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ADDITIONS TO THE VASCULAR FLORA OF THE ISLANDS OF PROCIDA AND VIVARA (CAMPANIA, SOUTHERN ITALY)

Abstract - *Additions to the vascular flora of the islands of Procida and Vivara (Campania, southern Italy).* In the present work new data of vascular plant species (*Amaranthus graecizans* subsp. *silvestris*, *Amaranthus viridis*, *Antirrhinum siculum*, *Araujia sericifera*, *Catapodium pauciflorum*, *Diospyros kaki*, *Galinsoga quadriradiata*, *Gamochaeta pensylvanica*, *Oxalis debilis*, *Oxalis latifolia*, *Portulaca granulatostellulata*, *Stenotaphrum secundatum*) and confirmation of previous findings (*Foeniculum vulgare* subsp. *vulgare*, *Posidonia oceanica*) are reported for the islands of Procida and Vivara. Furthermore, *Kalanchoë ×houghtonii* (casual) and *Opuntia microdasys* (naturalized) are new for the alien flora of the region (Campania), while *Gazania rigens* and *Syringa vulgaris* are reported for the first time in the province of Naples. The results obtained show the extensive presence of widely distributed and alien species. This may be due to progressive urbanization of the study areas and the increasing number of exotic species used in (and escaping from) artificial green areas.

Key words - alien species, Bay of Naples, biodiversity, invasiveness, small islands

Riassunto - *Integrazioni alla flora vascolare delle isole di Procida e Vivara (Campania, Sud Italia).* In questo lavoro vengono riportati nuovi elementi floristici (*Amaranthus graecizans* subsp. *silvestris*, *Amaranthus viridis*, *Antirrhinum siculum*, *Araujia sericifera*, *Catapodium pauciflorum*, *Diospyros kaki*, *Galinsoga quadriradiata*, *Gamochaeta pensylvanica*, *Oxalis debilis*, *Oxalis latifolia*, *Portulaca granulatostellulata*, *Stenotaphrum secundatum*) e conferme di precedenti citazioni (*Foeniculum vulgare* subsp. *vulgare*, *Posidonia oceanica*) per le isole di Procida e Vivara. Inoltre, *Kalanchoë ×houghtonii* (casuale) e *Opuntia microdasys* (naturalizzata) sono nuovi per la flora aliena della Campania, mentre *Gazania rigens* e *Syringa vulgaris* sono segnalati per la prima volta in provincia di Napoli.
I risultati ottenuti mostrano un'elevata presenza di specie ad ampia distribuzione ed aliene. Questi dati possono essere ricondotti alla progressiva urbanizzazione dei territori indagati e all'aumento del numero di specie esotiche utilizzate in aree verdi artificiali e da queste sfuggite.

Parole chiave - biodiversità, golfo di Napoli, invasività, piccole isole, specie aliene.

Introduction

The Campanian Archipelago in the Tyrrhenian Sea comprises five main islands (Ischia, Capri, Procida, Nisida and Vivara) and several islets (e.g. Li Galli, Vetara, San Martino and Rovigliano). The lithological substratum varies considerably among the main islands: Capri has a calcareous origin, while Ischia, Procida, Nisida and Vivara have a volcanic one. Today these islands are subjected to human impact with different degrees of intensity. Changes in land use can lead to the extinction of rare species from sensitive habitats and the establishment of alien plants. According to Domina *et al.* (2018), this highlights the heavy influence of human activities even in those areas not directly impacted. These trends are evident in many areas of the Bay of Naples where human pressure is very high. For example, a recent plant survey conducted in Campi Flegrei (Motti & Ricciardi, 2005) showed that about 45% of the species reported at the beginning of the 20th century were missing today. On the other hand, exotic species continues to spread in Campania region (Del Guacchio, 2015; Stinca *et al.*, 2016, 2017a; Motti *et al.*, 2018), and a further investigation is required in this regard.
Our work reports data concerning newly recorded or confirmed vascular plant species for the islands of Procida and Vivara (Campania, southern Italy), laying the emphasis upon exotic flora. These findings allow updating the floristic work made by Caputo (1967), which is the latest comprehensive contribution dedicated to these areas.

