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THE *ORIGANUM* COLLECTION OF GAETANO SAVI (1769-1844) IN THE *HERBARIUM HORTI PISANI* (PI)

Abstract - *The* Origanum *Collection of Gaetano Savi (1769-1844) in the* Herbarium Horti Pisani *(PI).* The collection of *exsiccata* of the genus *Origanum*, studied by Gaetano Savi and kept in the *Herbarium Horti Pisani* (PI) represents a valuable document of Savi's work as a taxonomist. It provides useful news for researchers of systematics and history of botany. The collection is enriched by some original drawings and includes the lectotypes of *Origanum confertum* Savi and *O. fortuitum* Savi.

Key words: *Origanum*, lectotypes, gynodioecy, Gaetano Savi, *Herbarium Horti Pisani* (PI), history of botany.

Riassunto - *La collezione di* Origanum *di Gaetano Savi (1769-1844) nell'*Herbarium Horti Pisani *(PI).* La collezione di campioni del genere *Origanum*, studiati da Gaetano Savi e intercalati nell'*Herbarium Horti Pisani* (PI), costituisce una preziosa documentazione dell'attività di Savi come tassonomo e fornisce notizie utili per gli studiosi di sistematica e di storia della botanica. La collezione è arricchita da alcuni disegni originali e contiene i lectotipi di *Origanum confertum* Savi e *O. fortuitum* Savi.

Parole chiave: *Origanum*, lectotipi, ginodioecia, Gaetano Savi, *Herbarium Horti Pisani* (PI), storia della botanica.

Introduction

Gaetano Savi (1769-1844) was Praefectus of the Botanic Garden and Director of the Botanic Museum of Pisa from 1814 to 1843. He was also a talented taxonomist who investigated different taxonomic groups and described many new species (IPNI, 2014), some of which bear his name still valid.
Savi was particularly interested in the cultivation, study and conservation of plants belonging to genera also very well-known and used in everyday life as food, herbs or gardening. This is the case, for example, of the numerous studies on the genera *Phaseolus* L., *Acacia* L., and *Origanum* L. (Ridolfi, 1845).
He studied the latter genus through the observation of many specimens, which he first cultivated in the Botanic Garden and then collected as documentation with *exsiccata*, preserved in the *Herbarium*. Gaetano Savi presented the results of these studies at the First Meeting of the Italian Scientists held in Pisa in October, 1839, during which he showed living and dried plants, drawings and descriptions to the audience ['*mostrava di tutte le specie di cui avea parlato gli esemplari freschi e secchi, ... e le figure, quali annunziava che si disponeva a pubblicare, unitamente alle descrizioni*', i.e. "he showed both dried and fresh materials for all the species he was talking about... and also showed the figures, he announced soon to be published along with descriptions"] (Savi, 1840a).
In this paper we re-examine these specimens, still kept in the *Herbarium Horti Pisani* (PI), as fundamental documentations of the works published at that time (Savi, 1835, 1839, 1840b). They are kept in the historical section of the General *Herbarium*, the oldest and most conspicuous section that just Gaetano Savi began to build up from the end of the Eighteenth century, thanks to his own collections and to exchanges with the botanists of the time (Ridolfi, 1845; Chiarugi, 1950; Amadei, 1987; Garbari *et al.*, 1991; Amadei, 2002).
In recent decades the *exsiccata* of Savi have been and still are the subject of several taxonomic and nomenclatural studies (Baldini & Jarvis, 1991; Garbari & Cecchi, 2000; Tomei *et al.*, 2005; Selvi & Cecchi, 2009; O'Leary *et al.*, 2010; Amadei *et al.*, 2013).
In this context, we considered interesting to carry out a full review of the *Origanum* collection of Savi, comparing his works with the herbarium sheets (including one or more specimens, i.e. single unconnected portions of exsiccated plants) and the documentation attached to them, consisting of letters, notes and drawings.

Studies of Savi about Origanum

Among the Savi publications (Ridolfi, 1845), two works are fully devoted to the genus *Origanum*.

