Some comments on *Passer italiae*-like of south Italy, Sicily and Malta

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Abstract - The authors summarize the results obtained over a period of about 150 years by various authors on the taxonomic position of Sparrows present in southern Italy, Sicily and Malta, identified on several occasions as *Passer italiae*, *P. hispaniolensis* or as hybrids of the two species. Based on the latest research and the analysis of the genome of the sparrows of Corsica, Crete, southern Italy, Sicily and Malta, it appears that it has finally been possible to establish that these populations possess a different degree of hybridization between *P. italiae* and *P. hispaniolensis*, with less genes of *P. hispaniolensis* in northern regions and more in southern ones. Therefore, the authors propose to name these populations *Passer italiae* x *hispaniolensis*.

Key words: plumage variability, *Passer italiae*, *Passer hispaniolensis*, *Passer italiae brutius*, synonymy, hybridation.

Riassunto - Alcuni commenti su *Passer* 'tipo' *italiae* del sud Italia, Sicilia e Malta.

Gli autori fanno una sintesi dei risultati ottenuti in circa 150 anni dai diversi autori sulla posizione tassonomica dei passeri presenti in sud Italia, Sicilia e Malta, identificati in diverse occasioni come *Passer italiae*, *P. hispaniolensis* e ibridi delle due specie. Sulla base delle ultime ricerche e l'analisi del genoma dei passeri di Corsica, Creta, sud Italia, Sicilia e Malta sembra che finalmente si sia potuto stabilire che queste popolazioni hanno un diverso grado di ibridazione tra *P. italiae* e *P. hispaniolensis*, con popolazioni a nord caratterizzate da meno geni e a sud da più geni di *P. hispaniolensis*. Pertanto gli autori propongono di denominare queste popolazioni *Passer italiae* x *hispaniolensis*.

Parole chiave: variabilità del piumaggio, *Passer italiae*, *Passer hispaniolensis*, *Passer italiae brutius*, sinonimia, ibridazione.

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INTRODUCTION

Waller (1981) described the taxonomic problem of *italiae*-like sparrows as "somewhat of a taxonomist's nightmare". Really, it has been very much debated and only in the last years we may possibly consider that it has been concluded! In the present paper we try to synthetize the main results on the variability of Sparrows in the Italian Peninsula, Sicily and Malta since the description of *Passer italiae* by Vieillot (1817), we present some photographs showing the wide variability and propose a practical choice to name the birds living in south Italy, Sicily and Malta.

TAXA RECORDED IN ITALY

We here would like to stress on the important factor that plumage comparison must be carried out during the breeding season (late March-July). We present below a short description of characters from the different taxa recorded in Italy. Linnaeus (1758) described the European *Fringilla domesticus* (= *Passer domesticus*) male as follows: '*remigibus rectricibusque fuscis, corpore griseo nigroque, fascia alarum alba solitaria; gula nigra, temporibus ferrugineis*' (dark primaries and rectrices, grey and black body, wing single fascia white, black throat, reddish temple). In summary *P. domesticus* male has a broad grey band on the crown and nape, and grey cheeks. About sixty years later, Vieillot (1817) described *Fringilla Italiae* (= *Passer italiae*) from Turin (Piedmont, NW Italy), locally named '*capannaia scherzosa*'. He compared it with the House Sparrow *Passer domesticus*, from which it differs by the smaller bill, the brown colour on the head, the back of the neck, the black colour of *capistrum* (corresponding to the collar) and the red colour of the apical parts of great coverts. In summary, *P. italiae* male has a chestnut crown and nape, and white cheeks, but a small black bib and a brown-streaked back. Temminck (1820) described *Fringilla hispaniolensis* (= *Passer hispaniolensis*) from Algeciras, South Spain characterized by a large black bib extending along the flanks, and a black and cream-streaked back. In southern Italy and Sicily some sparrows are very similar to *P. italiae*, but they have larger bibs and vaguely brown-streaked flanks. De Fiore (1890; he wrote that first authors who noticed the mixing plumage of *P. italiae* and *P. hispaniolensis* in Calabria were Andrea Fiori and Tommaso Salvadori) described with some detail individuals from Calabria (South Italy) that he

considered hybrids between *P. hispaniolensis* (reported as *P. salicicola*) and *P. italiae* and highlighted that he did not find neither typical *P. italiae* nor pure *P. hispaniolensis* in Calabria. He proposed (De Fiore, 1890, p. 29, note 1) "that it could be named *P. italiae* var. *brutius*". Twelve years later, Hartert (1902) described *P. hispaniolensis maltae* with the following characteristics: *Passer tergo nigricante, pileocastaneo, corporis lateribus paullum nigrostriatis*. *Differt a* Passer italiae *dicto tergo nigricante, lateribus nigrostriatis, a* P. hispaniolensis *dicto typico lateribus minus nigrostriatis* (= Sparrow dorsally blackish, head ferrugineous, lateral body with few black streaks. It differs from *P. italiae* by dorsal black colored plumage and lateral body black streaked, and from *P. hispaniolensis hispaniolensis* by less streaks on lateral body). When Hartert (1902) described *P. hispaniolensis maltae*, reported Malta as the type locality, but himself (Hartert, 1903) considered it present in Malta and in Sicily.

