned are the second and the fourth most represented types of labels in the Trèmols herbarium (Figure 3): *Société Helvétique pour l'Échange des Plantes*, with 1016 specimens (Figure 4C) and *Societat Botànica Barcelonesa*, with 241 specimens (Figure 4D). These two botanical societies promoted plant exchanges by sending a specific number of specimens collected by each member to all members (the latter not being invariably higher than 50) [15] (p. 129) [69] (p. 129) [70] (pp. 151–152). The *Société Helvétique pour l'Échange des Plantes* contributed decisively to the growth of the herbarium by providing a large number of specimens (more than one thousand) from all over the world and collected by botanists who had no other way to exchange plants with

Trèmols. In the case of the *Societat Botànica Barcelonesa*, although more than 600 specimens were distributed in 1872 and 1873 to its members [15], less than half are preserved in the current Trèmols herbarium, probably due to the incorporation of the society specimens into the BC general herbarium thanks to Marcos' arrangement works [14] (p. 133).

Figure 4. Examples of the most common label types of the Trèmols herbarium: the original type used by Trèmols ((**A**), BC-Trèmols 865483), the type used by Marcos ((**B**), BC-Trèmols 875148), the type used by the *Société Helvétique pour l'Échange des Plantes* ((**C**), BC-Trèmols 918934), the type used by the *Societat Botànica Barcelonesa* ((**D**), BC-Trèmols 920406), the personal label of van Heurck ((**E**), BC-Trèmols 951585), and the personal label of Congdon ((**F**), BC-Trèmols 876500).

Other than the labels of Trèmols himself, the most frequent personal labels in Trèmols herbarium—with more than 200 specimens (Figure 3)—are the ones of van Heurck (Figure 4E) and Congdon (Figure 4F), both already mentioned as the most important collectors (Figure 2). Other labels with more than 100 specimens (Figure 3) are different exsiccatae that were distributed in the 19th century, except the one of *Institutum Botanicum Barcinonense* that was mainly used for the specimens preserved in the extra boxes during the revision of the herbarium by A.M. Romo (Table S1).

The origin of label types of the Trèmols herbarium is similar to the collector's nationality; 239 are of European origin (86.3%)—with only 33 of them being Spanish (11.9%), two are from North Africa, two are from America, and one is from India.

3.4. Temporal Coverage

Most of the Trèmols herbarium specimens (11,322 specimens, i.e., 87.4% of the total) bear the collection date, a feature that allows us to characterise them from a temporal point of view, with a high degree of accuracy. The time interval during which the samples were collected ranged from 1809 to 1899. This 90-year period is larger than the 68 years of Trèmols's lifespan (e.g., 15 samples are prior to 1831, the year of his birth) and much larger than the time he was active as a botanist. This incongruity is explained by the large amount of material in the herbarium that was obtained through exchanges (Figure 5). It should be noted that only 57 samples were collected from 1809 to 1855, that is, a mere 0.5%, and the time period when samples were collected in a more consistent and continuous way was between 1856 and 1899.

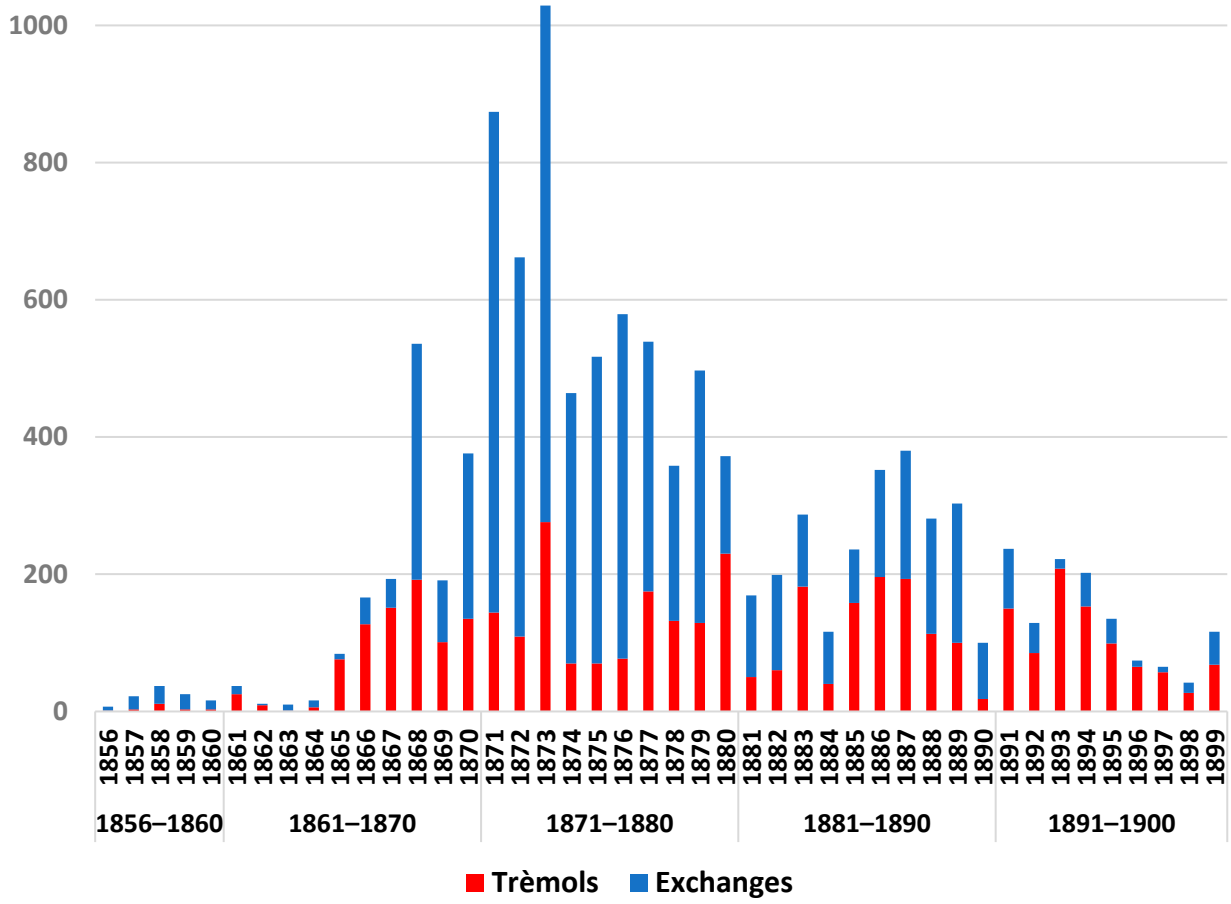

Figure 5. Years of collection of the dated specimens in the Trèmols herbarium (since 1856, when the herbarium began to grow effectively), attributable to Trèmols (shown by the red part of the bars) and obtained through the exchange (shown by the blue part of the bars). Only one specimen collected in 1874 is not included as it was not possible to attribute it to either Trèmols or the exchanges.

The decade of greatest growth of the herbarium was 1871–1880, which encompasses over half (52.4%) of the total samples (Figure 5). Of these, over three-quarters came from exchange activities thanks to the *Societat Botànica Barcelonesa* (1872–1878) [14], of which Trèmols was secretary and the *Société Helvétique pour l'Échange des Plantes*, of which Trèmols was a member between 1871 and 1879 [70] (p. 160). In the 1870s, however, there were three years (1874–1876) during which the percentage of the specimens collected by Trèmols was

extremely low compared to the specimens obtained via exchange, which coincided with the Third Carlist War (1872–1876). This Spanish Civil War, which affected northern Catalonia in particular, would have forced Trèmols to change the plant collection areas to the proximity of Barcelona or move towards the part of the Pyrenees located in the province of Lleida [8] (p. 284) [71] (p. 126). Despite this incidence, the increase in the total number of specimens in the Trèmols herbarium collected by Trèmols himself remained more or less constant until a few months before his death (Figure S3). The consistency of his work shows that he managed, in most cases, to overcome the problems generated by historical, family, or work events. On the other hand, the accumulation curve of specimens coming from exchanges is much steeper for the 1870s than for other periods because, during this decade, the two interchange societies mentioned above contributed a large number of samples. After 1880, specimen acquisition through exchanges slowed down—which can be partly attributed to the termination of the *Societat Botànica Barcelonesa* in 1878—and remained more or less stable in the following decades (Figure S3).

Regarding the intra-annual differences (Figure 6), Trèmols used to collect plants mostly in May and July; spring-blooming plants were collected in Mediterranean areas and Pyrenean plants—which bloom somewhat later—were collected in the summer. The low number of specimens collected in June is probably due to the fact that the exam period (after the classes ended) of the university, where Trèmols worked as a professor, was in June. Plants obtained through exchanges were harvested in the months of anthesis, which is the norm. The slight peak in July, not seen in other studies on Mediterranean plants [21], could be explained by the origin of a large number of plants from northern and central European countries and mountainous areas (see Section 3.5 about geographic coverage).