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In 1835, with a memory published in the 38th volume of the Academy of Turin, he tried to make clear a taxonomic subject that had also a practical interest, especially in culinary art: the classification of different *Origanum* taxa that were usually cultivated as aromatic plants, locally called 'Persia bianca' ("white Persia"), 'Persia verde' ("green Persia") and 'Persia nera' ("black Persia") (Savi, 1834).
He considered: a) the vernacular names generally used for the different plants; b) the scientific names and the descriptions identifying the different taxa from the most renowned botanists at that time: C. Linnaeus (1707-1778), L. Fuchs (1501-1566), M. L'Obel (1538-1616), C.L. Willdenow (1765-1812), A.P. De Candolle (1778-1841), etc.; c) the observation and the comparison of the various plants cultivated in the Botanic Garden of Pisa, collected and kept as *exsiccata* in the *Herbarium*.
He attributed 'Persia bianca' to *Origanum majorana* L., 'Persia nera' to *O. creticum* L. and 'Persia verde' to *O. syriacum* L. He also provided detailed descriptions of these three species, completed by their iconographies.
In a second paper (Savi, 1840b), he continued the analysis of other species, highlighting the difficulties in ordering a very variable genus. The first part deals with some putatively known species at that time: *Origanum smyrnaeum* L., *O. heracleoticum* L., *O. onites* L. and *O. aegyptiacum* L.
Regarding *O. smyrneum*, he drawn the conclusion that it corresponds to *O. glandulosum* Desf., then listed some distinctive characteristics, however claiming a high morphological variability within this species.
A further species is *O. heracleoticum*, which he attributed to *O. vulgaris* δ *virens*.
He also accepted the description of *O. onites* L., while for *O. aegyptiacum* he was not able to come to any certain conclusion ['*Questa specie è imbrogliata quant'altre mai*', i.e. "this species is by far the most intricated"].
The work continues with a discussion of two species described by Savi himself: *Origanum confertum* Savi and *O. fortuitum* Savi. About *Origanum confertum* he wrote: '*Fralle diverse piante che mi son nate col nome di Origanum aegyptiacum, v'è quella di cui parlai in una lettura che feci alla Sezione Botanica della Riunione scientifica di Pisa, e che dissi voler chiamare Origanum confertum, e che inserii nel Catalogo de' semi dell'Orto Pisano per l'anno 1839 coll'appresso frase: Origanum confertum foliis ovato-obtusis, vel ovato-rotundatis, inflorescentia thyrsoidea rigida, spicis subsessilibus confertis densissimis, cylindrico tetragonis, bracteis ovato-rotundatis cochleariformibus, calyce unilabiato subaequalibus. Nob.*', i.e. "Among the different plants born from seeds labeled as *O. aegyptiacum*, there is one I spoke about during the Botanical Section of the scientific Meeting in Pisa, called *Origanum confertum*, and included this name in the seed index for 1839 of the Pisa Botanic Garden along with the following sentence: *Origanum confertum foliis ovato-obtusis, vel ovato-rotundatis, inflorescentia thyrsoidea rigida, spicis subsessilibus confertis densissimis, cylindrico tetragonis, bracteis ovato-rotundatis cochleariformibus, calyce unilabiato subaequalibus. Nob.*". He provided also a figure ['*servirà a meglio farla conoscere e distinguerla dalle altre specie congeneri*', i.e. "it will be useful to better understand and recognize this species from others"].
About *Origanum fortuitum* he wrote '*... di cui feci parola alla Riunione scientifica di Pisa, ed inserii nel Catalogo de' semi. Il nome fortuitum deriva dall'essermi comparsa a caso, inaspettatamente, fra delle piante d'Origanum majorana, in un vaso nel quale aveva sparso del seme di quest'ultima specie, venutomi di fuori ... Checché ne sia, senza veruna pretensione che il da me descritto Origanum fortuitum sia una specie non descritta, ne do anche la figura nell'annessa Tavola, acciò altri di me più capace possa decidere ciò che della medesima si debba credere*', i.e. "I talked about this species during the scientific Meeting in Pisa, and I included it in the seed index. The name *fortuitum* comes from its quick and unexpected appearance in a pot, among *Origanum majorana* plants... However, I do not pretend that my *Origanum fortuitum* represents actually a still undescribed species, and for this reason I also provide an iconography, to allow experts to evaluate the correct status for my species".
It is noteworthy here to note that the diagnoses of these two species were actually published by G. Savi (as he stated in Savi, 1840b) one year before, in the *Index Seminum* of the Pisa Botanical Garden edited by his son Pietro Savi (1811-1871) (Savi, 1839). Albeit this antedates the valid publication of these names, it does not constitute a problem concerning the validity of the typifications recently made by Amadei *et al.* (2013), who referred to Savi (1840b).

Materials and Methods

The collection of *Origanum* herbarium sheets studied by Gaetano Savi is constituted by 40 *exsiccata* completed by handwritten labels and, in some cases, by pencil or ink drawings.
The first performed operation was the research of Savi's herbarium sheets within the General *Herbarium* in which they are inserted. Savi didn't use to sign the labels of his specimens. Moreover, only a part of them still had their original position while many, over the years, had been relocated with subsequent acquisitions. Nowadays the identification of the specimens was therefore possible only thanks to the recognition of Savi's handwriting (by comparison

with his manuscript material in the Botanic Museum Archives).
Then the data reported on the labels were transcribed and have been compared with those found in related works (Savi, 1835, 1840b). Subsequently, the specimens were reviewed according to the taxonomic concepts exposed in the most recent monograph of the genus (Ietswaart, 1980) and updated to current nomenclature (e.g. Euro+Med, 2006 onwards; The Plant List, 2013 onwards). It is noteworthy to say that Ietswaart knew only one of the Savi's papers about oreganos and did not examine the collections kept in the *Herbarium* of Pisa. The revision of the specimens from Egypt has been made according to Boulos (2000). The herbarium sheets are listed in alphabetical order by the scientific name derived from the update to current taxonomy.
After the order number of each herbarium sheet, the data handwritten on the original labels are reported in italics, followed by eventual annotations. Unless otherwise specified, the data on the labels are by Gaetano Savi. The numbers often present on them probably referred to the placement of the plants when cultivated in the Botanic Garden of Pisa.

There is often the sign 'V' followed by a number, which corresponds to the identification of the pot in which the plant was cultivated in the Botanic Garden of Pisa.
Some acronyms are also reported, 'OL', 'OC' and 'OM', the meaning of which has been made clear from the studies, still in progress, on the manuscript material of Savi kept in the Botanic Museum Archives.
In fact, Gaetano Savi has left, along with his herbarium sheets, several handwritten notebooks, which contain interesting information about his work as a professor and as *Praefectus* of the Garden.
In particular, in a notebook titled '*Ricordi di Baratti di Piante e Compere*' ("Annotations of plant exchanges and purchases") he has reported annotations on the maintenance and the care of the architectural structures as well as the collections held in the Garden from 1814 to 1833. In the constant references to the various sections of the Garden, these are often identified precisely with the following abbreviations: 'OC' for 'Orto del Cedro', 'OM' for 'Orto della Palma', 'OL' for 'Orto Linneano'. 'Orto del Cedro' is a name still used for this sector of the garden, while 'Orto Linneano' has been replaced by the late Nineteenth century terminology 'Scuola botanica'; 'Orto della Palma' is no more identified as a separate sector of the Garden.