TAXA RECORDED IN MALTA

Schembri (1843) listed two distinct breeding species: Passera Reale *Fringilla cisalpina* (= *Passer italiae*) and Passera Sarda *Fringilla hispaniolensis* (= *Passer hispaniolensis*). Twenty years later, Wright (1864) was doubtful that two species occurred in the Maltese Islands. In a collection of 40 to 50 birds he found intermediate specimens with visible streaks, to the point that a series could be formed with "gradations so imperceptible that it was quite impossible to draw the line of demarcation". Wright suggested whether these were two distinct species that interbreed and produce "hybrid progeny", or one species with a wide variation in streaks. His conclusion was that "for all purposes of science, they should be considered as one".

Wright also sent a large collection of sparrow skins collected by Andrew Leith Adams and himself to the Scottish naturalist Sir William Jardine. These were collected over a number of years from across the Maltese islands, with various degrees of black streaks. Jardine wrote back to Wright stating that "all the sparrows sent to me from Malta are *Pyrgita italica* (Viell.) 1917, and = *P. salicaria* sive *hispaniolensis*" (Wright, 1864).

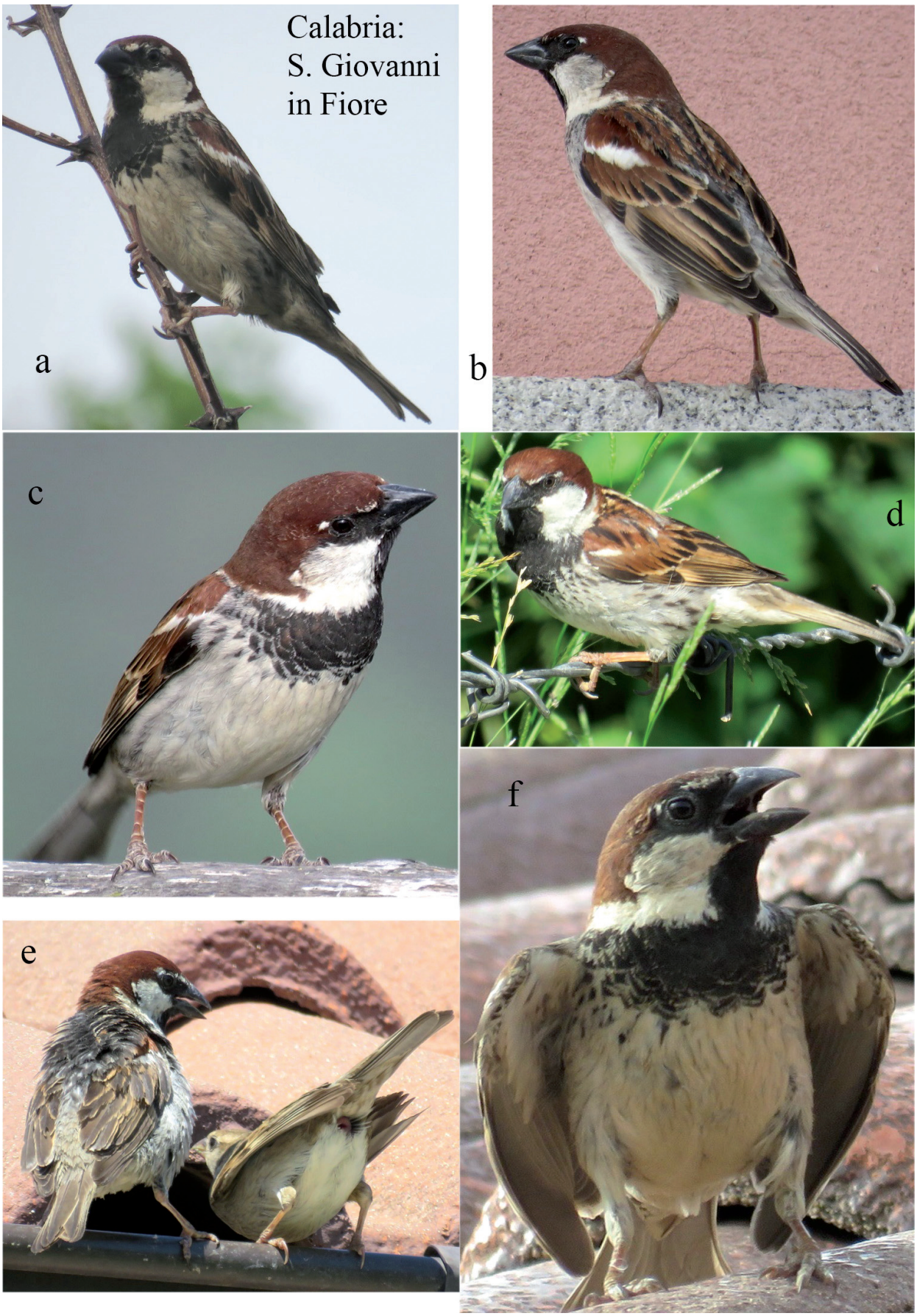
The first to suggest that the Maltese sparrow may be a cross between the Spanish and Italian sparrow was John Gould (Adams, 1870). Adams (1870) was not of the same opinion and believed that "the abnormal change in the habits of the Malta sparrow may have produced these variations in plumage". This confusion continued, Despott (1917) listed the Italian Sparrow as occurring in the Maltese Islands, although quite rare, but it was outnumbered by the more common Spanish Sparrow. A detailed description of the sparrow present in the Maltese Islands was presented by Sultana *et al*. (2011) and to date, all publications on Maltese avifauna still refer to it as Spanish Sparrow *Passer hispaniolensis*.

