



The Tangled Evolution of Italian Sparrow

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*Of late, the futility of attempts to find a universally valid criterion for distinguishing species has come to be fairly generally, if reluctantly, recognized-*Theodosius Dobzhansky

When the then 37 years old Dobzhansky wrote these words the problem of identifying a universally acceptable concept of species already had a long and respectable history. Unfortunately, despite much effort and painstaking attempts by eminent scholars such as Ernst Mayr and Massimo Pigliucci, the definition of species still defies a unitary concept today.

One of the greatest merits of Dobzhansky in discussing the species concept was the emphasis he put upon reproductive isolation as the prominent mean to isolate former populations, finally leading to incipient species.

The vast majority of biologists rarely if ever feel unsafe in recognizing natural entities within the living objects they deal with in everyday practice. Yet, some of us have the fortune to work with some slippery mental entities our minds continuously grapple with. Be it the Northern Oriole or Red wolf or whatever other infamous example you may think of, these “species” fascinate our minds exactly because of the very thin ice they stay upon there.

Almost every taxonomic group has its ‘enigmatic members’. Often, the enigma just stands in tangled evolutionary histories. This is the case for the endemic Italian sparrow, *Passer italiae* [1] the case we are most familiar with. Originally described as *Fringilla italiae* [1] the Italian sparrow name changed constantly over years because of conflicting viewpoints and ever implementing techniques [1]. At the beginning of the 20th century, Chigi [2-4] defined the Italian and Spanish sparrows as two forms of *P. domesticus*. In 1926 Rensch introduced the polytypic species concept to use a trinomial nomenclature. To Rensch, the Italian sparrow became *P. domesticus italiae*.

Meise et al. [5,6] considered the Italian sparrow a good example of stabilised hybrid. For Mayr it represents an example of a microevolutionary process: the secondary intergradation of populations confined among two zones. The expansion from the south of *P. hispaniolensis* would be responsible for primary intergradations, while the northern species is responsible for secondary intergradations.

As a stabilised hybrid *P. italiae* will survive until 1970, receiving good support in the scientific literature [7-9]. In 1977, Cova [10] considered Sicily to be the hybridisation zone interposed between two valid species, *P. italiae* and *P. hispaniolensis*. This author showed that

the Sicilian sparrow has an intermediate phenotype. Summer-Smith [11,12] in a global analysis of the genus *Passer* based upon behavioural and morphological traits, supported again a sub-specific status for the Italian endemic. Yet, *P. italiae* was considered a sub-species of *P. hispaniolensis*. The two-subspecies status was later formally confirmed by Baumgart [13] who proposed the nomenclature *P. italiae hispaniolensis* (Temminch 1820) for sparrows living in Sicily and *P. italiae italiae* for peninsular sparrows (Veillot 1817).

The Phylogenetic Species concept [14] was instead advocated by Stephan [15,16] in considering *P. italiae* a full species for the following reasons: 1) the nature and amount of variability within “italiae” is comparable to that of other *Passer* species; 2) hybrids occur between various species within the genus; and 3) there are some distinctive peculiarities in *P. italiae* reproductive biology.

In the 1987 Lo Valvo and Lo Verde defined *P. italiae* as an emergent interspecies analysing morphological variables [17,18].

Chromosomes analyses by Fulgione and co-workers [19] showed: a clear distinction between Italian sparrow and *P. domesticus* concerning both sex chromosomes and the distribution of heterochromatin blocks along autosomes; the kinship between Italian sparrow and *P. hispaniolensis* on the basis of sex chromosomes shape. Moreover, a song of the Italian population, using spectrogram analysis, shows a clinal variation from the south to the north, abruptly breaking in the contact zone with *P. domesticus* [20].

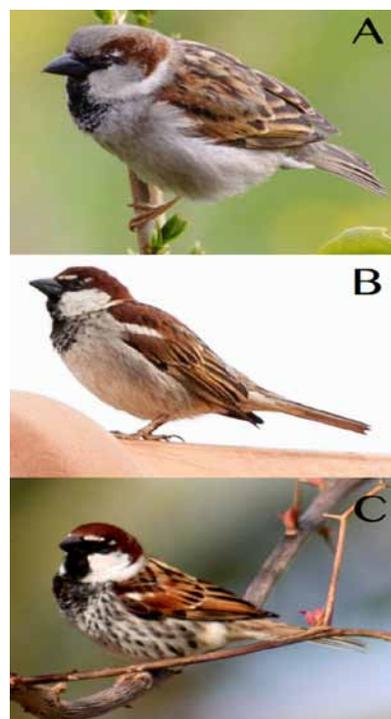


Figure 1: The image of bird indicate specific male plumage characteristics of the *Passer domesticus* (A), Italian sparrow (B) and *Passer hispaniolensis* (C).

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Allende and coworkers [21] in an extensive genetic analysis of *Passer*, refer to the Italian sparrow as *P. hispaniolensis italiae*, and assert that “*italiae*” is more likely conspecific to *P. domesticus* than to *P. hispaniolensis* (Figure 1).

Italian sparrow shows another outstanding and very informative trait status in breeding, having a short abortive spermatogenesis and a relatively high plasma androgen levels over winter [22]. It was shown in some birds [23] and reptiles [24] that populations expanding northward produce germ cells and sperm over autumn, whereas their southerly ancestors reproductive cycle typically has two full events. This would suggest that *P. italiae* originated from a species distributed to the South of its current range.

Hermansen et al. [25] repurposed the hybrid hypothesis, suggesting an origin as homoploid hybrid for the Italian sparrow, where the hybrid lineage gets geographically isolated from its parental species. Hermansen et al. [25] also suggested that this mode of speciation in birds might be more common than previously assumed.

Although the work of Hermansen et al. has merits, it fails to take in consideration all of the available information at hand. This could jeopardize their major statement (i.e. support for the hybrid hypothesis). If this is right, the tangled story of the Italian Sparrow as yet to be defined, much to the amusement and interest of those who consider a multidisciplinary approach the only feasible way to get (closer) to the reality of scientific facts.

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