The *Origanum* collection

***Origanum bilgeri* (Domin) Boros**
1. *Or. Syriacum OC 1 - 1109*
2. *Origanum ~~maru~~ syriacum!*
6 Ag. 1841 S.V. 1670
3. *Origanum syriacum*
4. *Origanum syriacum Persia verde*
Planta culta
The sheet is formed by two specimens.

***Origanum dictamnus* L.**
1. *Origanum dictamnus Calix glaber, 2-labiatus, oblongus, nervosus: labium superius elongatum, equale, obtusum integrum: inferius triplo brevius, dentibus duobus latis obtusissimis. Corolla calyce 7ene triplo longior, extus pubescens, labio superiori recto, obtuso, vix emarginato: Labio inferiori patulo breviori, limbo antice ad basim saccato: stamina recta, longe exsertum. Bracteae glabrae, virides, apice rufescentes, ovatae, calyce multo longiores et latiores.*
The sheet consists of four specimens.

***Origanum majorana* L.**
(as *Origanum confertum* Savi)
1. *Origanum confertum Nob.*
1837 V. 2766
The sheet consists of four specimens. In a recent work, these specimens were selected as the lectotype for the name *O. confertum* Savi (Amadei *et al*., 2013).

2. *An. 1836 Nato per Origanum aegyptiacum V. 2766. Calix unilabiatus*
The pot in which the plant was cultivated in the Botanic Garden of Pisa is the same as the previous sheet. On the label, handwritten by Gaetano Savi, his son Pietro added: '*Origanum confertum* Savi'.

3. *Origanum confertum Savi*

4. *Origanum ~~majorana~~ confertum Savi*
Hort. genuens.
The label has been handwritten by Pietro Savi.

5. *Origanum confertum Savi*
Savi
The sheet is formed by two specimens. The label has been handwritten by Pietro Savi, with the exception of a small note by Gaetano Savi, not well readable.

6. *Majorana vulgaris ? Origanum confertum Savi*
Hort. genuens.
The label has been handwritten by Pietro Savi.

(as *Origanum majorana* L.)
1. *Origanum majoranoides*
The sheet consists of four specimens.

2. *Origanum majorana*
The sheet consists of four specimens pinned on the third page of the folder, accompanied by a label

reporting the name. Along with specimens of *Origanum majorana* two original iconographic tables are preserved. The first depicts a branch with immature inflorescences, drawn in black ink (Fig. 1a). In the second two inflorescences at different stages of maturation are depicted in pencil, along with a bract and a calyx (Fig. 1b). The drawings are both of high botanical value. The monogram "F: P: dis.", appearing in the bottom left identifies Francesco Pierucci as the author of this iconography. Francesco Pierucci is the artist who painted one of the two portraits of Gaetano Savi known today, namely the one enclosed in the 'Elogio' of Ridolfi (1845).

Three out of the four specimens are bearing hermaphroditic flowers, while one is showing only female ones. This phenomenon, known as gynodioecy, is frequently observed within Lamiaceae tribe Mentheae. In the genus *Origanum*, up to now, it was documented, besides *O. majorana* (Langbehn *et al*., 2001), only in *O. syriacum* (Rodriguez-Riano & Dafni, 2007) and *O. vulgare* (Lewis & Crowe, 1956).

***Origanum onites* L.**

1. *Origanum castratum 2a, 2b, 2c. Corolla candida, extus pilosa et glandolosa, subregolaris: lobi 4 enim sunt subaequalis longitudinalis, omnes ottusi, superior latior et emarginatus. Lateralium quoque unus alterne, apice emarginatus, subtus calyce brevior. Bractea ovato-acuminata, nervosa, ciliata, glandulosa. Calyx apice leviter emarginatus, glandulosus, pilosus, nervosus. Spicae ovato-obtusae, pube alba, laevi, rigidiuscula. Stamina nulla. Stylus exsertus, apice 2-fidus.*

The sheet consists of three specimens. The flowers are not well detectable but, based on Savi's description, it seems that also this species can show gynodioecy.