THE OPINION OF AUTHORS

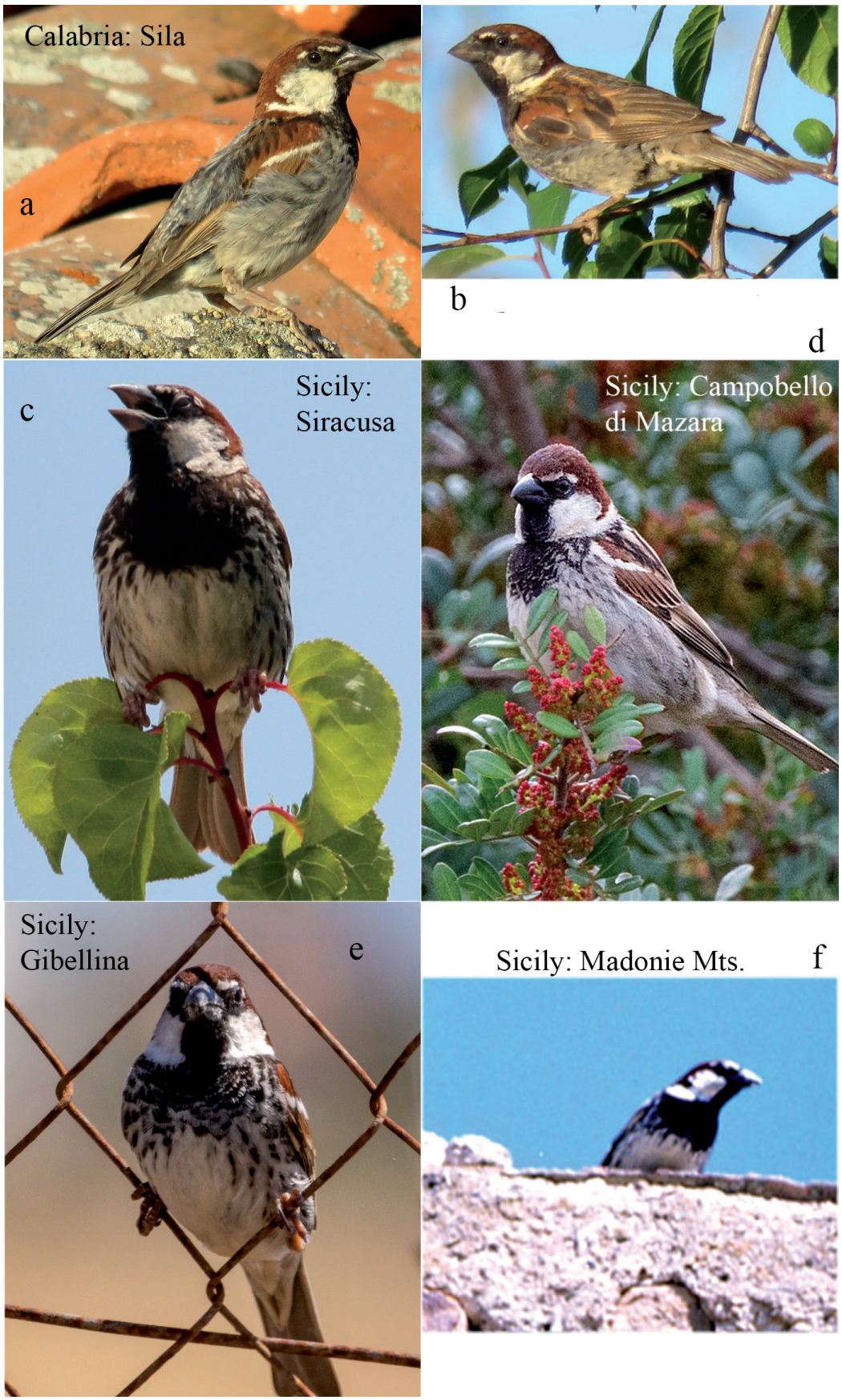
Vaurie (1959) only considered the presence in Europe of *Passer domesticus domesticus*, *P. domesticus italiae* (with *P. italiae schiebeli* Rokitansky, 1934 from Crete its synonym) and *P. hispaniolensis hispaniolensis*, with *P. hispaniolensis arrigonii* Tschusi, 1903 from Sardinia and *P. hispaniolensis canariensis* Tschusi, 1905 from the Canary Is., its synonymies. In addition, he wrote that *P. domesticus* hybridizes freely with *P. hispaniolensis*, and hybrids have been described under many names, and in some regions the population consists entirely of hybrids (e.g.: *brutius* De Fiore, 1890 in south Italy, *maltae* Hartert, 1902 in Malta and Sicily and *fluckigeri* Kleinschmidt, 1904 in Algerian Sahara). Giglioli (1907) identified as *P. hispaniolensis* Sparrows living in Sardinia, Sicily and Malta and solved the hybridization problem in Calabria as a local variety of *P. italiae*.