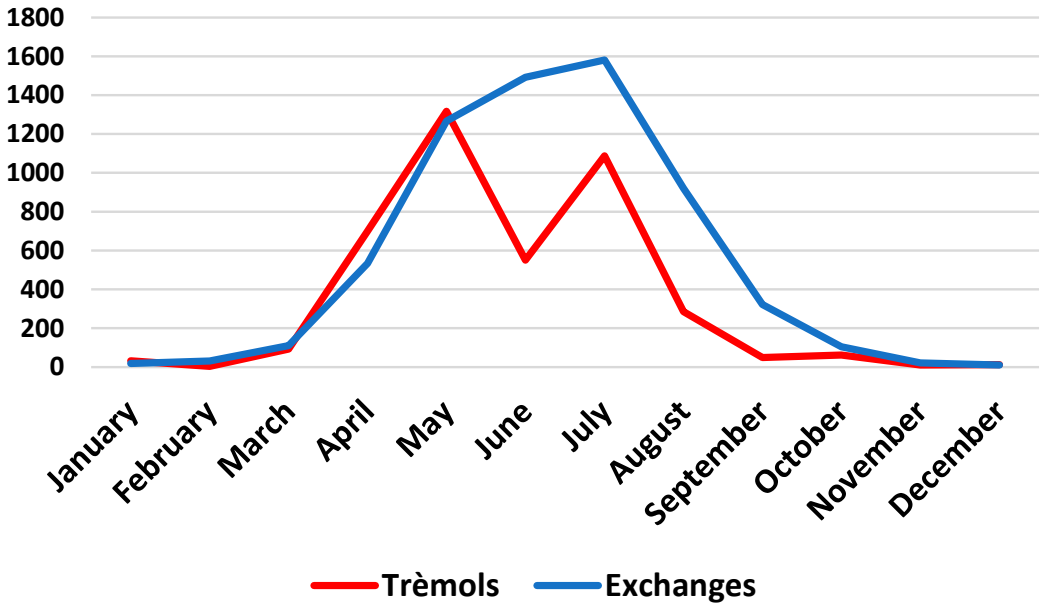

Figure 6. Months of collection of the Trèmols herbarium specimens (comprising 6413 specimens). Specimens collected by Trèmols are shown in red, and specimens from exchange activities are shown in blue (three specimens not attributed to either of the two categories are not included).

3.5. Geographic Coverage

Most of the specimens (98.0%) of the Trèmols herbarium are labelled with the locality where the plant was collected, while only 270 specimens have no locality indication. The analysis of the geographic origin of the specimens indicates that the Trèmols herbarium should be regarded as an international herbarium as these come from many corners of the world (Figure 7). Indeed, there are collection localities in five continents (Figure S4), although the most represented by far is Europe, with 93.0% of the specimens. America (3.4%) and Africa (1.5%) are also significantly represented, while Asia and Australia (both

0.1%) appear on a few occasions. Specimens come from 51 different countries (Table S3), and as expected, Spain is the most represented one, with 6013 specimens (46.4%), followed by France, with 1919 (14.8%), which was the closest country to Trèmols's home (Barcelona and Cadaqués are located just ca. 150 and 30 km away, respectively, from the French–Spanish border). Some European countries, such as Switzerland (875 specimens), Hungary (350), and Austria (321), or the United States (380) are the origin of a large number of specimens although they are neither contiguous to Spain nor have particular connections with the Iberian country. The explanation for this geographical distribution regarding the specimens' origin, rather than the physical distance from Barcelona or Cadaqués (the places where Trèmols lived), lies in the presence or absence of collectors with whom Trèmols had exchanges. In fact, one would expect to find many plants from North Africa, which is geographically and historically much closer to Spain, rather than from distant North America. For instance, a large number of specimens from North America arrived thanks to the duplicates sent by van Heurck, the most important collector in the Trèmols herbarium (see Section 3.4).

The high quantity of specimens coming from northern and central European countries, particularly from the largest European mountain ranges (Figure S5), is attributable to the exchanges through the botanical societies and, in turn, explains the blooming peak of July in Figure 6. For example, a large amount of the specimens of French origin (the country ranking second regarding the total number of specimens of the Trèmols herbarium, Table S3) obtained by the exchange are from mountain areas (French Pyrenees, Central Massif, and Maritime Alps), while the same applies for Italy (Maritime Alps but especially Apennines), the country ranking third (Table S3). In addition, the Trèmols herbarium contains nearly 900 specimens from Switzerland, an eminently mountainous country, which also reflects the fruitful exchange through the *Société Helvétique pour l'Échange des Plantes*. Other well-represented European mountain ranges are the Sudeten mountains and the Carpathians (Figure S5).

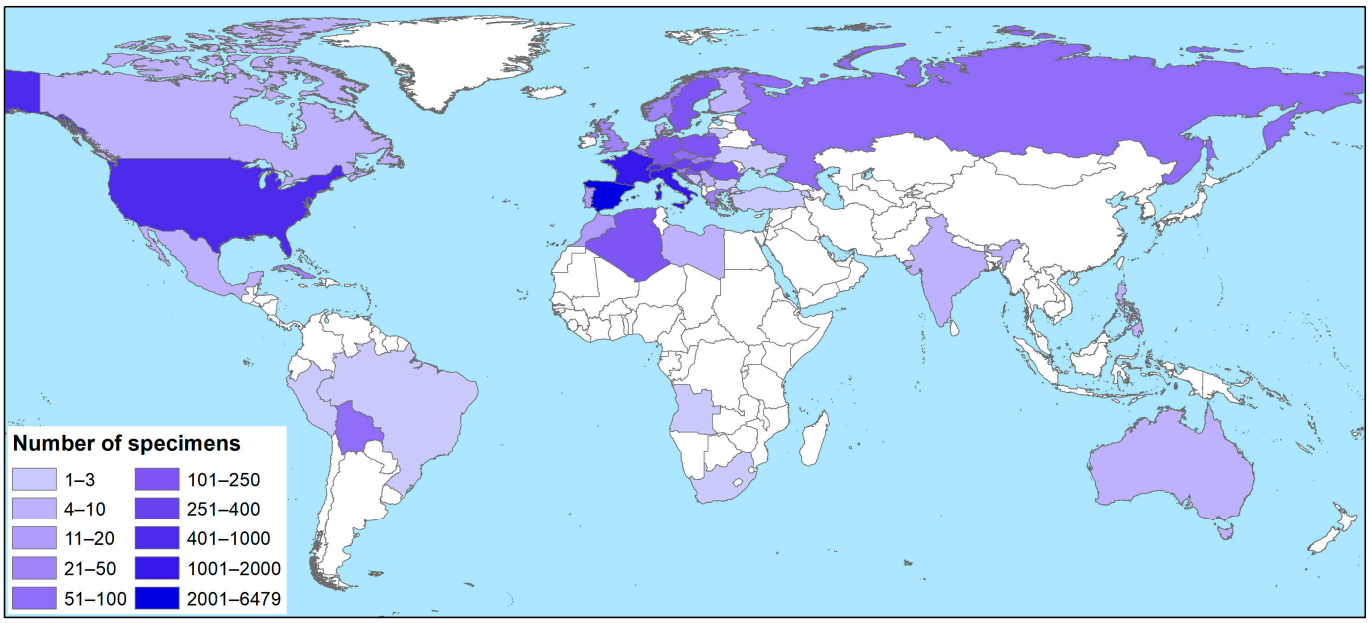

Figure 7. Countries of origin of the Trèmols herbarium specimens; their number is indicated by colour gradations.

The herborisation work conducted by Trèmols occurred mainly in Catalonia (Figure 8), with Barcelona and his native Cadaqués as starting points—41.6% of all the 6013 specimens collected in Spain (including those collected by Trèmols but also by other collectors) come from Barcelona province, while 31.4% come from Girona province where the village of

Cadaqués is located. Among the latter, it is worth mentioning the 144 specimens collected in Requesens in the eastern Pyrenees between 1866 and 1887 with the aim to study the flora of this region that was published by Trèmols some years later [9]. Regarding the Pyrenees, Trèmols did not distinguish between Spanish and French territory as he moved freely from one side of the border to the other, considering them a single mountainous area. Indeed, in the 19th century, the inhabitants of the part of Catalonia that was ceded by Spain to France thanks to the Treaty of the Pyrenees (1659) still had a weak feeling of belonging to the French nation while still sharing a strong cultural identity with the "southern" Catalans [72]; the frontier between the French and the Spanish Catalonia was not formally delimited till 1866 [73].