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Materials and methods

The present work is based on fieldwork conducted from 2016 to 2018, as well as literature surveys. The collected materials were deposited in the *Herbarium Appenninicum* and *Herbarium Porticense* (APP and PORUN-Herb. Stinca, abbreviations according to Thiers, 2017). For some species, to verify their past presence in the study area, we carried out herbarium researches in the following institutes: GDOR, GE, NAP, PAD, PORUN, and RO.
The floristic list includes the newly reported or confirmed taxa for Procida and Vivara (section I) and the species recently discovered in the islands for which new distribution data are reported (section II). Within each section, species names are sorted alphabetically according to the nomenclature treatment followed by the Italian vascular plants checklists (Bartolucci *et al*., 2018; Galasso *et al*., 2018). The collected specimens were identified according to Flora Europaea (Tutin *et al*., 1964-1980, 1993), *Flora d'Italia* (Pignatti, 1982; Pignatti, 2017a, b, 2018), and other monographic works cited in the floristic notes.
For each species, the following information is provided:
– basionym and synonym (if any);
– family, based on APG IV (2016);
– life form according to Raunkiaer (1934), modified by Pignatti (1982, 2017a, b, 2018) and verified by observations *in situ*;
– chorological group according to Pignatti (2017a, b, 2018) and, for the exotic species, current invasiveness status in Campania (Galasso *et al*., 2018), native range (Celesti-Grapow *et al*., 2009) and period of introduction (archaeophyte or neophyte) (Galasso *et al*., 2018);
– discovery sites (Exsiccata and Observata) with details on the location, growth environments, altitude, coordinates East and North (datum WGS84, UTM), collection date, legit and determinavit;
– any additional notes.
The new discoveries have made it possible to extend the floristic list of Procida and Vivara (Caputo, 1967). The taxonomic scheme and the nomenclature reported in Caputo's work have been updated according to Bartolucci *et al*. (2018) and Galasso *et al*. (2018). To solve the problems of synonymy, we also consulted Fiori (1923-1929).

Results and discussion

Additions to the flora of Procida and Vivara

***Amaranthus graecizans* L. subsp. *silvestris* (Vill.) Brenan** [≡ *A. silvestris* Vill.]
Amaranthaceae - T scap - Palaeosubtropical.
First report for Procida.
Exsiccata: Procida in loc. Terra Murata, road edge, 39 m, 418347-4512582, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (APP, PORUN-Herb. Stinca).

***Amaranthus viridis* L.**
Amaranthaceae - T scap - Invasive alien [South America] - Neophyte.
First report for Procida.
Exsiccata: Procida in loc. Corricella, road edge, 3 m, 418059-4512749, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (APP, PORUN-Herb. Stinca).
Notes: *A. viridis* is an invasive exotic plant in Campania (Stinca *et al*., 2013; Galasso *et al*., 2018); however, in Procida it appears naturalized.

***Antirrhinum siculum* Mill.**
Plantaginaceae - H scap - Endemic.
First report for Procida.
Exsiccata: Procida in loc. Terra Murata, wall, 66 m, 418409-4512643, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca et F. Conti (APP, PORUN-Herb. Stinca).
Notes: this endemic species of the Tyrrhenian regions of mainland Italy and Sicily is widespread in the Bay of Naples.

***Araujia sericifera* Brot.**
Apocynaceae - P lian - Invasive alien [South America] - Neophyte.
First report for Procida.
Exsiccata: Procida in loc. Chiaiolella, cultivated land edge, 2 m, 415991-4511395, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (PORUN-herb. Stinca); Procida in loc. Chiaiolella, cultivated land edge, 2 m, 415991-4511395, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (APP, PORUN-Herb. Stinca).
Notes: *A. sericifera* is an invasive exotic plant in Campania (Stinca *et al*., 2013; Galasso *et al*., 2018); however, in Procida it appears naturalized. This species is generally a secondary host for viruses harmful to crops (Parrella *et al*., 2013).