Martorelli (1906), Giglioli (1907), Arrigoni degli Oddi (1929) and Bertani (1944) treated *Passer italiae* as a valid species. Meise (1936) considered *P. italiae* a good example of a stabilized hybrid; according to Mayr (1963) it represents an example of a microevolutive process: the secondary intergradation of populations confined among two zones. Johnston (1969) considered *Passer italiae* a stabilized hybrid between *P. domesticus* and *P. hispaniolensis*. Cova (1977) followed them, considering Sicily the hybridization zone interposed between *P. italiae* and *P. hispaniolensis*.

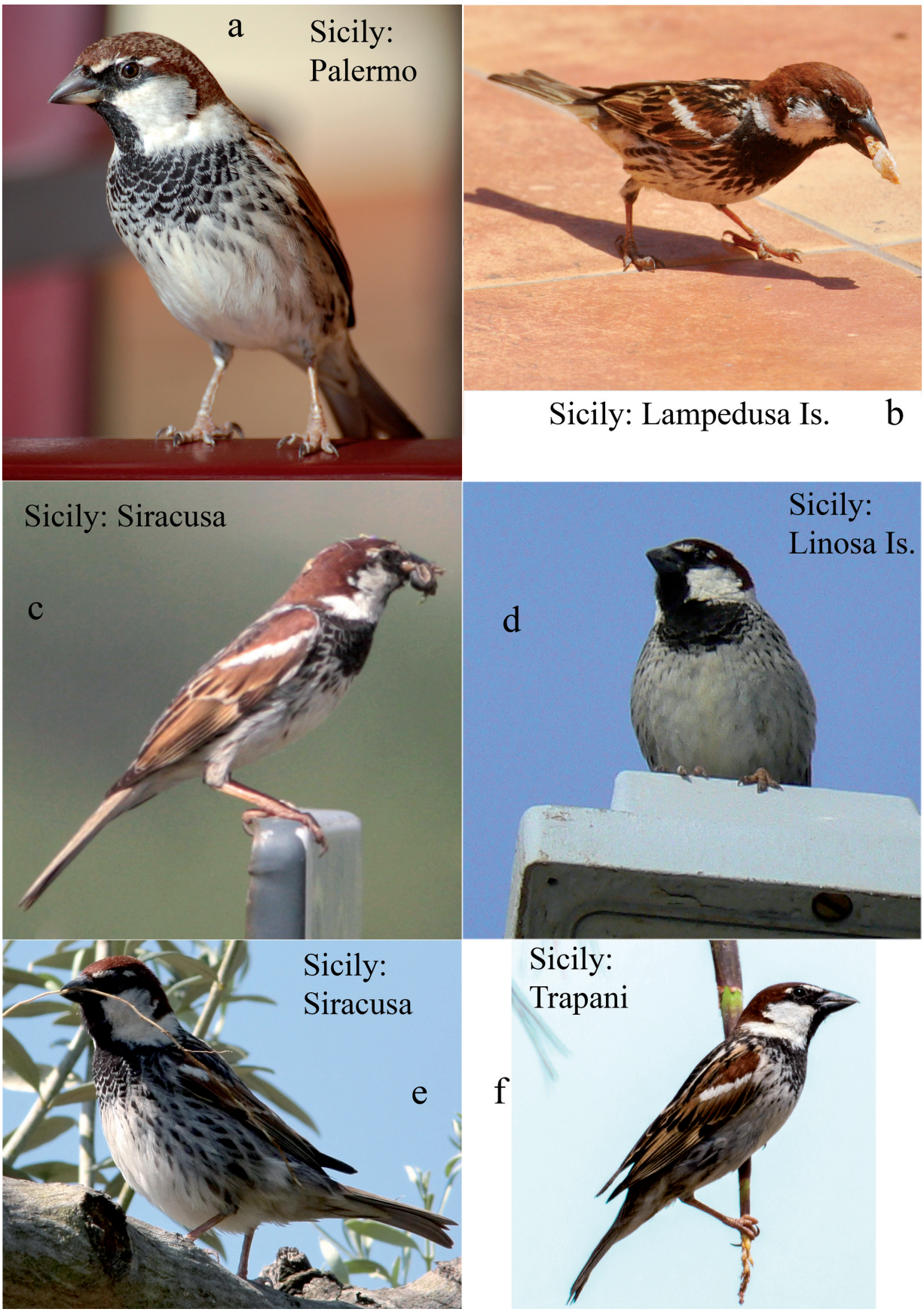
Furthermore, Bertani (1944), Johnston (1969) and Lo Valvo & Lo Verde (1987) observed that *hispaniolensis* characters increase southward along the Italian peninsula, Sicily and Malta. According to Summers-Smith (1988) south of about the latitude of Naples there is an extensive clinal zone of *Passer italiae* intergradation with *hispaniolensis* through southern Italy to Sicily and Malta. However, Summers-Smith (1988) considers *P. italiae* (Vieillot, 1817) a subspecies of *P. hispaniolensis* (Temminck, 1820), but according to the ICZN (1999) *P. italiae* has the priority on *P. hispaniolensis*, because it has been described three years before the latter (Baumgart, 1984, who proposed to name it *Passer italiae hispaniolensis*). Massa (1989) proposed to consider *Passer italiae* as a valid species, as Vieillot (1817) himself had proposed. Cramp & Perrins (1994) reported in Malta, Sicily and small islands off Sicily hybrid populations of *P. italiae* with *P. hispaniolensis*, named x *maltae* Hartert, 1902, and Massa *et al*. (1997) in the European Atlas of breeding birds recorded Italian Sparrow *Passer* x *italiae* from Italian peninsula, Sicily and Corsica. Corso (2005) recorded both species in Sicily, Ientile & Massa (2008) listed *P. hispaniolensis* in Sicily, and Masseti (2009) considered that the recent literature on Sicilian and Maltese Sparrows does not include *P. domesticus italiae*. In accordance with the last checklist of the birds of Sicily (Massa *et al*., 2021) are morphologically recognizable both *P. italiae* and *P. hispaniolensis*. Del Hoyo *et al*. (2009) recorded *Passer italiae* in all the Italian peninsula, Sicily and Malta, but inadvertently when they treated the status and conservation of *P. hispaniolensis* reported an estimate of 40,000 breeding pairs in Malta. Concerning the Malta population, however, Raine *et al*. (2009) reported from Malta 100,251-295,826 pairs of *P. hispaniolensis*. In https://avibase.bsc-eoc.org/species.jsp?lang=IT&avibaseid=928E7D54&sec=summary&ssver=1 *P. hispaniolensis maltae* is reported as *Passer italiae maltae*.