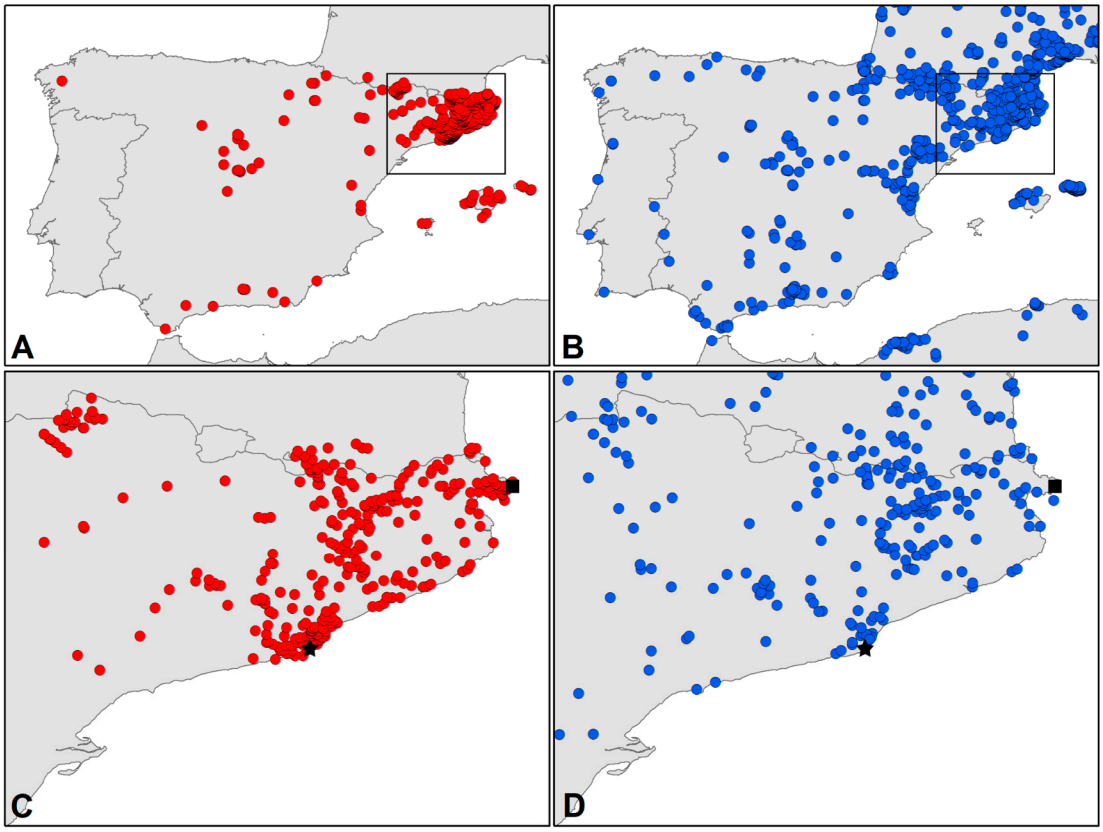

Figure 8. Localities of the specimens from the Trèmols herbarium that come from the Iberian peninsula (**A**,**B**) and from Catalonia, in the northeastern part of Spain (**C**,**D**). Specimens collected by Trèmols are shown by red dots and those obtained by exchange are shown by blue dots. In the Catalonian map (**C**,**D**), the black square indicates the Cadaqués village and the black star represents Barcelona city.

Leaving Catalonia, Trèmols only made very few, non-systematic collections as he delegated the gathering of specimens to local botanists, but without the ambition of having a complete picture of the Iberian flora. It is worth noting the large number of plants (150 specimens) he collected in 1873 on a long botanical trip to the Pyrenees, which was extended in time to avoid the logistical restrictions caused by the Third Carlist War (Section 3.3) [71] (p. 117). During this trip, he collected 70 specimens in the Pyrenees of Lleida province (Port de la Picada, Vall d'Aran, Artiga de Lin), 73 specimens in the Pyrenees of Huesca (Puerto de Benasque, Maladeta, Castanesa), and seven in the Pyrenees of Girona (Vall de Núria) and France (Bagnères-de-Luchon, Eyne). These restrictions coincided with the need to have a lot of samples to exchange through the two botanical societies that were at the height of their activity in those years [8] (p. 284). Other Spanish areas in which Trèmols collected recurrently were the Balearic Islands, where he travelled several times from 1867 to 1873 (collecting a total of 80 specimens). These visits can be traced back to

his friendship with Rodríguez Femenias, a naturalist from Maó [8] (p. 285), with whom he exchanged 42 letters between 1870 and 1880 [71] (p. 110). Madrid was also an area that he visited several times; he went there regularly as a university professor to take part in examination commissions, and in his herbarium, there are 86 plants from the Madrid area collected between 1859 and 1892.

Other areas to which he travelled sporadically and where he collected specimens are the city of Granada in southern Spain and Cuba. He went to Granada through his professorship in inorganic chemistry in the Faculty of Pharmacy in 1861, and he remained there until 1862. During this period, he collected 40 specimens in Granada and its surroundings. He visited Cuba in 1880, which was his first stop on a trip to the United States, commissioned by the *Diputació de Barcelona*, to find varieties of grapevines resistant to phylloxera [70] (p. 160). From this first stage of the journey, Trèmols brought 30 plants back to his herbarium, but surprisingly, we have little information about the rest of this journey.

3.6. Taxonomic Coverage

The majority of the specimens preserved in Trèmols herbarium (11,814 specimens, representing 91.2% of all the collection) are identified at the species level or lower. The rest are identified at the genus level (1126 specimens), except nine specimens that have only the indication of the family or type of organism (three vascular plants, four algae, and two bryophytes). The specimens identified only at the genus level largely correspond (63.3% of the 1126 specimens) to the ones of the extra boxes that were not identified originally by Trèmols or Marcos but were identified by one of us (Gavioli) or by A.M. Romo in more recent years.

Regarding the main taxonomic groups, 12,885 specimens (99.5%) belong to vascular plants and only 65 (0.5%) are cryptogams that are preserved in a separate volume; among the cryptogam specimens, there are 38 algae specimens, 24 lichen specimens, and three bryophyte specimens. The low percentage of cryptogam specimens in the herbarium is because the exchange societies in which Trèmols participated (*Societat Botànica Barcelonesa* and *Société Helvétique pour l'Échange des Plantes*) only comprised vascular plants [15,69]. Indeed, the cryptogam specimens were mainly collected by Trèmols (63.1%) and only a few were sent by other botanists like van Heurck or obtained through the *Société Vogéso-Rhénane*, in which cryptogams were included in its exchanges [74], unlike the two societies mentioned above. Of the vascular plants, 12,870 specimens (99.9%) are angiosperms, 15 specimens (0.1%) are gymnosperms, and 233 specimens (1.0%) are pteridophytes. These percentages are similar to those of the herbarium of the *Societat Botànica Barcelonesa* [15].

A total of 176 families are represented in the Trèmols herbarium; 83.0% (147 families) are vascular plants, 9.6% (17 families) are algae, 6.2% (11 families) are lichens, and only one corresponds to bryophytes. Among the 147 families of vascular plants, Fabaceae is the most important, with 2457 specimens (corresponding to 471 species, i.e., 12.4%), followed by the Asteraceae, with 1026 specimens (394 species, i.e., 10.3%), Rosaceae, with 1023 specimens (284 species, i.e., 7.4%), Caryophyllaceae, with 1003 specimens (268 species, i.e., 7.0%), Brassicaceae, with 912 specimens (294 species, i.e., 7.7%) and Poaceae, with 836 specimens (277 species, i.e., 7.3%) (Table S4). This ranking indicates that the main families represented in the Trèmols herbarium are the same main families as the Iberian and European floras albeit with a different order according to the species richness. In the flora of the Iberian Peninsula, the Asteraceae is the largest family with 12.9% of all the species, followed by the Fabaceae (8.7%), Poaceae (7.3%), Caryophyllaceae (4.9%), and Brassicaceae (4.6%) [75] (p. 113). For Europe, the five families with the highest number of species are the Asteraceae (14.8%), Poaceae (7.8%), Fabaceae (7.1%), Caryophyllaceae (5.7%), and Rosaceae (5.2%) [76]. However, although the high number of specimens of Fabaceae in the Trèmols herbarium may seem surprising, such an overrepresentation has been found in other herbaria, including physical and virtual ones (such as the Australasian Virtual Herbarium [77]), and both historical (e.g., the collection of Taiwanese plant specimens of the PH herbarium [78]) and modern ones (e.g., the UNEX herbarium [79]). Using the latter as

an illustrative example of an eminently Iberian herbarium (the specimens coming from the Iberian Peninsula account for 96% of the total number of specimens of UNEX herbarium), the Fabaceae are overrepresented as they account for 21% of the total number of specimens, much more than Asteraceae (15%) [79]. We believe that the overrepresentation of this family in herbaria can be related to their frequent and important edible uses, but also probably because they are often very easy to identify. In addition, it is important to note that the Trèmols herbarium is mainly composed of exchanged material and, as such, it was not chosen by Trèmols himself, but sent at the discretion of the donor; this would blur the expected pattern of specimens' representativeness of the composition of the (Iberian) native flora and, instead, lead to the accumulation of specimens in no particular order.

