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NOTES ON THE OMNIVOROUS FEEDING OF THE COMMON WALL LIZARD *PODARCIS MURALIS* IN A MONTANE URBAN AREA (CARNIC ALPS, NORTH-EASTERN ITALY)

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Riassunto – Note sull'alimentazione onnivora della Lucertola muraiola *Podarcis muralis* in un'area urbana montana (Alpi Carniche, Italia Nord-orientale). Nel corso del 2019 è stata condotta un'indagine sull'onnivoria della Lucertola muraiola *Podarcis muralis* a Tolmezzo (Carnia). È stato verificato il consumo dei seguenti alimenti/specie: *Podarcis muralis*, mela, pera, banana, melone, anguria, ananas, susino, pomodoro, *Arum italicum*, *Fragaria vesca*, uovo di gallina, *Chaenomeles japonica*. Sono segnalati anche l'utilizzo del cadavere di un conspecifico ed il consumo di una foglia secca. Da una revisione della letteratura disponibile tali alimenti non risultano precedentemente riportati. Tale utilizzo è avvenuto con relativa regolarità ed è stato effettuato nel 57.14% e nel 25% dei casi rispettivamente da maschi e da femmine.

Parole chiave: Lucertola muraiola, *Podarcis muralis*, Alimentazione, Onnivoria, Erbivoria, Area urbana, Alpi Carniche, Friuli, Italia Nord-orientale.

Abstract – In 2019, a survey was conducted on the omnivory of the Common wall lizard *Podarcis muralis* in Tolmezzo (Carnia). Consumption of the following foods/species was recorded: *Podarcis muralis*, apple, pear, banana, melon, watermelon, pineapple, plum, tomato, *Arum italicum*, *Fragaria vesca*, chicken egg, *Chaenomeles japonica*. Use of the carcass of a conspecific and consumption of a dry leaf are also reported. A review of the available literature failed to find reports of these foods. This use occurred with relative regularity and was performed in 57.14% of cases by males and in 25% by females.

Key words: Common wall lizard, *Podarcis muralis*, Feeding, Omnivory, Herbivory, Urban area, Carnic Alps, Friuli, North-eastern Italy.

1. – Introduction

Most European lacertids feed mainly on arthropods, although other invertebrates and occasionally small vertebrates can also be preyed upon; a certain quantity of soft plant food can be eaten, especially by larger species and by populations living on islands (POUGH, 1973; ARNOLD, 1987; PÉREZ-MELLADO & CORTI, 1993; VAN DAMME, 1999; COOPER & VITT, 2002; MAČÁT *et al.*, 2015).

The Common wall lizard *Podarcis muralis* is a generalist and opportunistic species that feeds mainly on a wide variety of invertebrates such as Coleoptera, Collembola, Dermaptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Orthoptera, Psocoptera, Thysanoptera, Thysanura, Amphipoda, Isopoda, Arachnida, Chilopoda, Gastropoda, Myriapoda and Oligochaeta (KABISCH & ENGELMANN, 1969; STRIJBOSCH *et al.*, 1980; MOU, 1987; GARCÍA-FERNÁNDEZ *et al.*, 1989; CAPULA *et al.*, 1993; PÉREZ-MELLADO & CORTI, 1993; BOMBI & BOLOGNA, 2002; MOLLOV & PETROVA, 2013).

Having on various occasions observed individuals of *Podarcis muralis* feeding on plant substances and other foods not usually reported in the specific literature, I decided to acquire information on the subject.

2. – Study area and methods

The investigation took place in an urban area situated in an alpine valley floor (Tolmezzo, 46°23'56"N 13°01'09"E, 310 m s.l.m., Carnic Alps), characterized by low building density and consisting of an extensive residential zone where the houses have adjacent areas used for vegetable and flower gardens (usually with trees, shrubs, hedges).

Podarcis muralis is the most Common reptile in the area and is widespread. The search for food takes place both with a sit-and-wait strategy and by active pursuit, especially in grassy sectors, and is carried out from the ground to the roofs of buildings also using the vegetation. Liquids are taken in through food and by exploiting water remaining on surfaces or in various cavities and in flowerpot dishes, demonstrating opportunism in resource use (cf. e.g. DÍAZ, 1995). Although this lizard is preyed upon (as verified on various occasions) by bird and reptile species living in the urban areas of the zone such as the Blackbird *Turdus merula*, Magpie *Pica pica*, Hooded crow *Corvus cornix*, House sparrow *Passer domesticus*, Italian sparrow *Passer italiae*, Smooth snake *Coronella austriaca* and Black European whip snake *Hierophis carbonarius* (RASSATI, 2015, 2016, 2018), the most Common predator is the domestic and feral cat *Felis catus*, which actively hunts it (RASSATI, 1998).

In order to concentrate the observations, the investigation was carried out in an area of ca. 600 m^2 representative of the variety of habitats in the zone.

All observations made in 2019 were considered, and the author's personal database was drawn upon for information and previous data.