Figs. 1 - a-f) *Passer italiae* x *hispaniolensis.* From / Da: Calabria, San Giovanni in Fiore (Cosenza). (Photo / Foto: G. Congi).

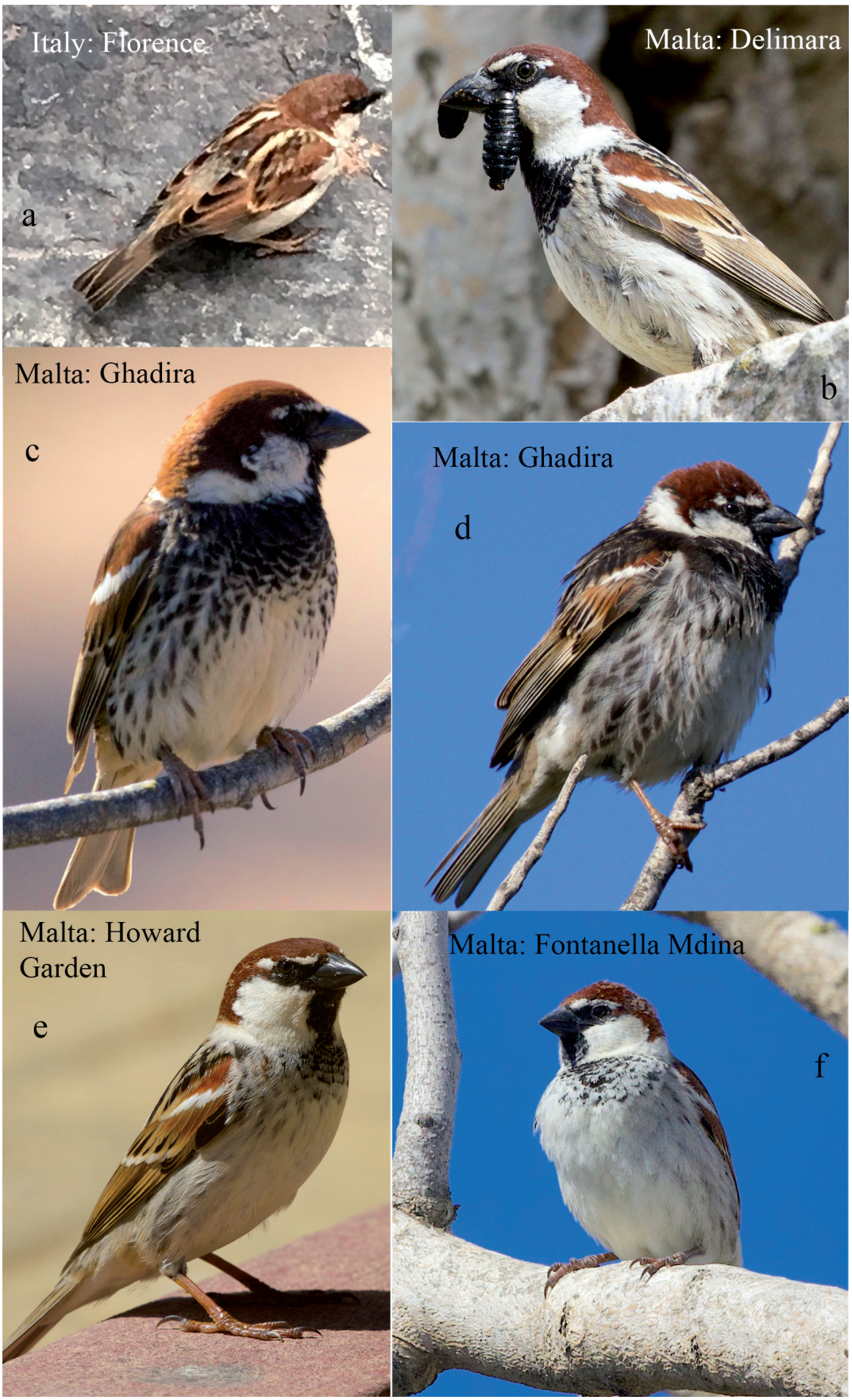


Figs. 2 - a-f) *Passer italiae* x *hispaniolensis*. From / Da: a-b) Calabria, Sila; c) Sicily / Sicilia, Siracusa; d) Sicily / Sicilia, Campobello di Mazara; e) Sicily / Sicilia, Gibellina; f) Sicily / Sicilia, Madonie Mts / Petralia Soprana. (Photo / Foto: a-b) G. Congi; c) S. Baglieri; d-e) A. Barbera; f) B. Massa).



Figs. 3 - a-f) *Passer italiae* x *hispaniolensis*. From / Da: a) Sicily / Sicilia, Palermo; b) Sicily / Sicilia, Lampedusa Is.: c) Sicily / Sicilia, Siracusa; d) Sicily, Linosa Is.; e) Sicily / Sicilia, Siracusa; f) Sicily / Sicilia, Trapani (Photo / Foto: a-b) T. La Mantia; c, e) S. Baglieri; d) B. Massa; f) A. Barbera).

Figs. 4 - a-f) *Passer italiae* x *hispaniolensis,* From / Da: a-e) Sicily / Sicilia, Siracusa (Photo / Foto: S. Baglieri); f) Sicily / Sicilia, Isola delle Femmine (Photo / Foto: B. Massa).



Figs. 5 - a) *Passer italiae.* From: central Italy, Florence / Da: Italia centrale, Firenze (Photo / Foto: B. Massa). b-f) *Passer italiae* x *hispaniolensis.* From different localities of Malta / Da differenti località di Malta. (Photo / Foto: J. J. Borg & R. Cachia-Zammit).

Actually, Lo Valvo & Lo Verde (1987) observed a clinal variation *italiae-hispaniolensis* in southern Italy, and a mixed population *italiae-hispaniolensis* is regularly observed in Sila (Calabria), with an increase of pure *P. hispaniolensis* over 1000 m a.s.l. by Congi (2021). An east-west *italiae-hispaniolensis* cline has been observed in north Sicily (Massa in Masseti, 2009), and in the eastern part of Sicily, over the last twenty years an increase of *italiae*-like has been observed (S. Baglieri, *pers. comm*.).