Comparing the families of the Trèmols herbarium with the ones of the Iberian flora [40], there are sixteen families that are not included in the latter, six of them occurring in the Southern Hemisphere. The specimens of these families were mainly obtained through exchanges and collected by other botanists (Table 1), except those collected in Cuba by Trèmols during his trip in 1880 (BC-Trèmols 976523, BC-Trèmols 976525) or those grown in a botanical garden—labelled as "Jardín" [garden] or "Jardín botánico en Barcelona" [botanical garden in Barcelona]—and collected by Trèmols, one in 1867 (BC-Trèmols 957228) and the other without a date (BC-Trèmols 956800). The exact location of this ancient botanical garden (where 45 specimens were gathered, including Mediterranean and alien plants) was between the municipalities of Sarrià and Gràcia, within the *Granja Experimental de la Diputació* [70] (p. 176), which was active between 1854 and 1926 [80]. All these specimens belonging to families that are not native to the Iberian Peninsula were surely of interest to Trèmols and allowed him to have a cosmopolitan herbarium.

Table 1. Families of vascular plants from the Trèmols herbarium not included in the Iberian flora [40], with the represented species, areas of distribution (according to POWO [37]), and specimen data (locality, collector, and herbarium code). An asterisk indicates specimens obtained through exchanges.

Family	Taxon	Distribution Area	Specimen Data
Acoraceae	*Acorus calamus* L.	North America and Asia	Botanical garden in Barcelona, F. Trèmols (BC-Trèmols 957228)
Calophyllaceae	*Mammea americana* L.	Central America	Cuba, F. Trèmols (BC-Trèmols 976523)
Calycanthaceae	*Chimonanthus praecox* (L.) Link	North-Central, South-Central, and Southeast China	Botanical garden in Barcelona, F. Trèmols (BC-Trèmols 956800)
Combretaceae	*Terminalia citrina* (Gaertn.) Roxb.	Asia and Southeast Asia	* Manila (Philippines), unknown (BC-Trèmols 956798)
	Combretum indicum (L.) DeFilipps	Asia, Southeast Asia, and Australia	* Manila (Philippines), unknown (BC-Trèmols 956799)
Chrysobalanaceae	*Chrysobalanus icaco* L.	Central Africa and South America	Cuba, F. Trèmols (BC-Trèmols 976525)
Dipterocarpaceae	*Vatica* sp.	India and Southeast Asia	* East Indies, W. Griffith (BC-Trèmols 929021)
Elaeocarpaceae	*Vallea stipularis* L.f.	South America	* Bolivia, G. Mandon (BC-Trèmols 928871)
Erythroxylaceae	*Erythroxylum* sp.	Southern Hemisphere	* Mauritius, F. W. Sieber (BC-Trèmols 929289)
Gleicheniaceae	*Dicranopteris pedata* (Houtt.) Nakaike	Southeast Asia	* East Indies, W. Griffith (BC-Trèmols 959878)
Linderniaceae	*Torenia bicolor* Dalzell	India	* Mangalore (India), J. F. Metz (BC-Trèmols 962132)
Malpighiaceae	*Mascagnia sepium* (A. Juss.) Griseb.	Central and South America	* Bahia (Brasil), P. Salzmann (BC-Trèmols 975304)

Table 1. *Cont.*

Family	Taxon	Distribution Area	Specimen Data
Menispermaceae	*Menispermum canadense* L.	North America	* Bedford County (USA), A. H. Curtiss (BC-Trèmols 875172)
Moraceae	*Morus celtidifolia* Kunth	Central and South America	* Mexico, M. Botteri (BC-Trèmols 962409)
Piperaceae	*Piper melastomoides* Schltdl. & Cham.	Mexico	* Mexico, M. Botteri (BC-Trèmols 962408)
Restionaceae	-	Southern Hemisphere	* Australia, W. Griffith (BC-Trèmols 957361)
Staphyleaceae	*Staphylea trifolia* L.	United States of America	* Pomfret (USA), J. W. Congdon (BC-Trèmols 929350)
	Staphylea pinnata L.	Central and East Europe	* Italy, G. Gibelli (BC-Trèmols 929348)
			* Carbonara al Ticino (Italy), G. Gibelli (BC-Trèmols 929347)
			* Gumpoldskirchen (Austria), J. A. Krenberger (BC-Trèmols 929346)
			* Szigetújfalu (Hungary), J. A. Tauscher (BC-Trèmols 929349)

3.7. Type Specimens Identified

Among the plant material preserved in the Trèmols herbarium, we have identified 27 type specimens corresponding to 19 taxa. As already indicated by Font Quer [58] (p. 10), Trèmols herbarium is poor in type material. According to IPNI [81], Trèmols only described one taxon, *Cressa loscosii* Trèmols, with its type material being distributed by the *Societat Botànica Barcelonesa*. No original specimens of this species are preserved in the current Trèmols herbarium because they were transferred—probably by Marcos—to the BC general herbarium (sheets BC 642928 and BC 41900). Therefore, as expected, all type material preserved in the Trèmols herbarium come from exsiccatae and many duplicates can be found in other herbaria.

Notably, there are three specimens collected by Trèmols that have been used to describe new taxa. The first one is a specimen collected in Sant Hilari Sacalm (Girona province) used to describe *Hieracium catalaunicum* Arv.-Touv. & Gaut., Hieracioth. 2: Hisp. nº 30–31 (1897), in sched. (≡*Hieracium compositum* subsp. *catalaunicum* (Arv.-Touv. & Gaut.) Zahn) and preserved in the collection of the *Hieraciotheca gallica et hispanica* (BC-Hieraciotheca 877784). The second one is a specimen collected in Cap de Creus (Girona province) that was used to describe *Statice tremolsii* Rouy in Bull. Soc. Bot. France 41: 325 (1894) (≡*Limonium tremolsii* (Rouy) Erben) and was distributed in 1879 through the *Societé Helvétique pour l'Échange des Plantes* by Trèmols as *Statice salsuginosa* var. *glabra* Willk. & Lange and of which we found a specimen in the Vayreda herbarium (BC-Vayreda 993019). The third one is a specimen collected in Requesens mountain (Girona province), which was used to describe *Armeria maritima* subvar. *littorifuga* Bernis in Anales Inst. Bot. Cavanilles 12(2): 219 (1955) (≡*Armeria arenaria* subsp. *littorifuga* (Bernis) Malag.) and of which we have not found in any of the consulted herbaria. Unfortunately, none of these specimens are currently preserved in the Trèmols herbarium and therefore, are not included in the following list.

According to the type definitions of the *International Code of Nomenclature for algae, fungi, and plants* [51], seven isolectotypes, 19 syntypes, and one isotype have been identified within the Trèmols herbarium. For all taxa, we provide the basionym, the accepted name according to POWO [37], the place of publication, the indication of the original locality in the protologue (ind. loc.), the kind of the type material, the original label data, the herbarium codes—both from the Trèmols herbarium (in bold) and duplicates from other

herbaria, and the URL (Uniform Resource Locator) of the images of the Trèmols herbarium specimens.