2. *Origanum onites*
V. 1436
22 luglio 1841

a b

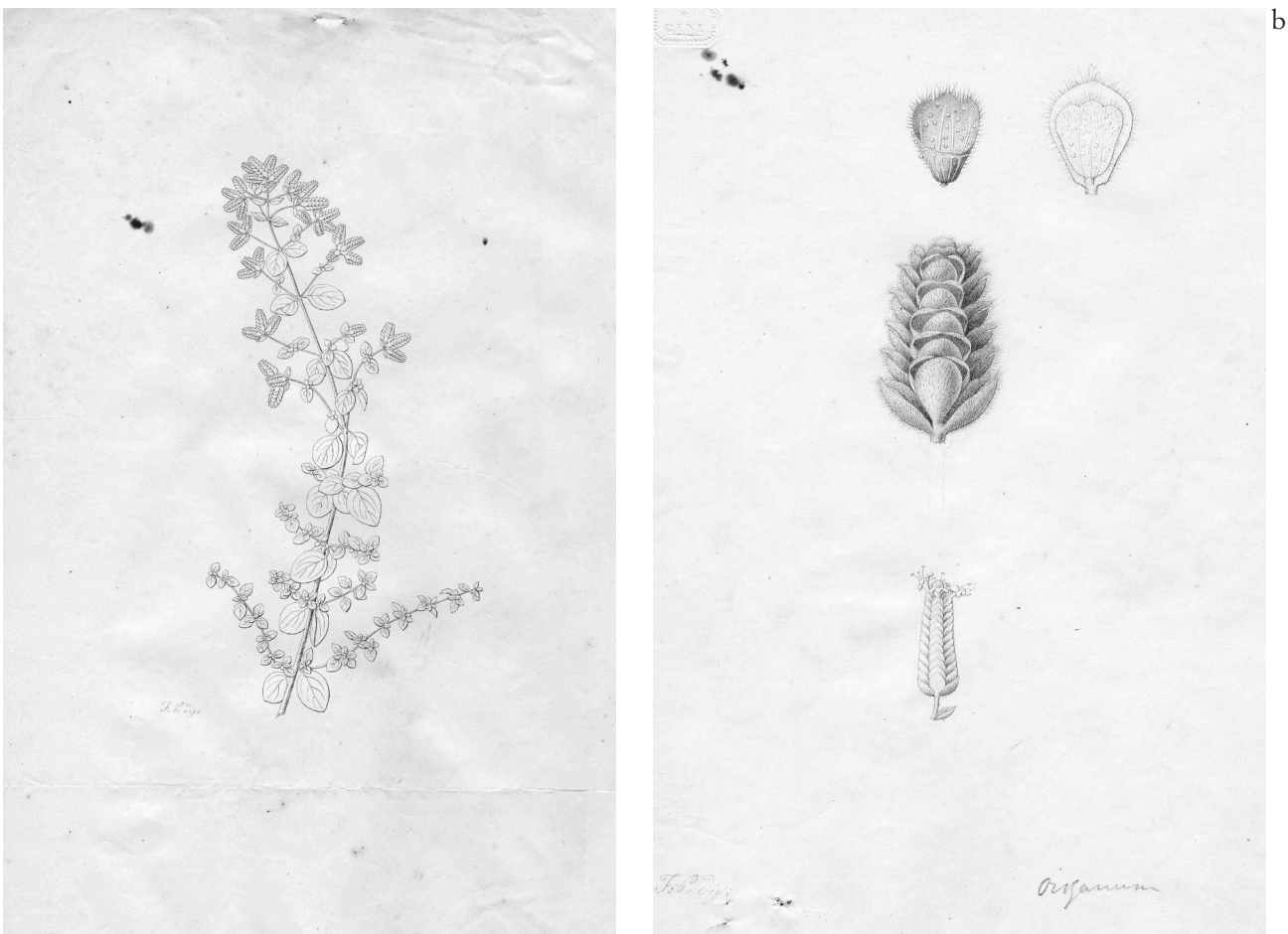

Fig. 1 - *Origanum majorana*. Drawings by Francesco Pierucci. a: flowering branch (ink drawing); b: particulars of the flower (pencil drawing).

The sheet is formed by two specimens.
3. *Origanum onites - 1a, 1b, 1c, 1d - Corolla labiata: labium superius erectum emarginatum, inferius trilobatum lobis patentibus: lobi omnes acutiusculi. Bractea ovato-acuta, nervosa, pilosa, ciliata, glandulosa, calyci subaequalis. Calyx apice 3-dentatus. Stamina longa exserta. Stylus exsertus, apice 2-fidus. Pubes alba molliuscula.*

The sheet consists of two specimens.
4. *Origanum onites, nato per Origanum majorana* ("born labeled as *Origanum majorana*"), *Maru, pallidum aegyptiacum. O. onites spicis ovato-oblongis densis confertis cymoso corymbosis. La figura della Flora Graeca Tab. 572 è buona* ("The figure in Tab. 572 of *Flora Graeca* is good"). *Variat foliis integris bracteis obtusis vel acutiusculis.*
V. Gussone. Bracteae ovatae cochleariformes, nervosae, pilosae glandulosae calycis labium superius, magnum, cuneiforme, bracteae subaequale nervosum, pilosum valde glandulosum, labii inferioris loco fissum. Spiculae ovato-oblongo-conicae, 4-5 lineares, in parvis cymis digestae, cymaeque in corymbum dispositae. Planta a viridi-lutescente, tota pilis mollibus seita.
The sheet is formed by two specimens. Attached to the sheet there is a small piece of transparent paper on which floral details were depicted in pencil, accompanied by the writing *Origanum onites Flor. Graec., Orig. onitis.*

5. *Origanum pallidum una volta creduto tale* ("once upon a time I thought it was")

***Origanum ×paniculatum* W.D.J.Koch**
(as *Origanum fortuitum* Savi)
1. *Origanum fortuitum paniculae ramis patulis subascendentibus, spicis ovato-conicis crassiusculis, bracteis ovatis cochleoriformibus villosis, eglandulosis, calyces exquisite labiato. Fusti alti da un piede a un piede e mezzo. Suffrutice della grandezza dell'O. syriacum, fusti però più robusti i rami della pannocchia son più rigidi e più patenti: le spighette non più lunghe di quattro linee, ovato-coniche, con brattee ovato-cochleariformi, sprovviste di glandole, nervose, più lunghe del calice. Calice subconico, nervoso, appena peloso, glandoloso, labiato con labbro superiore più lungo e tridentato, e i due denti del labbro inferiore più stretti, e tutti cigliati. La corolla è più grande di quella dell'O. syriacum, rossa, o color di rosa più o meno pallido, col labbro superiore più profondamente smarginato che in quello. Le foglie han la stessa figura di quelle dell'O. syriacum, ma egualmente che il resto della pianta hanno peluria più folta, e son di color verde-bigio, biancastro*, i.e. "Stems one feet to one feet and half tall. Suffrutex of similar size to *O. syriacum*, but stems more robust and panicle branches more rigid and patent: the spikelets are not longer than four lines, ovate-conical, with ovate-cochleariform bracts, lacking glandules, nervous, longer than calyx. Calyx subconical, nervous, slightly hairy, glandulous, bilabiate with upper lobe longer and tridentate, bottom lobe with two narrower teeth, all ciliate. Corolla larger than *O. syriacum*, red or more or less pale rose, with upper lobe more deeply emarginate. The leaves share the same shape as *O. syriacum*, but they are more densely hairy, greish-green to whitish, as the rest of the plant".
The sheet is formed by two specimens. In a recent work of typification, these specimens were selected as the lectotype of the name *O. fortuitum* Savi (Amadei *et al*., 2013).