P. italiae-like, that is sparrows phenotypically belonging to *P. italiae*, live in Corsica, Crete and some oases of Maghreb, where a complete range of intermediate between *P. domesticus* and *P. hispaniolensis* has been noticed (Summers-Smith & Vernon, 1972; Metzmacher 1986a, 1986b; Ait Belkacem *et al*., 2016). In south Corsica Thibault (1983) reported hybrid populations of *P. italiae* x *P. hispaniolensis*, the latter likely immigrated from Sardinia. It is known that *P. hispaniolensis* is erratic and may colonize new territories (e.g. Ponza and Zannone Is.: Casati, 1962; Moltoni, 1968). In recent years *P. hispaniolensis* has spread from Balkans to the Adriatic coasts of Italy and probably a certain influx of this species arrives also to Sicily and Malta (even if to date we have no concrete evidence of migration to and from the Maltese Islands), with the possibility of settling and mixing with local populations. This may have the effect of the presence of pure *P. hispaniolensis* in these islands, as well as a further hybridization with local Sparrows.

HYBRID STABILIZED POPULATIONS

Johnston (1969) first highlighted the possible spreading of sparrows with agriculture and other human activities, particularly in the Italian peninsula, where agriculture developed very early. Generally and traditionally *P. domesticus* and *P. italiae* are considered closely associated with human activities, like agriculture and urban settlements, while *P. hispaniolensis* should live in natural or semi-natural habitats (Summers-Smith, 1988). However, this is not always the norm, there are many exceptions, like *P. hispaniolensis* in Sardinia or in other Mediterranean localities. The expansion from the south of *P. hispaniolensis* would be responsible for primary intergradations, while the northern species is responsible for secondary intergradations (Fulgione & Rippa, 2012).

According to Ait Belkacem *et al*. (2016) *P. italiae* is widespread in North Africa and Sicily (including small islets). Chromosomes analyses by Fulgione *et al*. (2000a) showed: a clear distinction between *P. italiae* and *P. domesticus* concerning both sex chromosomes and the distribution of heterochromatin blocks along autosomes, and the kinship between *Passer italiae* and *P. hispaniolensis* on the basis of sex chromosomes shape. Further, according to Fulgione *et al*. (2000b) the song of the *Passer italiae* shows a clinal latitudinal variation, abruptly breaking in the contact zone with *P. domesticus*. Fulgione *et al*. (2005), because *P. italiae* has a short abortive spermatogenesis and a relatively high plasma androgen levels over winter proposed that it originated from a species distributed to the south of its current range. According to Hermansen *et al*. (2011) in the homoploid hybrid speciation interbreeding between diverged lineages leads to the formation of a third stable lineage, without a change in chromosome number.

However, there are Mediterranean islands, such as Lesbos (Brooks, 1995), where *P. domesticus* and *P. hispaniolensis* live together without hybridizing, sometimes breeding colonially together at the base of the large nests of White Storks *Ciconia ciconia* (P. Brichetti, *pers. comm.*). Very probably when these two species co-occur in large numbers, they do not interbreed, but when one or both species are rare, they interbreed extensively, probably because of limited availability of conspecific mates (Hermansen *et al*., 2011).

Hermansen *et al*. (2011) divided the Italian populations of sparrows into five groups based on phenotypes: 1) individuals from the contact zone between *P. domesticus* and *P. italiae* (Alps); 2) typical *P. italiae* (Italian peninsula, Calabria excluded); 3) individuals of *P. italiae* from south Italy (from Eboli southwards); 4) Sicilian *P. italiae*; 5) pure *P. hispaniolensis* from Sardinia and Gargano peninsula (Apulia). South Italian and Sicilian Sparrows have larger bibs and some black streaking on the flanks. Hermansen *et al*. (2011) found Sicilian sparrows much closer to *P. hispaniolensis* than the rest of *P. italiae*, but the birds analysed for mtDNA had *P. domesticus* haplotypes. Besides, they found that *P. italiae* shares identical haplotypes with *P. domesticus* and *P. hispaniolensis* and does not form a clade of its own. According to Töpfer (2006) an intermediate plumage is not evidence of hybrid origin. Brichetti & Fracasso (2013) published one interesting plate by S. Gandini showing the whole variability in Italy of *P. domesticus*, *P. italiae* and *P. hispaniolensis*, with the plumage pattern of hybrid populations in south Italy and Sicily. We present here in 30 figures the great variability in the populations of *Passer* living in South Italy, Sicily and Malta; all the individuals were photographed during the breeding season.

THE GENOME OF *PASSER ITALIAE*

More recently, Runemark *et al*. (2018) sequenced the genome of four island populations of the homoploid hybrid Italian sparrow *Passer italiae* and reported that a variety of novel and fully functional hybrid genomic combinations are likely to have arisen independently on Crete, Corsica, Sicily and Malta, with differentiation in candidate genes for beak shape and plumage colour. Interestingly, their study demonstrates that hybrid genomes may vary, and identifies new candidate reproductive isolation genes. Following Runemark *et al*. (2018), *P. italiae* populations differ in position along the axis of differentiation of the parent species, with Crete and Corsica closer to *P. domesticus* and Sicily and Malta closer to *P. hispaniolensis*. They found a significantly higher introgression of *P. hispaniolensis* in Sicily and Malta populations, compared with the populations from Crete and Corsica. The genetically very similar Sicilian and Maltese populations show a considerable difference in plumage; Runemark *et al*. (2018) interpret this phenomenon with the repeated hybridization between the same parental species, which may