***Arctostaphylos uva-ursi* (L.) Spreng. var. *angustifolia* Pau** in Not. Bot. Fl. España 6: 78 (1895)

=*Arctostaphylos uva-ursi* (L.) Spreng.
Ind. Loc.: "Torrijas, Aragón austro-occidental"
Lectotype (designated by Lahora Cano & Ferrer-Gallego [82] (p. 51): [SPAIN] Aragonia: Jabalambre (Torrijas), july 1890, C. Pau (MA 89655; isolectotypes: **BC-Trèmols 974966**, MA 89671).
Image available at: https://www.ibb.csic.es/herbari/JPEG/BC974966.jpg (accessed on 26 January 2024)

***Arenaria loscosii* Teixidor** in Restaurador Farm. 34: 173 (1878)

=*Arenaria conimbricensis* Brot. subsp. *conimbricensis*
Ind. Loc.: "Leg. Loscos inde Peñarroya ad Valderrobres comm. 8 June 1877"
Syntype: [SPAIN] Inde Peñarroya ad Puerto de Valderrobes, 8 june 1877, F. Loscos, SERIES EXICCATA FLORAE ARAGONENSIS CENTURIA SECUNDA 14 (**BC-Trèmols 920817**).
Image available at: https://www.ibb.csic.es/herbari/JPEG/BC920817.jpg (accessed on 26 January 2024)

***Arenaria minutiflora* Loscos**, Descr. Esp. Nuevas Reparto 1873–1874: 14 (1875)

=*Arenaria leptoclados* (Rchb.) Guss.
Ind. Loc.: "Hab circumcirca Castelserás in petrosis calcareis siccis in rupibus et in campis paulo irrigatis"
Lectotype (designated by Benedí & Montserrat [83] (p. 129): [SPAIN] regionis inferioris Aragonia. Circumcirca Castelserás, 1873, SOCIETAS BOTANICA BARCINONENSIS (Herb. Loscos 470; isolectotypes: **BC-Trèmols 920815**, BC-SBB 861939, BC-Cadevall 817028).
Image available at: https://www.ibb.csic.es/herbari/JPEG/BC920815.jpg (accessed on 26 January 2024)

***Barbarea affinis* Gand.**, Fl. Lyon.: 45 (1875)

=? (name unplaced)
Ind. Loc.: "Champs près le bourg d'Alix (Rhône)"
Syntype: [FRANCE] Alix, 14 May 1870, M. Gandoger, Flora Gallica exsiccata 72 (**BC-Trèmols 865706**).
Image available at: https://www.ibb.csic.es/herbari/JPEG/BC865706.jpg (accessed on 26 January 2024)

***Carex loscosii* Lange**, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1877–1878: 223 (1878)

=*Carex mairei* Coss. & Germ.
Ind. Loc.: "Circa Castelserás Aragoniae ad ripas corrugi 'la acequia nueva' vocati parcius 19 Jun. c. fl. matur. Loscos!"
Syntypes: [SPAIN] Pr. Castelserás ad ripas corrugi vocati La Acequia nueva, sed partius, 19 June 1875, F. Loscos, SERIES EXICCATA FLORAE ARAGONENSIS (**BC-Trèmols 876827**, **BC-Trèmols 876828**, **BC-Trèmols 876829**).
Images available at: https://www.ibb.csic.es/herbari/JPEG/BC876827.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC876828.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC876829.jpg (accessed on 26 January 2024)

***Carex verna* var. *elata* F. Gérard** in Magnier, Scrin. Fl. Select. 7: 129, 135 (1888)

=? (not included in POWO [37])
Ind. Loc.: "Vosges"

Syntypes: [FRANCE] Vosges: Portieux, digue des Canaux d'irrigation, 12–23 May 1887, F. Gérard, Flora selecta exsiccata 1827 (**BC-Trèmols 975464**, BESA 011480, P 01784574). [FRANCE] Vosges: Portieux, 24 April 1886, F. Gérard, FLORA VOGESIACA (**BC-Trèmols 975521**). [FRANCE] Vosges: Portieux, September 1887, F. Gérard, FLORA VOGESIACA (**BC-Trèmols 976207**).

Images available at: https://www.ibb.csic.es/herbari/JPEG/BC975464.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC975521.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC976207.jpg (accessed on 26 January 2024)

Fumaria caespitosa **Loscos**, Tratado Pl. Aragón: 26 (1876–1877)

=*Fumaria vaillantii* Loisel.

Ind. Loc.: "Leg. circumcirca Castelserás in segetes sicci vel paulo irrigati, speciatim ultra La Nora freq. 28 April 1875, Loscos".

Syntypes: [SPAIN] circumcirca Castelserás in segetes sicci vel paulo irrigati, speciatim ultra La Nora, 28 April 1875, F. Loscos, SERIES EXICCATA FLORAE ARAGONENSIS (**BC-Trèmols 865594**, BC 97570, JE 00018039, SG 2737).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC865594.jpg (accessed on 26 January 2024)

Genista valdes-bermejoi **Talavera & L. Sáez** in Anales Jard. Bot. Madrid 57: 208 (1999)

=*Genista balearica* Willk. ex Porta

Ind. Loc.: "MAJORQUE: 'Es coll des Coulomns dins el Tossals verts d'Aumalluch. 19 Juin, environ 600 métres' (Mar. et V.)"

Lectotype (designated by Talavera & Salgueiro [84] (p. 208): [SPAIN] Es col des Coulomns dins al Tossals vers Aumalluch. Mayorque, 18 June 1852, G. Vigineix, INSTITUT DE BOTANIQUE DE MONTPELLIER (MPU-KNOCHE; isolectotype: **BC-Trèmols 933079**).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC933079.jpg (accessed on 26 January 2024)

Polygala vayredae **Costa**, Supl. Cat. Pl. Cataluña 10: 91 (1877)

=*Polygaloides vayredae* (Costa) O. Schwarz

Ind. loc.: "Hab. In collibus Vall del Bach inter Capsech et Baget (Olot) sitis die 23.ª Aprilis hujusce anni amiciss. Stanislaus Vayreda detexit et mecum benevole communicavit"

Lectotype (designated by Gavioli et al. [4] (p. 2): [SPAIN] Coll de Carrera Vall del Bach (Pyr. Or.), April 1877, E. Vayreda, SOCIÉTÉ HELVÉTIQUE (BC-Costa 929697; isolectotypes: **BC-Trèmols 918953**, BC-Vayreda 929698).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC918953.jpg (accessed on 26 January 2024)

Rosa gabrielis **F. Gérard** in Magnier, Scrin. Fl. Select. 4: 75, 84 (1884)

=*Rosa corymbifera* Borkh.

Ind. loc.: ""

Syntypes: [FRANCE] Bords de la Vologne à Granges (Vosges), 4 July fl. 30 September fr. 1884, F. Gérard, SOCIÉTÉ VOGÉSO-RHÉNANE (**BC-Trèmols 956453**, FI 014245, JE 00025413, JE 00025567, P 03009085, S 13-13130, S 13-13131). [FRANCE] Vosges: Granges, prés humides des bords de la Vologne, 4 July fl, 30 September fr. 1880, F. Gérard, Flora selecta exsiccata, 829 (**BC-Trèmols 956454**, CLF 338943, KFTA 0000993, KFTA 0000994, LY 0293581, P 03140520, P 04462331, P 04152586).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC956453.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC956454.jpg (accessed on 26 January 2024)

Rosa gandogeriana **Debeaux** in Bull. Soc. Bot. France 21: 9 (1874)

=*Rosa sempervirens* L.

Ind. loc.: "Habitat in agro ruscinonensi Galliae, in sepibus prope Perpignan"

Syntype: [FRANCE] Perpignan (Pyr. Or.), 15 June 1873, O. Debeaux, HERBIER DE O. DEBEAUX (**BC-Trèmols 956446**).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC956446.jpg (accessed on 26 January 2024)

Rosa montana **Chaix var.** ***pliniana*** **Cornaz ex Crép.** in Bull. Soc. Roy. Bot. Belgique 28: 193 (1889)

=*Rosa montana* Chaix

Ind. loc.: "environs de Bormio"

Syntypes: [ITALY] à 10 min au aval des Nouveaux Bains de Bormio, 9 July 1888 28 July 1887, C. Cornaz, FLORE DE BORMIO (**BC-Trèmols 956521**). [ITALY] aux dessus de la route de Bains à Bormio, 4 July 1888 fl. 1 August 1887 fr., C. Cornaz, FLORE DE BORMIO (**BC-Trèmols 956522**, JE 00012686, P 04175762).

Images available at: https://www.ibb.csic.es/herbari/JPEG/BC956521.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC956522.jpg (accessed on 26 January 2024)

Rosa robusta **F. Gérard** in Magnier, Scrin. Fl. Select. 5: 92, 100–101 (1886)

=*Rosa marginata* Wallr.

Ind. loc.: "Juin. Haies pierreuses des terrains calcaires. Vosges, environs de Châtel, Zincourt, Vaxoncourt"

Syntypes: [FRANCE] Vosges: entre Châtel et Zincourt, 18 June fr. September fr. 1885, F. Gérard, HERBIER F. GERARD CHATEL (Vosges) (**BC-Trèmols 956550**, **BC-Trèmols 956551**, CHE 047432, L 0821111, MPU 174151, MPU 1177583, P 06787249). [FRANCE] Vosges: enviros de Châtel, Zincourt, Vaxoncourt, June, September 1885, F. Gérard, Flora selecta exsiccate 1161 (**BC-Trèmols 956552**, KFTA 0000919, LECB 0001494, LY 0292993, LY0708596, LY 0708597, MPU 433122, MPU 1177587, MPU 1177588, P 04201741, P 03141409).