***Catapodium pauciflorum* (Merino) Brullo, Giusso, Miniss. & Spamp.** [≡ *Desmazeria pauciflora* Merino]
Poaceae - T scap - Mediterranean-Atlantic.
First report for Vivara.
Exsiccata: Vivara in loc. Capitello, tufaceous cliff, 7 m, 415378-4511289, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (APP, PORUN).
Notes: in the Bay of Naples, *C. pauciflorum* is already known for Capri and Ischia (Brullo *et al*., 2003). According to Brullo *et al*. (2003) *C. marinum* (L.) C.E.Hubbard is not present in Italy, so that plants pre-

viously reported for Procida (Béguinot, 1901, sub *C. loliaceum* Lk.; Caputo, 1967, sub *C. loliaceum* [Huds.] Lk.) could be ascribed to *C. pauciflorum*. Furthermore, in GDOR, GE, NAP, PAD, PORUN and RO there are currently no Béguinot nor Caputo specimens referring to this taxon.

***Diospyros kaki* Thunb.**
Ebenaceae - P m - Casual alien [South-East Asia (China, Korea and Japan)] - Neophyte.
First report for Procida.
Exsiccata: Procida in loc. Terra Murata, wall, 56 m, 418365-4512665, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (APP, PORUN-Herb. Stinca).
Notes: *D. kaki* is a popular fruit tree in southern Italy. The individuals observed in Procida were spread by the seeds of nearby cultivated plants. In Campania, this species was previously reported in the province of Naples for Castellammare di Stabia and Ottaviano on Mt. Vesuvius (Stinca *et al*., 2013).

Foeniculum vulgare* Mill. subsp. *vulgare
Apiaceae - H scap - Euri-Mediterranean.
Confirmation for Procida.
Exsiccata: Procida in loc. Terra Murata, grassy slope, 66 m, 418409-4512643, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (APP, PORUN-Herb. Stinca)
Notes: in Procida, *F. vulgare* subsp. *vulgare* was reported in 1897 by Geremicca & Rippa (sub *Foeniculum capillaceum* Gilib.), but later not found by Caputo (1967), who only observed *F. vulgare* Mill. subsp. *piperitum* (Ucria) Bég..

***Galinsoga quadriradiata* Ruiz & Pav.** [= *G. ciliata* (Raf.) F.S.Blake]
Asteraceae - T scap - Invasive alien [North, Central and South America] - Neophyte.
First report for Procida.
Exsiccatum: Procida in loc. Corricella, road edge, 15 m, 417776-4512836, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca).
Notes: *G. quadriradiata* is an invasive exotic plant in Campania (Galasso *et al*., 2018); however, in Procida it appears naturalized.

***Gamochaeta pensylvanica* (Willd.) Cabrera** [≡ *Gnaphalium pensylvanicum* Willd.]
Asteraceae - T scap - Naturalized alien [North, Central and South America] - Neophyte.
First report for Procida.
Exsiccata: Procida in loc. Corricella, grassy place, 1 m, 23.07.2016,417887-4512687, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca); Procida in loc. Porto, flowerbed, 2 m, 417783-4513195, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca).

***Gazania rigens* (L.) Gaertn.** [≡ *Othonna rigens* L.]
Asteraceae - T scap - Casual alien [South Africa] - Neophyte.
First report for Procida and province of Naples.
Observatum: Procida, along via Giovanni da Procida, in floor cracks, 10 m, 416189-4511555, 17.06.2017, obs. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (photo).
Notes: in Campania, this species was previously reported by De Natale & Strumia (2007) in the province of Salerno, precisely in the municipalities of Pollica (Acciaroli) and Pisciotta (Torre dei Caprioli).