generate locally adapted populations. The corresponding author of the last paper, G.-P. Saetre, wrote to B. Massa (*pers. comm*.): "I have sampled and sequenced sparrows all over Italy, including near Vittoria, Enna and Giardini-Naxos on Sicily. Phenotypically there is large variation, and particularly from Campania and southwards many individuals look phenotypically quite like "*hispaniolensis*". Sparrows on Malta look almost entirely like *P. hispaniolensis*. We were therefore very surprised to learn that they too have substantial amounts of *P. domesticus* genes - they too are of hybrid origin much like the birds on Sicily and the rest of Italy. There are colonies of pure *P. hispaniolensis* breeding in Puglia/Molise, as well as some on the Po plain in the north. However, all *hispaniolensis*-looking individuals we have genotyped from Campania, Calabria and Sicily have had a mix of *domesticus* and *hispaniolensis* genes, just like in the rest of Italy". We believe that this is very probably the last and most conclusive paper on Italian Sparrows. Correctly, Metzmacher (1986a) highlighted that it is unlikely that the same phenomenon can be explained in two different ways (hybrid or species), but presently *P. italiae* is considered a stabilized hybrid in all its distribution.

STATUS OF SPARROWS IN EUROPE

On the first report by BirdLife International (2004) the Spanish Sparrow *P. hispaniolensis* and House Sparrow *P. domesticus* were considered, with secure status (NonSpec) for the former and declining (Spec3) for the latter; the Italian Sparrow *P. italiae* was not even considered and therefore not listed at all, probably because it was still considered as a subspecies of the House Sparrow. Also BirdLife International (2015) considered both *P. domesticus* and *P. hispaniolensis* with Least Concern status, but not *Passer italiae*. Today, in many areas occupied by *P. domesticus* it declined up to 50%; according to BirdLife International (2017) *P. domesticus*, even if in the past has been introduced in many countries, like North America and New Zealand, it is a Spec3 decreasing (species whose global population is not concentrated in Europe, where it has an unfavorable status), and *P. italiae* a Spec2 decreasing (species whose global population is concentrated in Europe, where it has an unfavorable status), while *P. hispaniolensis* is considered stable. Following Schneider & Sattler (in Keller *et al*., 2020), the decrease in Sicily of *P. italiae* affected more than half of the island, and according to Díaz (in Keller *et al*., 2020) it could be due to the expansion of *P. hispaniolensis* in Italy, Sicily included. This may be due to an equivocal interpretation and report from Sicily of both species in different times. Nevertheless, as we highlighted above, a hybrid form between *P. italiae* and *P. hispaniolensis* has been always present in Sicily and Malta, but not pure individuals of *P. italiae*, and recently a few individuals of morphologically pure *P. hispaniolensis*. Concerning this species, apart from Spain and other countries where it occurs, including Sardinia, in the last years it has immigrated to southern Italy from the Balkans. Its distribution covers a wider area other than Europe, and its inclusion in NonSpec is largely correct. *P. italiae* is reported from Switzerland (Vulnerable, stable), France (Corsica) (Vulnerable, unknown status), Greece (Crete) (Vulnerable, stable), Slovenia (Vulnerable, unknown status) and Italy (87% of global population, Vulnerable, decreasing). However, *P. italiae* is also distributed in scattered zones of North Africa. Considering the hybrid origin of *P. italiae* and its distribution, we believe that it cannot be considered concentrated in Europe, and consequently cannot be recorded as Spec2, but possibly as Spec3, like *P. domesticus*.

CONCLUDING REMARKS

First we should establish the validity of a name in the case the subspecific status should be used. The oldest name of this hybrid population is that of De Fiore (1890), and according to the ICZN (1999), art. 45.6.4.1., it is a subspecies if first published before 1961 and its author expressly used one of the terms "variety" or "form" (including use of the terms "var.", "forma", "v." and "f."); examples reported in the art. 45.6.4.1. allow to conclude that *Passer italiae* var. *brutius* (stabilized hybrid population between *P. italiae* and *P. hispaniolensis*) today should be treated as *Passer italiae brutius* De Fiore, 1890. As we have shown above, *Passer hispaniolensis maltae* Hartert, 1902 and *P. domesticus fluckigeri* Kleinschmidt, 1904 have the same characters of *brutius*, and must be considered definitively its synonyms. Thus, in the case a name will be used to indicate this hybrid population living in south Italy, Sicily and Malta, it should be *Passer italiae brutius* De Fiore, 1890.

However, after the conclusions of Runemark *et al*. (2018) we need to establish a practical, not a taxonomic name for specimens living in south Italy, Sicily and Malta, and we consider that the best option could be *Passer italiae* x *hispaniolensis*. This could also apply to Maghrebian hybrids.

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