2. *Origanum fortuitum V. 42*
The sheet consists of three specimens.

3. *Origanum fortuitum*
The sheet consists of two specimens and is pinned on the third page of the folder, accompanied by a label reporting the name.

***Origanum rotundifolium* Boiss.**
1. *Origanum tournefortii*
The sheet is pinned on the third page of the folder, marked by the label *Origanum tournefortii*. It appears to be devoid of inflorescences, but the particular form of the leaves has allowed an identification for comparison.

***Origanum sipyleum* L.**
1. *Origanum sipyleum*
The sheet consists of two specimens pinned on the third page of the folder, which is accompanied by the label with the name, and by two sheets pinned together. Attached to the sheet there is a small piece of transparent paper on which parts of the flower of *Origanum sipyleum* and *O. tourneforti* are depicted in pencil.

***Origanum syriacum* L. var. *aegyptiacum* (L.) Tackh.**
1. *Majorana nervosa*
The sheet consists of three specimens. On the label of the folder Gaetano Savi manuscript also *Origanum villosum Nobis*, a name that does not appear in his works about oreganos.

2. *Majorana nervosa, Origanum villosum Nob.*
Calyx labium superius rotundatum 2-obtuse tridentatum loco labii inferioris fissura. Strobili globosi. Calix striatus multis glandulis globosis aureo lucidis scadens in margine superiori dense ciliatus pilis longis. Bracteae striatae dense tomentosae candicantis. Bracteae cuneiformes calyci aequales, pilosae dense ciliatae. Folia ovato-acutiuscula, sessilia dense pilosa, albida. D'Egitto
The sheet is pinned on the third page of the folder, accompanied by a label that lists the names.
On the label of the folder Gaetano Savi wrote also '*Origanum villosum Nobis*'.

Origanum syriacum* L. var. *syriacum
1. *Origanum maru Smith Fl. Graec tab. 573 p. 59.3.6., Majorana microphylla Bentham*
The sheet consists of some branches with many leaves and the remains of an inflorescence, all contained in an envelope. Some floral parts are preserved between two pieces of glass, wrapped in a folded sheet of paper. Attached to the sheet there are a letter and two drawings. The letter, addressed to Gaetano Savi by Carlo Passerini, is dated August 13th, 1837, and reports the description of *O. smyrneum* taken from the 'Flora Graeca' (Sibthorp & Smith, 1806) and arguments of greeting. At the end we read a note by Passerini on the drawings: '*PS mia intenzione era di ricopiare in questa lettera i disegni ma ho pensato meglio di mandarli come sono*', i.e. "PS my intention was to copy the drawings in this letter, but I better thought to send them as they was".
Carlo Passerini (1793-1857), was a Florentine naturalist pupil of Gaetano Savi and friend of his son Paolo, curator of the Museum of Natural History in Florence (Conci, 1975). He is the author of the drawings that are on at least one of the two attached sheets, presented in a pre-final version. It is the image of the plant copied from the iconography of *O. maru* appearing in 'Flora Graeca' (Sibthorp & Smith, 1806), originally drawn by the German artist Ferdinand Bauer (1760-1826).
Of the two drawings the first, in pencil on a sheet of transparent paper, reproduces a flowering branch, an inflorescence and the details of the flower. It is added to the writings *Fl. Graeca Origanum maru* and *O. maru*, by Savi himself. The second drawing in ink reproduces a raceme, an inflorescence, a special branch with leaves and the details of the flower, accompanied by the writing '*Origan: Maru*'.

***Origanum vogelii* Greuter & Burdet**
1. *Origanum pseudo-majorana Nob.*
2 OC
The sheet is pinned on the third page of the folder, marked by the label *Origanum pseudo-majorana Nob.*, a name that does not appear in his works about oreganos, along with two sheets of *Origanum* sp.

***Origanum vulgare* L. s.l.**
1. *Origanum vulgare*
The sheet is formed by two specimens pinned on the third page of the folder, accompanied by a label with the name. Along with the sheet an iconography of *O. vulgare* is preserved. The drawing is in ink, on a small sheet of paper, and depicts the final part of a raceme with immature inflorescences and the name in pencil (Fig. 2a). The precise line, the accuracy of the details and the use of a non-transparent paper suggest that the drawing has been made *in vivo* by a skilled illustrator which could be Francesco Pierucci, who also made the iconography of *O. majorana*, although in this case there is no signature.
2. *Origanum vulgare b humile OM p. 3 1097; Origanum virens Gussone*
The sheet, formed by two specimens, is accompanied by a drawing in ink on a small sheet of paper, which depicts the final part of a raceme with immature inflorescences (Fig. 2b). As for the previous sheet, it is a valuable drawing that may have been drawn on fresh material by Francesco Pierucci.
3. *Origanum vulgare OM 16 1372.3; O. virens Gussone*
The sheet is formed by two specimens.
4. *Origanum vulgare calyce piloso, ciliato, eglanduloso Brattee più lunghe de' calici appena cigliate calice peloso e glanduloso.* ("Bracts longer than calyces, slightly ciliate, hairy and glandulose").
The sheet consists of five specimens. The analysis of the specimens does not allow a certain identification at subspecies level for four specimens, as the bracts longer or equal to the calyx would lead to subsp. *hirtum* (Link) Ietsw. but the absent or reduced hairiness on the bract margins would bring towards subsp. *glandulosum* (Desf.) Ietsw. Only one specimen seems to actually belong to subsp. *glandulosum*. The data on the labels show that Gaetano Savi had already established these characters as important for identification.