***Kalanchoë ×houghtonii* D.B.Ward** [≡ *Bryophyllum ×houghtonii* (D.B.Ward) P.I.Forst.; = *K. daigremontiana* Raym.-Hamet & H.Perrier × *K. delagoensis* Eckl. & Zeyh.]
Crassulaceae - Ch succ - Casual alien [hybrid (horticultural origin)] - Neophyte.
First report for Procida and Campania.
Exsiccatum: Procida in loc. Terra Murata, wall, 39 m, 418347-4512582, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (PORUN-Herb. Stinca).
Notes: according to Stinca *et al.* (2017a), the individuals observed in Procida spread from plantlets sprouting from leaf margins. In Italy, *K. ×houghtonii* has been already reported in Liguria, Toscana, Puglia, Calabria, Sicilia and Sardegna (Galasso *et al*., 2018).

***Oxalis debilis* Kunth** [≡ *Acetosella debilis* (Kunth) Kuntze; = *O. corymbosa* DC.]
Oxalidaceae - G bulb - Naturalized alien [South America (Brazil and Argentina)] - Neophyte.
First report for Procida.
Exsiccatum: Procida in loc. Terra Murata, in floor cracks, 78 m, 23.07.2016, 418526-4512726, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca).
Notes: in Italy, this species is expanding through the high production of bulbs that are unintentionally spread by human activities (Stinca, 2017). *O. debilis* is a naturalized exotic plant in Campania (Galasso *et al*., 2018); however, in Procida it appears casual.

***Oxalis latifolia* Kunth** [≡ *Acetosella violacea* (L.) Kuntze subsp. *latifolia* (Kunth) Kuntze]
Oxalidaceae - G bulb - Naturalized alien [North, Central and South America] - Neophyte.
First report for Procida.
Exsiccatum: Procida in loc. Corricella, grassy place, 1 m, 417887-4512687, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca).

Notes: in Italy, this species is expanding through the high production of bulbs that are unintentionally spread by human activities (Stinca, 2017). *O. latifolia* is a naturalized exotic plant in Campania (Galasso *et al*., 2018); however, in Procida it appears casual.

***Opuntia microdasys* (Lehm.) Pfeiff.** [≡ *Cactus microdasys* Lehm.]
Cactaceae - P succ - Naturalized alien [North America (Mexico)] - Neophyte.
First report for Procida and Campania.
Observata: Procida in loc. Terra Murata, rocky slope, 35 m, 418587-4512720, 17.06.2017, obs. A. Stinca, A.G. Stinca et M. Ravo, det. A. Guiggi (photo); Procida in loc. Terra Murata, rocky slope, 35 m, 418587-4512720, 17.06.2017, obs. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Guiggi (photo).
Notes: in Procida, a population of *O. microdasys* was found on a tufaceous rocky slope (exposure South-East, slope 60-80°), near the medieval village of Terra Murata, where it appears stabilized. This population covers an area of approximately 150 m^2 and consists of about ten individuals. However, the steepness and inaccessibility of the site makes it difficult to define the exact number of plants. This exotic species may have been introduced on the island through residue pruning of plants cultivated nearby and subsequently spread, or from seeds transported by birds. In Italy, *O. microdasys* has been already recorded in Lombardia, Liguria, Toscana, Lazio, Puglia, Sicilia and Sardegna (Galasso *et al*., 2018).

***Portulaca granulatostellulata* (Poelln.) Ricceri & Arrigoni** [≡ *P. oleracea* L. var. *granulatostellulata* Poelln.]
Portulacaceae - T scap - Cryptogenic.
First report for Procida.
Exsiccatum: Procida in loc. San Giuseppe, rocky slope, 10 m, 416188-4511549, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (PORUN-Herb. Stinca).
Notes: in Campania, this species was previously reported in Naples and Sorrento (Danin *et al*., 2016). It is probable that the previous reports of *P. oleracea* L. for Procida (Béguinot, 1901; Caputo, 1967) could be ascribed to *P. granulatostellulata*. Furthermore, in GDOR, GE, NAP, PAD, PORUN and RO there are currently no Béguinot nor Caputo specimens referring to this taxon.