Images available at: https://www.ibb.csic.es/herbari/JPEG/BC956550.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC956551.jpg (accessed on 26 January 2024), https://www.ibb.csic.es/herbari/JPEG/BC956552.jpg (accessed on 26 January 2024)

Rubus cladotrichus **Gand. ex Genev.**, Monogr. Rubus Bassin Loire ed. 2: 352 (1880)

=? (name unplaced)

Ind. loc.: "Bois, taillis, terr. cale. Maine-et-Loire: Saumur (Trouillard)."

Syntypes: [FRANCE] Arnas, 22 July 1873, M. Gandoger, M. GANDOGER.-Flora Gallica exsiccata 794 (**BC-Trèmols 947960**, JE 00002000, JE 00002001, JE 00014783, KFTA 0001087, MPU 027181, MPU 027182, MPU 027183, MPU 027184, MPU 027188, P04154267).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC947960.jpg (accessed on 26 January 2024)

Rubus theobroma **Gand.** in Mém. Soc. Émul. Doubs 8: 215 (1884)

=? (not included in POWO [37])

Ind. loc.: "Rhône: Denicé"

Syntypes: [FRANCE] Denicé, 8 August 1876, M. Gandoger, Flora Gallica exsiccata 414 (**BC-Trèmols 948057**).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC948057.jpg (accessed on 26 January 2024)

Rubus valentinus **Pau**, Not. Bot. Fl. Españ. 1:11 (1888)

=*Rubus ulmifolius* Schott

Ind. loc.: "en ribazos de «Marroyo», Segorbe (Valencia), à unos 340 m alt. 25 Junio 1886"

Lectotype (designated by Monasterio-Huelin [85] (p. 63): [SPAIN] Valentia: Segorbe, loco dicto "Marroyo", 25 June 1886, Caroli Pau Herbarium hispanicum (MA 54302; isolectotype: **BC-Trèmols 948071**).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC948071.jpg (accessed on 26 January 2024)

***Silene holzmannii* Heldr. ex Boiss.**, Fl. Orient. [Boissier] Suppl. 91 (1888)

Ind. loc.: "in scopulo maritimo Arpedoni insularum Pharmacosarum Atticae (Heldr.! Et Holzmann!)"

Holotype: [GRECE] in Pharmacusarum scopelo "Arpedoni", in freto Salaminio, 6 May 1877, T. Heldreich & J. Holzmann, De Heldreich Herbar. Florae Hellenicae 81 (G 00330305; isotypes: AIX 019667, B 10 0460775, **BC-Trèmols 919252**, FI 010213, FR 0031958, FR 0031957, FR 0031959, G00382985, G 00382986, GOET 000675, HBG 503529, HBG 503528, JE 00016135, JE 00016136, K 000725977, S 07-13630, W 1888-0007454, W 1889-0044250, W 1912-0017832, WU 0073536, WU 0073604, W 1966-0008938, Z 000002683, Z 000002684).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC919252.jpg (accessed on 26 January 2024)

***Silene arvensis* Loscos**, Tratado Pl. Aragón 1: 31 (1876)

=*Silene muscipula* L. subsp. *muscipula*

Ind. loc.: "pr. Castelserás in segetes vulgaris"

Lectotype (designated by Talavera & Muñoz Garmendia [86] (p. 440): [SPAIN] pr. Castelserás in segetes vulgaris, 26 May 1875, F. Loscos, SERIES EXICCATA FLORAE ARAGONENSIS CENTURIA PRIMA 18 (G; isolectotype: **BC-Trèmols 976378**).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC976378.jpg (accessed on 26 January 2024)

***Sphaeralcea mandonii* Baker f.** in J. Bot. 31: 364 (1893)

=*Andeimalva mandonii* (Baker f.) J.A. Tate

Ind. loc.: "Viciniis Sorata i in nemoribus",

Lectotype (designated by Tate [87] (p. 16): [BOLIVIA] Prova Larecaja, Vicinis Sorata (Bolivia), April, October 1859, G. Mandon (K 000328809, isolectotype: **BC-Trèmols 928868**, BM 000571082, F 0063104F, G 00353355, G 00353356, GH 00058147, GOET 007792, K 000328809, LIL 000871, MPU 016482, NY 00222119, NY 00222120, NY 00222121, P 00156879, P 00156881, P 00156882, S 02-1).

Image available at: https://www.ibb.csic.es/herbari/JPEG/BC928868.jpg (accessed on 26 January 2024)

3.8. Specimens of Distributional Interest

We have found up to 19 occurrences attributed to Trèmols cited in *Flora dels Països Catalans* [45] and two in *Flora iberica* [40]. Of them, only five have been located in the Trèmols herbarium, all of them cited in *Flora dels Països Catalans* [45]. These are described below (for each specimen, the updated locality, date, and collector are indicated):

***Anacyclus radiatus* Loisel. Material**: [SPAIN] Sant Andreu de Llavaneres, June 1894, F. Trèmols (BC-Trèmols 960728). **Notes**: This species was cited from Maresme county (Barcelona province) by Bolòs & Vigo [88] (p. 800), who indicated that they did not see any specimen. We have found it in the extra boxes collection identified only at the genus level, but we were able to confirm its specific identity.

***Avena fatua* L. Material**: [SPAIN] Cadaqués, F. Trèmols (BC-Trèmols 962639); Cadaqués, May 1880, F. Trèmols (BC-Trèmols 962633). **Notes**: Bolòs & Vigo [89] (p. 456) cited this species from Alt Empordà county (Girona province), attributing this locality to Trèmols but without seeing any specimen. The two specimens that we were able to locate, both preserved in the extra boxes, are from this county, thus confirming the presence of this species.

***Epilobium roseum* Schreb. subsp. *roseum*. Material**: [SPAIN] Requesens, July 1884, Collsacabra, 1876 F. Trèmols (BC-Trèmols 956891). **Notes**: Bolòs & Vigo [90] (p. 675) cited this species from Albera Massif (Girona province), attributing this locality to Trèmols but without seeing any specimen. The sheet BC-Trèmols 956891 includes two localities in the label (Requesens near Albera Massif and Collsacabra in the Garrotxa county) and two

samples that we have identified as *Epilobium tetragonum* L. and *E. roseum*. There is no indication of which sample corresponds to which site in the sheet, and Trèmols cited both species in his Requesens flora [9]. It is not possible to know with certainty whether the plant identified as *E. roseum* is from Requesens but in his floristic study of Albera Massif, Font [91] included the Trèmols reference as a plant to be searched.

***Erodium cicutarium* (L.) L'Hér. Material**: [SPAIN] Cadaqués, April 1875, F. Trèmols (BC-Trèmols 929202). **Notes**: Bolòs & Vigo [92] (p. 308) added a note for *Erodium cicutarium* subsp. *jacquianum* (Fisch., C.A. Mey. & Avé-Lall.) Ball (=*Erodium salzmannii* Delile subsp. *salzmannii* in POWO [37]), indicating that the plants from Alt Empordà county (Girona province) in the Trèmols herbarium were large forms of the subsp. *cicutarium* (*Erodium cicutarium* s. str. in POWO [37]). This specimen was also identified by Juan José Aldasoro as *E. cicutarium*, the author of this genus in *Flora iberica* [40], which confirms what Bolòs & Vigo had detected.

***Fumaria gaillardotii* Boiss. Material**: [SPAIN] Barcelona, F. Trèmols, April 1870 (BC-Trèmols 865534). **Notes**: Bolòs & Vigo [90] (p. 716) cited two subspecies: *Fumaria gaillardotii* subsp. *gaillardotii* (=*F. gaillardotii* s. str. In POWO [37]) and *F. gaillardotii* subsp. *major* (Maire) O. Bolòs (=*Fumaria barnolae* Sennen & Pau subsp. *barnolae* in POWO [37]). For the first subspecies, they indicate a specimen from Barcelona collected by Trèmols and cited by Lidén [93], who mentions three specimens collected in 1892, distributed originally as *F. agraria* Lag. and preserved in the BM, LD, and UPS herbaria. Thanks to the curators of these herbaria, we have been able to find a specimen with the same data cited by Lidén [93] in the herbarium of Uppsala (UPS V-114025) and the herbarium of Lund (LD 2294645); in contrast, in the London herbarium (BM), they could not find it. We have found a specimen conserved in Trèmols herbarium originally labelled as *F. agraria* Coste and collected in Barcelona earlier (in 1870), which corresponds to *F. gaillardotti* and supports the presence of this species in the city.