***Origanum vulgare* L. subsp. *gracile* (W.D.J.Koch) Ietsw.**
1. *Origanum monacharum*
Semi 1838 V. 1513 Ocymum monacharum M.T.
Origanum S.V. 1513 An. 1838 Nato di semi venuti da Trieste e da Pavia col nome di Ocymum monacharum. ("*Origanum S.V. 1513 An. 1838* Born by seeds obtained from Trieste and Pavia under the name *Ocymum monacharum*"). *Calix aequalis fauce pilis albus instructus dentibus viridibus tubo pallido, striis 10 saturate viridibus glandulis globosis pellucidis [scadente]. Corolla alba, labio superiore profunde emarginato, inferiore trilobo, extus pilosa et glandulosa. Bracteae virides, obovato-acutae, vel lanceolato-spatulatae glabrae, parce-glandulosae, calyce longiores, distantes (laxae), patentes hinc calyces semper conspicui, et nullimode spicae strobiliformes. Folia petiolata, ovata, vel ovato-cordata, nervosa, parva pilosa, ciliata, glandulis globosis impressis referta. Caules pilosi, pilis albis sursum flexis, vel deflexis tectus. Odor Origani vulgaris. Videtur annus. Descrizione e figura d'una particolare apparenza dell'O. smyrneum.* ("Description and figure of a peculiar appearance of *O. smyrneum*").
The sheet is accompanied by some drawings in ink. On a small irregularly cut sheet of transparent paper, some magnified floral elements and the silhouette of an inflorescence are drawn. As in other cases, it is an

a b

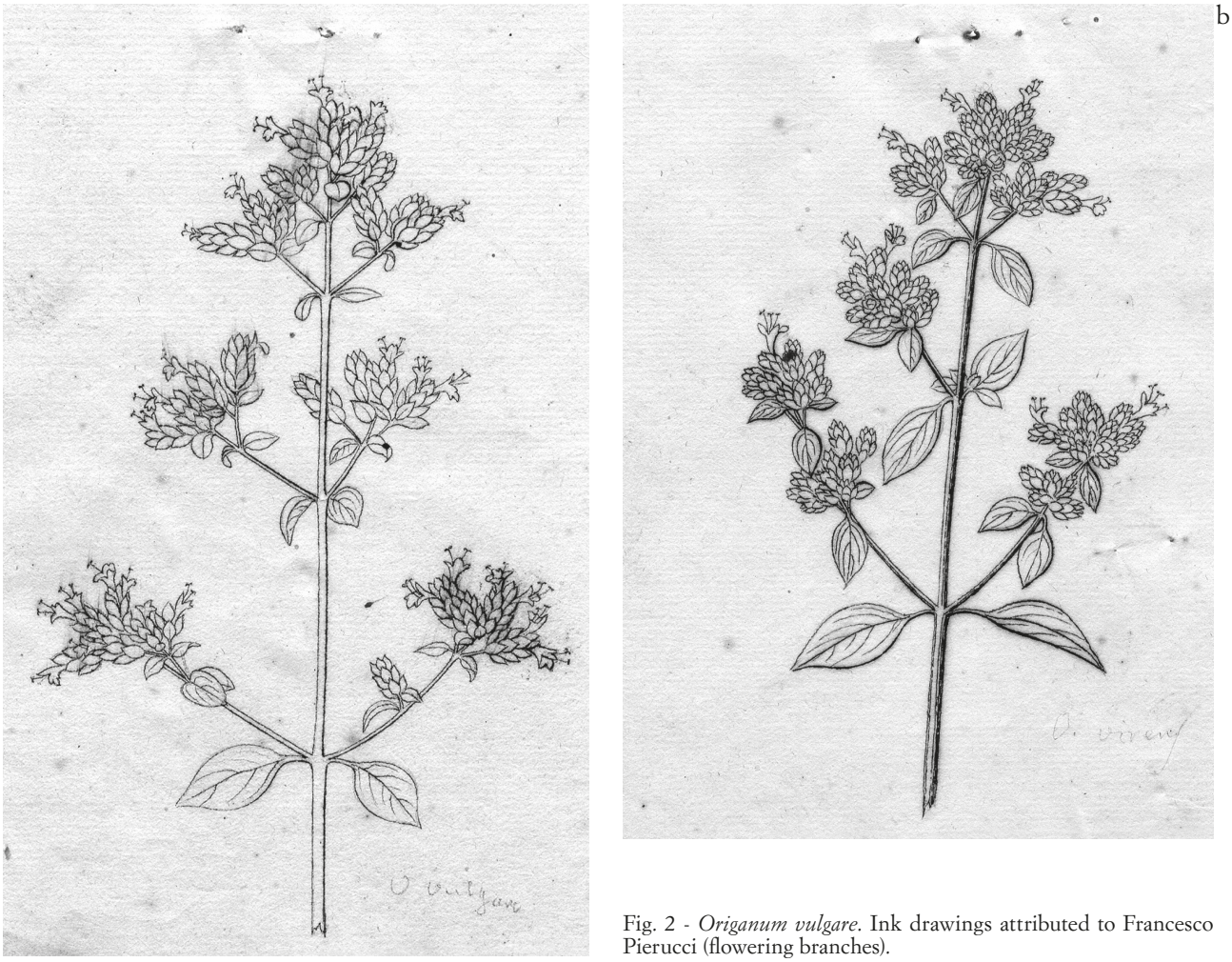

Fig. 2 - *Origanum vulgare*. Ink drawings attributed to Francesco Pierucci (flowering branches).

image copied from the iconography in 'Flora Graeca' (Sibthorp & Smith, 1806), drawn by Ferdinand Bauer. Only the silhouette, which looks like a sketch, can be assumed to have been drawn by Savi himself, reproducing a specimen *in vivo*. On a second small sheet of transparent paper a section of leafy stem is drawn in ink, for which the same considerations made of previous iconography apply. Finally, on a small sheet of paper a flowering top and a sterile shoot are drawn in ink (Fig. 3). This latter drawing was likely made by Francesco Pierucci.