***Posidonia oceanica* (L.) Delile** [≡ *Zostera oceanica* L.]
Potamogetonaceae - I rad - Steno-Mediterranean.
Confirmation for Procida.
Exsiccata: Procida in loc. Ciracciello, sandy seabed, -1 m, 415818-4511340, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (PORUN-Herb. Stinca); Procida at the Scoglio Cannone, sandy seabed, -0.5 m, 417556-4513273, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca et F. Conti (APP, PORUN-Herb. Stinca).
Notes: *P. oceanica* was not recorded for Procida in the previous floristic studies. However, its presence is reported in some papers related to marine environment (e.g. Zupo & Stübing, 2010). In the Bay of Naples, *P. oceanica* is already recorded for the sandy seabed of Ischia (Ricciardi *et al*., 2004), Campi Flegrei (Motti & Ricciardi, 2005), Nisida (De Natale, 2003), Naples (De Natale & La Valva, 2000), Capri (Ricciardi, 1998) and Sorrento Peninsula (Caputo *et al*., 1994).

***Stenotaphrum secundatum* (Walter) Kuntze** [≡ *Ischaemum secundatum* Walter]
Poaceae - G rhiz - Casual alien [Tropical America, Africa and Asia] - Neophyte.
First report for Procida.
Exsiccata: Procida in loc. Terra Murata, uncultivated land, 44 m, 418341-4512642, 17.06.2017, leg. A. Stinca, A.G. Stinca et M. Ravo, det. A. Stinca (PORUN-Herb. Stinca); Procida in loc. Terra Murata, uncultivated land, 44 m, 418341-4512642, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca).
Notes: in Campania, this species was previously reported by Rosati *et al*. (2012) for Capaccio Paestum (province of Salerno) and Stinca *et al*. (2016) for Pozzuoli (province of Naples).

***Syringa vulgaris* L.**
Oleaceae - NP - Casual alien [South-East Europe] - Neophyte.
First report for Procida and province of Naples.
Exsiccatum: Procida in loc. Corricella, rocky slope, 1 m, 417887-4512687, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca et F. Conti (PORUN-Herb. Stinca).
Notes: in Campania, this species was previously reported for Bagnoli Irpino only (province of Avellino) (Del Guacchio, 2015).

New data for species recently discovered or confirmed for Procida

***Cyperus alternifolius* L. subsp. *flabelliformis* Kük.** [= *C. involucratus* Rottb.]
Cyperaceae - G rhiz - Casual alien [East Africa] - Neophyte.
Exsiccatum: Procida between loc. Corricella and loc. Terra Murata, in floor cracks, 33 m, 418272-4512773, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca).
Previous report: Procida, site unspecified (Del Guacchio & La Valva, 2017).

***Eleusine indica* (L.) Gaertn.** [≡ *Cynosurus indicus* L.]
Poaceae - T scap - Naturalized alien [Africa Tropical and Asia] - Neophyte.
Exsiccata: Procida in loc. Chiaiolella, in floor cracks, 2 m, 415991-4511395, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca); Procida in loc. Corricella, road edge, 15 m, 417776-4512836, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca); Procida in loc. Porto, flowerbed, 2 m, 417783-4513195, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (PORUN-Herb. Stinca); Procida in loc. Terra Murata, in floor cracks, 80 m, 418456-4512718, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (APP, PORUN-Herb. Stinca).
Previous report: Procida, Prigione Borbonica (Del Guacchio & La Valva, 2017).
Notes: *E. indica* is an invasive exotic plant in Campania (Stinca & Motti, 2013; Galasso *et al.*, 2018); however, in Procida it appears naturalized.