Most of the interesting specimens from the distributional point of view collected by Trèmols are either present in the BC general herbarium rather than in the Trèmols herbarium (because they were taken by Marcos from the original Trèmols herbarium and incorporated in the general collection; below, we are indicating them with an asterisk) or are preserved in other herbaria (having arrived there via exchange). This is the case of (1) *Adoxa moschatellina* L. from Montseny (Barcelona province)—BC 660637, a specimen cited in *Flora dels Països Catalans* [88] (p. 603), where it is indicated that there was probably a labelling confusion, and in the section of "species to be found" of *Flora iberica* [94] (p. 203), (2) *Asteriscus maritimus* (L.) Less. (*Pallenis maritima* (L.) Greuter in POWO [37]) from Barcelona—BC-Cadevall 819654, specimen cited in *Flora dels Països Catalans* [88] (p. 761), (3) *Euphorbia seguieriana* Neck. from Barcelona—CAS 674820, locality cited in *Flora dels Països Catalans* [89] (p. 571), (4) *Juncus bulbosus* L. from Cadaqués (Girona province)—MAF 30301, specimen cited in *Flora dels Països Catalans* [89] (p. 181), (5) *Juniperus oxycedrus* subsp. *macrocarpa* (Sibth. & Sm.) Ball (*Juniperus macrocarpa* Sm. in POWO [37]) from Cadaqués (Girona province)—BC 660040*, locality cited in *Flora dels Països Catalans* [90] (p. 204), (6) *Lavandula dentata* L. from Maó (Balearic Islands)—BC 48028, specimen cited in *Flora dels Països Catalans* [88] (p. 336), (7) *Linaria vulgaris* subsp. *italica* (Trevir.) Arcang. (*L. angustissima* (Loisel.) Borbás in POWO [37]) from Montserrat (Barcelona province)—MANCH, specimen cited in *Flora dels Països Catalans* [88] (p. 424) and in *Flora iberica* [95] (p. 240), (8) *Polygonum arenarium* subsp. *pulchellum* (Loisel.) Thell. from Montcada (Barcelona province)—MAF 43487 (labelled as the first record for the Iberian Peninsula by L. Villar in 1985), cited in *Flora dels Països Catalans* [90] (p. 620) and in the section of "species to be found" of *Flora iberica* [96] p. (586), and (9) *Thymelaea tinctoria* subsp. *nivalis* (Ramond) Nyman (*T. tinctoria* (Pourr.) Endl. in POWO [37]) from Núria (Girona province)—BP, locality cited in *Flora dels Països Catalans* [90] (p. 691).

Finally, there are five specimens that we have not been able to find (all of them from localities included in *Flora dels Països Catalans* [45]). These are specimens of (1) *Arum maculatum* L. from Alt Empordà county (Girona province) [89] (p. 672), (2) *Convallaria*

majalis L. also from Alt Empordà (Girona province) [89] (p. 124), (3) *Helianthemum canum* (L.) DC. from Montserrat (Barcelona province) [92] (p. 207), (4) *Ophrys tenthredinifera* Willd. from Vallès Occidental county (Barcelona province) [89] (p. 662), and (5) *Viola tricolor* subsp. *subalpina* Gaud. from Montseny mountains (Barcelona province), cited in [92] (p. 244). *Arum maculatum* and *C. majalis* are cited by Trèmols [9] in his floristic study about Requesens mountain, which is located in Alt Empordà county. The presence of *O. tenthredinifera* in Vallès Occidental county is included in the *Flora de Catalunya* of 1933 of Cadevall [97] (p. 334), who mentioned the locality of Montcada, attributing it to Trèmols. The presence of *Helianthemum canum* in Montserrat was observed by Pau [98] (p. 23), indicating it as *H. vineale* Pers. Nevertheless, none of these occurrences are cited in the catalogue of the original herbarium by Riofrío in 1918, when it was incorporated into the RACAB. Therefore, it is not certain that Trèmols collected voucher specimens of these localities and, thus, Bolòs & Vigo [45] most likely used the abovementioned literature to include them in their *Flora dels Països Catalans*.

All the specimens cited in this section demonstrate Trèmols's willingness to look for interesting plants to exchange with other botanists. Unfortunately, as it is indicated in the introduction section, part of the Trèmols herbarium was used to grow the general herbarium of the Botanical Institute of Barcelona between the 1930s and the 1960s. The aim of this rearrangement, made under the supervision of Font Quer and A. de Bolòs, was surely to improve the quantity, but also the quality, of the BC general herbarium. Therefore, specimens transferred from Trèmols herbarium were surely more interesting from a distributional and taxonomical point of view. It is remarkable that, among the 19 specimens cited in this section, only five are currently preserved in the Trèmols herbarium; two of them (specimens of *Anacyclus radiatus* and *Avena fatua*) were found in the extra boxes, which have been revised during the present study, thus indicating that they were not accessible for the authors of both *Flora dels Països Catalans* and *Flora iberica*. Although some of the specimens transferred to the general herbarium are labelled as "ex. Herb. Trèmols", not all of them are identified. At present, 574 out of the 138,475 digitised specimens of the general herbarium—digitised specimens account for nearly one-quarter of all the collection, which is estimated to contain around 600,000 specimens—are labelled this way (some of them having been recently labelled). A comparison between the first catalogue of the RACAB completed in 1918 and the Trèmols herbarium database could allow us to clarify this rearrangement to gain a better understanding of the botanical contribution of Trèmols to the knowledge of the Catalan flora.

3.9. Specimens of Conservation Significance in Catalonia

The RBFC [55] includes 304 taxa of conservation interest, 199 of them being threatened taxa according to the IUCN criteria [99] and 105 are non-threatened but considered endemic or subendemic to Catalonia. Of the >4500 specimens of plants collected from Catalonia that are within the Trèmols herbarium, only 75 are of taxa of conservation interest (Table S5). The vast majority of these specimens (80.0%) correspond to non-threatened taxa that are endemic or subendemic to Catalonia (60 specimens of 17 taxa), while threatened taxa are not common in the Trèmols herbarium. We were only able to find nine specimens of six "Vulnerable" (VU) taxa, two specimens of two "Endangered" (EN) taxa, and four specimens of three "Critically Endangered" (CR) taxa (Table S5). These results are similar to the ones obtained by Nualart et al. [19] regarding the whole BC herbarium, in which the number of specimens and the number of taxa represented in the BC herbarium decreases as the degree of threat increases. The representativeness of taxa of conservation interest of the whole BC herbarium with regard to Catalonia (250 out of 304, i.e., 82.2%) is much higher than that of the Trèmols herbarium (28 out of the 304, i.e., 9.2%); however, this is an expected result given the different volume of specimens (ca. 800,000 vs. <13,000). Among the 75 specimens of conservation concern in the Trèmols herbarium, the following ones are of particular interest:

***Dianthus seguieri* subsp. *requienii* (Godr.) M. Bernal, Laínz & Muñoz Garm.** (endemic—"Least Concern", LC). **Material**: [SPAIN] Montserrat, July 1897 (BC-Trèmols 920539); Montserrat, July 1897, F. Trèmols (BC-Trèmols 962458). **Notes**: Although the distribution area of this taxon is large, occupying the northeastern quarter of Catalonia, its presence on the Montserrat mountain (Barcelona province) is not recorded either in the RBFC [55] or in the BDBC [56]. The flora of Montserrat [98] includes some old citations [100–102], but the authors indicate that this taxon does not occur in Montserrat mountain in contrast to the geographically close Sant Llorenç de Munt mountain and attribute it to the cooler climate of the latter mountain. It cannot be ruled out, however, that in the 19th century, when this plant was collected and cited, the environment of Montserrat was slightly different from the current one, allowing the presence of this plant.

Halimium halimifolium* (L.) Willk. subsp. *halimifolium (non endemic—"Vulnerable", VU). **Material**: [SPAIN] Castelldefels, May 1867 (BC-Trèmols 876672). **Notes**: According to the RBFC [55], this taxon is discontinuously distributed along the coastline from Blanes (Girona province) to Hospitalet de l'Infant (Tarragona province). In their recently published flora of the Llobregat River Delta (located south of the city of Barcelona), González et al. [103] (p. 193) cited this taxon from Gavà and Prat de Llobregat but not from Castelldefels. Nevertheless, the BDBC [56] includes a series of specimens from Castelldefels that are conserved in different collections within the BC herbarium: one specimen from the BC-Vayreda herbarium (BC-Vayreda 950397) collected in 1876, three specimens from the general herbarium (BC-6526 collected by Trèmols on 1881, BC 645598 of 1878 and BC 6525 of 1871), and one from the Salvador herbarium (BC-Salvador 1322). Bolòs [104] (p. 410) also cited these occurrences from the Salvador and Cadevall herbaria. The specimen preserved in the Trèmols herbarium confirms this old extinct locality.