2. <u>*Origanum smyrnium β barbatum*</u>

The sheet consists of four specimens. It is accompanied by the drawing of some floral details, copied, as in the previous case, from the 'Flora Graeca' (Sibthorp & Smith, 1806). Copied in pencil on a small sheet of transparent paper, they represent the same subjects with a greater wealth of details.

***Origanum vulgare* L. subsp. *viridulum* (Martrin-Donos) Nyman**

1. <u>*Origanum creticum*</u>

"OL. Origanum creticum. corrispondente alla figura della tav. 177 di Nees ab Esenback. Calice di lembo eguale, diviso in cinque denti eguali, appena nervoso quasi glabro: denti cigliati e pelosi alla loro base interna, i quali peli convergono nella maturazione, e il calice ha dell'analogia con quello dei Thymus e altri. brattee poco più lunghe del calice. Fusti legnosi patenti diffusi, rami distesi. Foglie di color verde piombato cupo. Corolle bianche. Labbro superiore smarginato: inferiore trilobo più lungo, stami inclusi. Strobili tereti, subquadrangoli lassi, lunghi fino a ... Persia nera", i.e. "OL. *Origanum creticum.* It corresponds to the figure in tav. 177 by Nees ab Esenack. Calyx with equal lobes, divided into five equal teeth, slightly nervous, almost glabrous: teeth ciliate and hairy in the inner proximal part, with the hairs converging at maturation; calyx similar to that of *Thymus* and others. Bracts slightly longer than calyx.

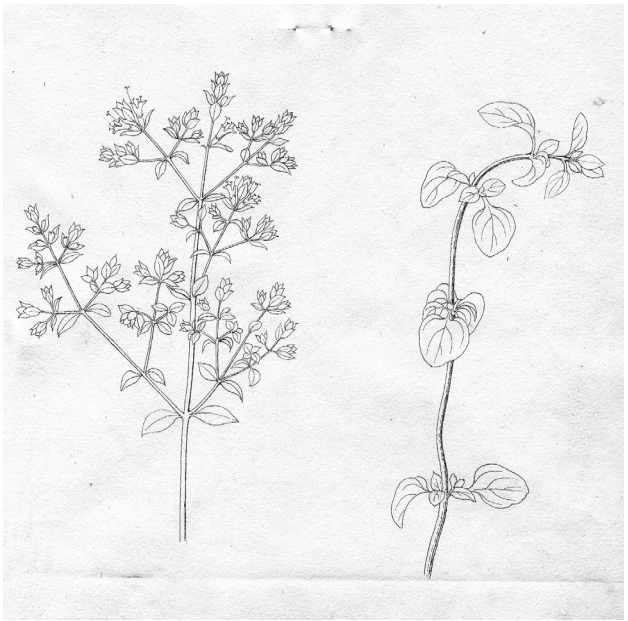

Fig. 3 - *Origanum vulgare* subsp. *gracile*, inflorescence and sterile twig. Ink drawing attributed to Francesco Pierucci.

Stems woody, patent with elongated branches. Leaves dark green. White corollas. Upper lobe emarginate: bottom lobe with three segments and longer, stamens included. Strobili erect, slightly quadrangular, laxe, long up to ... black Persia".
The sheet is added by a second label, handwritten in pencil, that reports '*L'istesso di quello dell'OL. Brattee obovato-ottuse, nervose, glabre o poco pelose. Calice di fauce eguale, 5-denti eguali nervoso, peloso con glandule sessili globose auree denti ciliati, e cigli anche nella fauce interna*', i.e. ("The same as OL. Bracts obovate-obtuse, nervous, glabrous or slightly hairy. Calyx of equal throat, with five equal teeth, hairy with sessile, globose, golden glands, teeth ciliate, and cilia occurring also in the inner throat").

Origanum vulgare* L. subsp. *vulgare
1. *Origanum vulgare β prismaticum*
Brattee subeguali ai calici appena cigliate. Calice peloso glandoloso. ("Bracts subequal to calyces, slightly ciliate. Calyx hairy and glandulose").
The sheet, consisting of five specimens, is pinned on the third page of the folder accompanied by a label with the name annotated by Pietro Savi.

***Origanum* sp.**
1. *Origanum affine Nob.*
The name is handwritten by Savi on the envelope containing the sheet, which is completely crushed. This name does not appear in his works about oreganos.

2. *Origanum aegyptiacum*
Nell'Orto di S. Maria Nuova di Firenze e nell'Orto botanico di Pisa prima del 1800. ("In the Garden of S. Maria Nuova of Florence and in the Botanic Garden of Pisa before 1800").
The sheet consists of two specimens pinned on the third page of the folder of *O. pseudo-majorana* Nob.