***Euphorbia maculata* L.** [≡ *Chamaesyce maculata* (L.) Small]
Euphorbiaceae - T rept - Naturalized alien [North America] - Neophyte.
Exsiccata: Procida in loc. Terra Murata, in floor cracks, 90 m, 418564-4512725, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (APP, PORUN-Herb. Stinca).
Previous report: Procida, along via Vittorio Emanuele (Del Guacchio & La Valva, 2017).
Notes: *E. maculata* is an invasive exotic plant in Campania (Galasso *et al.*, 2018); however, in Procida it appears naturalized.

***Ricinus communis* L.**
Euphorbiaceae - NP - Naturalized alien [Tropical Africa] - Archaeophyte.
Exsiccata: Procida in loc. Corricella, rocky slope, 1 m, 417887-4512687, 23.07.2016, leg. A. Stinca, F. Conti, M. Ravo et V. Giacanelli, det. A. Stinca (APP, PORUN-Herb. Stinca).
Previous report: Procida, site unspecified (only observed) (Del Guacchio & La Valva, 2017).

Conclusions

In this work, 22 floristic notes were reported for the islands of Procida and Vivara. In all, 16 species were discovered for the first time in the study areas, while 2 reported in the past was confirmed (*Foeniculum vulgare* subsp. *vulgare*, *Posidonia oceanica*). Furthermore, new data on the distribution of 4 species recently discovered on Procida (Del Guacchio & La Valva, 2017) were presented (*Cyperus alternifolius* subsp. *flabelliformis*, *Eleusine indica*, *Euphorbia maculata*, *Ricinus communis*).
The new findings are mostly represented by alien species (Galasso *et al.*, 2018): *Amaranthus viridis*, *Araujia sericifera*, *Diospyros kaki*, *Galinsoga quadriradiata*, *Gamochaeta pensylvanica*, *Gazania rigens*, *Kalanchoë ×houghtonii*, *Opuntia microdasys*, *Oxali debilis*, *Oxalis latifolia*, *Stenotaphrum secundatum* and *Syringa vulgaris*. All the exotics examined are neophytes. *Kalanchoë ×houghtonii* (casual) and *Opuntia microdasys* (naturalized) are new for the alien flora of Campania, while *Gazania rigens* and *Syringa vulgaris* are reported for the first time in the province of Naples. Only 3 are indigenous species reported for the first time on these islands: *Amaranthus graecizans* subsp. *silvestris*, *Antirrhinum siculum*, *Catapodium pauciflorum*.
These findings show the considerable presence of widely distributed and alien species. According to Stinca & Motti (2013) and Stinca *et al.* (2017b), this may be due to the progressive urbanization of the investigated areas and the increasing number of exotic species used in (and escaping from) artificial green areas. The increase in exotic flora has also been found on other small Mediterranean islands (Celesti-Grapow *et al.*, 2016) and in Campania as well (e.g. Stinca & Motti, 2009; Brundu *et al.*, 2012; Stinca *et al.*, 2014; Del Guacchio, 2015).
The species discovered in this research, added to the few recent data from De Natale *et al.* (2008), Del Guacchio (2015), Hilpold *et al.* (2015), and Del Guacchio & La Valva (2017), make it possible to integrate Caputo's observations (1967), updating the vascular flora of Procida and Vivara to 461 species and subspecies. In our opinion, the reports of *Geranium robertianum* L. (Caputo, 1967), *Oxalis dillenii* Jacq. (Del Guacchio, 2015) and *Polypodium vulgare* L. (Caputo, 1967) are doubtful and further field investigations and herbarium research are essential to verify their presence in the study area. Therefore, the data reported in this study represent a further contribution to the knowledge of the vascular flora of Procida and Vivara, as well as the region of Campania as a whole.

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