To establish whether the consumption of plant food was an exceptional event or a regular occurrence, 1-hour observations were carried out during the time of greatest activity of the lizards for 12 days each month from June to September at a site used for food waste from the "wet" fraction of garbage; it consisted of a concrete tank to which the lizards were also attracted by the large number of insects and other invertebrates.

3. – Results and discussion

In addition to prey belonging to the taxa mentioned in the Introduction, the consumption of various foods not usually included in the trophic spectrum of *Podarcis muralis* was recorded (reported in Table 1).

Food consumption at the tank seems to have occurred with relative regularity, as it was recorded on 27.08% of the days. The diversity of foods used was most likely favoured by their concentration and their presence throughout the period in which the lizards were active. An exception to this was the consumption of fruits of the Italian arum *Arum italicum* (Fig. 1) and Wild strawberry *Fragaria vesca* present in the study

Food/Species	Notes
Podarcis muralis	Carcass of conspecific
Apple	Feeding on peels
Pear	Feeding on peels
Banana	Feeding on peels
Melon	Feeding on rinds
Watermelon	Feeding on rinds
Pineapple	Feeding on rinds/remains
Plum	Feeding on stones
Tomato	Feeding on remains
Arum italicum	Feeding on fruits
Fragaria vesca	Feeding on fruits
Chicken egg	Feeding on shells
Chaenomeles japonica	Feeding on a dry leaf

Table 1 - Foods consumed by *Podarcis muralis* recorded during the study
Tabella 1 - Alimenti consumati da *Podarcis muralis* rilevati nel corso dello studio

area at least 25 meters from the tank, respectively with only two plants close to each other and with a few scattered plants. Another exception was a dry leaf of a Japanese quince *Chaenomeles japonica* (Fig. 2) about 20 m from the tank. The use of the carcass of a conspecific (Fig. 3) for trophic purposes was recorded previously by way of a photograph published in RASSATI (2012) and is the only datum deriving from observations not carried out in 2019. The fruits of *Arum italicum* and *Fragaria vesca* were bitten into while still on the plant and/or detached and found on the ground. In both cases, the behaviour was observed several times. Given these findings, it is possible to hypothesize a role, albeit a limited one, of *Podarcis muralis* in zoochory. Feeding on the other plant remains was performed in the case of hard remains (e.g. Pineapple, Plum) by detaching small parts of pulp that remained attached and in the case of softer remains (e.g. Apple) by also biting the peels (Fig. 4).

Of the individuals observed to use the foods reported in Table 1 and for whom it was possible to determine the sex, 57.14% were males and 25% females. Perhaps the greater size and biting power of the males contributed to this difference, inducing them to feed on harder "substances" such as a carcass or the *Arum italicum* fruits. Indeed, more powerful biting power is important for inclusion of plant material in the diet (SOKOL, 1967; HERREL *et al.*, 1998) and can allow access to larger prey (HERREL *et al.*, 1999), with implications on patterns of resource use, niche divergence and sexual dimorphism (HERREL *et al.*, 2001). The percentage of the quantity of ingested plants also increases significantly with larger body size (VAN DAMME, 1999; COOPER & VITT, 2002), which results in greater head size and biting power (HERREL *et al.*, 2001).

The review of the available literature failed to reveal any report in the diet of *Podarcis muralis* of the foods recorded in this investigation. Therefore, it is believed

that they constitute the first reports, thus expanding the information on this lacertid's trophic spectrum. In particular, use of the carcass of a conspecific for trophic purposes is noteworthy, as such a use seems to have been reported only with regard to living individuals (cf. e.g. ŽAGAR & CARRETERO, 2012).

The present observations suggest that, at least in an urban area, the consumption of non-"usual" foods is more frequent than expected, even though this can probably be considered (cf. cited bibliography) an exception at the level of the entire population; this demonstrates a certain trophic plasticity, as occurs with regard to invertebrates of which almost all species are preyed upon in proportion to their availability (DÍAZ, 1995). This alimentary versatility is perhaps one of the keys to the very broad ecological adaptability of *Podarcis muralis*. However, prolonged observations also in extra-urban areas might reveal surprises, since some of the plant species reported in Table 1 are also distributed in natural environments.

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Figure 1 - *Podarcis muralis* eating an *Arum italicum* fruit / *Podarcis muralis* che mangia un frutto di *Arum italicum* (Photo G. Rassati)

Figure 2 - *Podarcis muralis* feeding on a dry leaf of *Chaenomeles japonica* / *Podarcis muralis* che si ciba di una foglia secca di *Chaenomeles japonica* (Photo G. Rassati)

Figure 3 - *Podarcis muralis* using the carcass of a conspecific for trophic purposes / *Podarcis muralis*. Utilizzo del cadavere di un conspecifico per fini trofici. (Photo G. Rassati)

Figure 4 - *Podarcis muralis* feeding on an apple peel / *Podarcis muralis* che si ciba di una buccia di mela (Photo G. Rassati)

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