3. *Origanum pseudo-majorana Nob.*
Somiglia per la forma del calice la pianta descritta da Bentham p. 339 qual varietà della Maiorana hortensis, ma per le foglie e il portamento non può dirsi a quella simillima. Avrei dubitato che fosse la Majorana crassifolia Bentham ma le foglie non le ha sessili. ("It resembles the plant described by Bentham p. 339 as a variety of *Maiorana hortensis* for the calyx shape, but the leaves and habit are different. It may appear close to *Majorana crassifolia* Bentham, but it shows not sessile leaves").
The sheet is formed by two specimens. The name is handwritten on the label of the folder and does not appear in his works about oreganos. On a little envelope, containing some flowers, Pietro Savi wrote '*Orig Pseudomajorana*'. It was not possible to identify this specimen, according to Ietswaart (1980).

4. *Origanum aegyptiacum*
The specimen on the sheet is lacking inflorescence.

Conclusions

The collection of *Origanum* by Gaetano Savi consists of 40 herbarium sheets attributed by him to 19 species and 3 varieties, some of which have been discussed in two papers (Savi, 1835, 1840b). From our revision, they resulted pertaining to 8 species, 3 subspecies, 2 varieties and 1 hybrid, according to current taxonomy (Euro+Med, 2006 onwards; The Plant List 2013 onwards).
Some sheets are original/type material for two species names that Savi described and named as *Origanum confertum* and *O. fortuitum*. The observation of the distinguishing characters and the analysis of the descriptions already allowed to identify their lectotypes (Amadei *et al*., 2013).
It should be noted that according to the monograph of Ietswaart (1980), the specimens described by Savi as *O. confertum* fall within the variability of *O. majorana*, albeit Savi distinguished the two species based on their size, hair density, leaf position, rigidity of all the parts and in particular of the inflorescence, bract shape and its proportion respect with calyx.
Similarly, the specimens described by Savi as *O. fortuitum* fall within the current circumscription of *Origanum* ×*paniculatum*.
Among the specimens cultivated by Savi and kept in the *Herbarium*, which do not belong to the species treated in his published works, there are some *nomina*

nuda: *Origanum affine* Savi, *O. villosum* Savi and *O. pseudo-majorana* Savi. They are probably specimens for which Savi did not have enough elements (or time) to establish a certain taxonomic position. Our revision fully confirmed these uncertainties.
In many cases the labels are bearing detailed descriptions of several morphological characters of the specimens, which are based on careful and deep observations.
The labels report also collection dates that relate specifically to the years 1836, 1837, 1838 and 1841.
From these dates, the related published work and the presentation made at the First Meeting of Italian Scientists in Pisa (Savi, 1840a), it can be concluded that the interest of Gaetano Savi in oreganos has developed all throughout the third decade of the Nineteenth century.
As usual for the specimens of Gaetano Savi, it is not stated on the label the place of collection or source of the material. Indeed, at that time, the role of a *Herbarium* was slightly different from that we consider today. Savi put together his herbarium collection essentially for comparison purposes, as an aid in the identification of new specimens and in the study of new species.
In this regard, we can only make some consideration on the basis of the few data reported on the labels.
Oreganos grown in the Botanic Garden in those years must have had different origins. We can assume that in part they came from collections, of both specimens or seeds, carried out in the Tuscan territory.
Some specimens have arrived in Pisa as a result of exchanges both of plants or seeds, then cultivated in the Garden. For example, for sheet number 1 of *Origanum vulgare* subsp. *gracilis,* Savi wrote '*Origanum S.V. 1513 An. 1838 Nato di semi venuti da Trieste e da Pavia …*', i.e. "*Origanum S.V. 1513 An. 1838* born by seeds obtained from Trieste and Pavia". Still, for the sheets number 4 and 6 of *Origanum confertum*, he wrote '*Hort. genuens.*'. A track of these exchanges can be found in the notebook '*Ricordi di Baratti di Piante e Compere*', in which Savi also annotated the names of his correspondents, and for each of them sent and received plants or seeds. Among others, he wrote about Professor Nocca from Pavia and the Marquis Ippolito Durazzo from Genoa, with whom he exchanged '*Cartucce di semi*', i.e. "Accessions of seeds".
For a sheet we find '*Nell'Orto di S. Maria Nuova di Firenze e nell'Orto botanico di Pisa prima del 1800*', i.e. "In the Garden of S. Maria Nuova of Florence and in the Botanic Garden of Pisa before 1800". Finally, a sheet came from Egypt.
Along with herbarium specimens, there is a very interesting original iconographic material. These are twelve drawings, in pencil or ink, of different types: two of them, very precise *in vivo* reproductions, are signed by Francesco Pierucci (Fig. 1a, 1b), three have no signature but for their style they also can be attributed to Pierucci (Fig. 2a, 2b, 3); two drawings have been drawn by Carlo Passerini who copied, through the use of transparent paper, the iconographies published in the 'Flora Graeca' (Sibthorp & Smith, 1806); six drawings seem to be just preliminary sketches, presumably drawn by Savi himself during the study of the plants.
Pierucci also signed the iconographies of both *O. confertum* and *O. fortuitum* published by Savi (1840b) one year later their formal description in Savi (1839). The originals of these drawings are missing in our collection. These two drawings, together with the five traced in our study and kept in the *Herbarium* of Pisa, very likely constitute the full corpus of iconographies presented by Savi, along with the plants, during the First Meeting of the Italian Scientists.
Finally, the *Origanum* collection of Gaetano Savi kept in the Herb*arium Horti Pisani* (PI) has proved to be a source of material for historical, taxonomic and biological (i.e. gynodioecy, possibility to analyze these materials with a molecular systematics approach) considerations, also shedding more light on Gaetano Savi as a botanist, his way of working and the relationship he had with other personalities of his time.

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