***Hieracium sonchoides* Arv.-Touv.** (endemic—"Least Concern", LC). **Material**: [SPAIN] Collsacabra, July 1885 (BC-Trèmols 876051). **Notes**: The distribution of this species is scattered, being cited in different localities of Catalonia. However, the locality mentioned for the specimen preserved in the Trèmols herbarium (Collsacabra, which is a small plateau located between the Barcelona and Girona provinces) is not included in the RBFC [55]. The BDBC [56] includes a specimen collected in 2018 in a nearby location (VAL 239264).

***Hippuris vulgaris* L.** (non endemic—"Critically Endangered", CR). **Material**: [SPAIN] Canadal, La Jonquera, F. Trèmols (BC-Trèmols 962135). **Notes**: According to the RBFC [55], there is only one remaining population of this species, although it was cited in the past in several locations along the Pyrenees but also in other areas of Catalonia. In 2015, a second population was discovered, not far from the other (<40 km; [105]). The Trèmols specimen, preserved in the extra boxes, confirms an old locality [106] (p. 219) from La Jonquera (Girona province) that was not recorded either in the RBFC [55] or in the BDBC [56] and that significantly extends its historical range to the north-east.

***Oplismenus undulatifolius* (Ard.) Roem. & Schult.** (non endemic—"Critically Endangered", CR). **Material**: [SPAIN] Botanical Garden of Olot, without a collector but label manuscript is probably by Vayreda (BC-Trèmols 962276); Castellfollit de la Roca, R. de Bolòs (BC-Trèmols 962277). **Notes**: The presence of this species in Catalonia was discovered by Ramón de Bolòs (1852–1914) in Castellfollit de la Roca in 1889, as mentioned in the RBFC [55], although it was later (in 1922 or perhaps a little bit earlier) discovered in Sant Joan de les Fonts, near Olot (Girona province) [107]. One of the specimens preserved in the Trèmols herbarium (BC-Trèmols 962277) corresponds to the ones collected by Bolòs in the first locality (and thus, it should be regarded as the testimony of such discovery), although there is no indication of date. It should be noted that there have been discrepancies regarding its native status [55], which is of enormous significance as the species was legally protected until very recently. Indeed, *Oplismenus undulatifolius* has been delisted from the catalogue of protected plants in Catalonia in November 2023 [108] because now, there is a wide consensus on its alien status [109,110]. As already indicated by Bolòs [111], the species could have arrived as a "contaminant" (unintentional introduction with industrial commodities). Although the specimen BC-Trèmols 962276, collected in a particular garden

of "Torre Castanys" (later "Parc Nou d'Olot"), also has no date, it probably corresponds to planted individuals from the original population of Castellfollit de la Roca.

***Polygala vayredae* Costa** (endemic—"Vulnerable", VU). **Material**: [SPAIN] Coll de Carrera, Vall d'en Bac, April 1877, E. Vayreda (BC-Trèmols 918953) (isolectotype, see Section 3.7). **Notes**: According to the RBFC [55], it is a species endemic to the eastern Pyrenees, only known from the Vall d'en Bac (Garrotxa county in Girona province), the type locality where the plant was collected for the first time in 1877. The core of its known range does not seem to have changed much since the cartographic works of Bolòs [112] as only some peripheral populations of very small size have been found since then. The BDBC [56] includes a series of specimens from different Spanish herbaria from 1877 (when it was described) to 2013 thanks to many local botanists and exsiccatae like *Société Helvétique pour l'Échange des Plantes*, *Flora Iberica Selecta* of Font Quer, or *Plantes d'Espagne* distributed by Frère Sennen. With the distribution of these specimens, this new species, which was rare (occurring in a single locality) but locally abundant, became known, as illustrated by the 54 specimens of this taxa conserved in Catalan herbaria (of which 22 were distributed by exsiccatae [21]). Indeed, the Trèmols specimen was acquired thanks to the *Société Helvétique*, as noted in its label, and not through Costa (the botanist who described this species), demonstrating once again the importance of exchange societies in the Trèmols herbarium.

The search of the occurrences attributed to Trèmols cited in the RBFC [55] (using the same methodology as in Section 3.8) allowed us to detect four of them: two occurrences of two threatened taxa that are "Vulnerable" (VU) and two occurrences of two taxa that are "Data Deficient" (DD). We were able to find only one specimen in the Trèmols herbarium which is listed below:

***Arabis verna* (L.) R. Br** (non endemic—"Data Deficient", DD). **Material**: [SPAIN] Cadaqués, cala Jònculs, April 1869, F. Trèmols (BC-Trèmols 865795). **Notes**: According to Losa [113] the presence of this species in Catalonia was first reported by Trèmols thanks to this specimen preserved in his own herbarium. The authors of the RBFC [55] (p. 678) did not find any recent evidence of this species in Cap de Creus and hypothesised that the plant could be locally extinct.

For the other three occurrences attributed to Trèmols and cited in the RBFC [55], we failed to locate their voucher specimens in the Trèmols herbarium, but two of them were present in the BC general herbarium and one in the MA herbarium (an asterisk indicates when they come from the Trèmols collection): (1) *Dryopteris cambrensis* (Fraser-Jenk.) Beitel & W.R. Buck (non endemic—"Data Deficient", DD) from Montseny (Girona) (MA 212), (2) *Limonium bellidifolium* (Gouan) Dumort (non endemic—"Vulnerable", VU) from Roses (Girona) (BC 650942*), and (3) *Myriolepis ferulacea* (L.) Lledó, Erben & M.B. Crespo (non endemic—"Vulnerable", VU) from Roses (Girona) (BC 661072*, locality indicated as doubtful).

4. Conclusions

The careful study of the Trèmols herbarium for over a decade leaves no doubt that it is a very valuable collection with two distinct geographic frameworks: (1) Catalan and (2) European. The first can be easily explained by the nationality of Trèmols and his gathering habits which rarely extended beyond the borders of this Iberian region. The second can be linked to the collaboration of Trèmols with two plant exchange societies that were very active at the international level in the second half of the 19th century: the *Societat Botànica Barcelonesa* and the *Société Helvétique pour l'Échange des Plantes*. However, we should neither underestimate Trèmols's need to have a good variety of specimens that would help him to determine the plant taxa he collected in a period in which the consultation of floras and dichotomous keys was rarely possible, nor belittle his ability to maintain relationships with a large number of botanists of very different origins and interests.

Judging from the structure of the herbarium and the documents that we were able to consult, it is clear that Trèmols was not interested, like other botanists of his time, in creating a representative herbarium of the Spanish flora; rather, he was mostly interested

in Mediterranean plants and those of mid- and high mountains in his commitment to studying the surroundings of the places where he lived or worked: Barcelona, Cadaqués, and the Pyrenees.

The figure and work of Trèmols make us think of a scientist divided into two beings: (1) an enlightened and encyclopaedic man who had collected such a wide array of specimens both in terms of origin and characteristics, almost as if he wanted to create his own personal botanical *wunderkammer* and (2) a person with an outside perspective through scientific networks. In short, the Trèmols herbarium demonstrates both the great effort of its creator and the great liveliness of the botanical world at the end of the 19th century.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/d16020105/s1, Figure S1: Distribution of the identifications of the Trèmols herbarium over the years, Figure S2: The collectors of the Trèmols herbarium represented according to their nationality, Figure S3: Growth curves of the Trèmols herbarium for the 1861–1899 period. Specimens collected by Trèmols are shown in red and specimens from exchange activities are shown in blue, Figure S4: Continents of origin of the Trèmols herbarium specimens, Figure S5: Localities of the specimens from the Trèmols herbarium from Europe. Specimens collected by Trèmols are shown by red dots and those obtained through exchanges are shown by blue dots. Green polygons indicate European mountain areas, Table S1: Botanists of the Trèmols herbarium with 10 or more identifications, Table S2: Collectors who gathered plants over a period of more than 20 years, indicating their nationality, interval of gathering, number of specimens, and ratio of specimens per year, Table S3: Collection countries with more than 25 specimens in the Trèmols herbarium; the number of specimens and their percentage is indicated, Table S4: Vascular plant families of the Trèmols herbarium with more than 100 specimens. Number of taxa (including genus, hybrids, species, and infraspecies levels) and number of species are indicated, Table S5: The 28 taxa from the Trèmols herbarium that are cited in the RBFC [55] according to the IUCN threat categories, their endemism status, and the number of specimens. The accepted name according to POWO is also indicated when it is different.

Author Contributions: All four authors participated in the design of the investigation. N.N. conducted the data research, coordinated the work, collaborated for the data collection, analysed the protologues, and performed the analyses. L.G. digitised and revised the database digitisation, revised the protologues, and provided the historical revision of the text. N.I. collaborated for data collection and analysis. All four authors discussed and wrote the first draft of the manuscript. J.L.-P. led the revision and editing of the final version of the manuscript. All authors have read and agreed to the published version of the manuscript.

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