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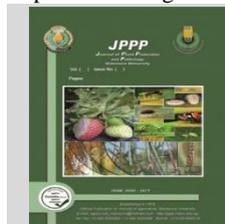
First Record of the Slug *Leidyula floridana* (Leidy, 1851) in Egypt

Awwad, M. H.*

Department of Agricultural Zoology and Nematology Faculty of Agriculture, Cairo Al-Azhar University



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ABSTRACT

The slugs were gathered from various places of Cairo, Giza, and Qalyubia governorates in Egyptian nurseries. *Leidyula floridana* considered as highly harmful to agricultural productivity. That found in other agricultural regions with widespread in gardens, nurseries, and agricultural areas, the slug was popularly known as the Florida leather leaf slug that recorded she was a real pest of ornamental plants in southern Florida and field crops. This research provides critical information on this species, historical and current distribution in Egyptian agricultural areas.

Keywords: Gastropoda, Slugs, Gardens, nurseries Nile delta, Egypt.

INTRODUCTION

The family Veronicellidae (Gray) includes morphologically different slugs often known as leather leaf slug. *Leidyula floridana* (Leidy Fam (Veronicellidae) regarded one of the most extensively dispersed slugs in the world. They are flattened, unlike other slugs, and have a thick mantle covering their whole body. This family included about 20 genera and 100 species (Thomé 1989). Veronicellid slugs are mostly found in the tropics and subtropics, and are most several in the Americas and Africa despite of some slugs are found in Asia and Australia (Barker 2001, Gomes & Thomé 2004). Slugs reproduce hermaphroditically, and almost are oviparous. They are herbivorous and detritivorous, they frequently dig in the soil throughout day. These species are significant agricultural pest. Coffee, banana, tobacco, pepper, tomato, and, notably, bean plants are being harmed (Rueda *et al.* 2002). These species, particularly *Angiostrongylus cantonensis* (Chen, 1935) (Strongylida: Metastrongylidae). Slugs leave mucus them as they active, which might eaten with vegetable, providing another possible route of human infection. *Leidyula floridana* (Leidy), popularly known in the Florida as leather leaf, is the most common veronicellid found in the United States. It was first described at Florida, and suggested by its particular name. However, some believe it originated in Cuba (Pilsbry 1948), where now widespread (Maceira 2003), also appears on other Antilles islands. Its distribution in United States was once restricted to southern Florida but it is now found central and northern Florida, Louisiana, and Texas (Dundee 1977), Mexico (Naranjo-Garcia *et al.* 2007). *L. floridana* was distinguished by a short light-colored dorsomedial stripe and irregular dark dorsolateral stripes. However, color pattern varies, particularly dorsolateral stripes, which may be dotted to a series of dots or even missing. It is brownish, ranging from chocolate to yellowish brown to on dorsal side. As a result, external characters are untrustworthy for identification, and most of the material on genus is dubious (Thomé 1989). More recently Gomes (2007), has depicted twisted, corkscrew-like shape of penis in *L. floridana*, which is greatest morphological indication of species identity, although trait is too often overlooked when identifying the species. *L. floridana* was described by Pilsbry

(1948) and has only been documented as an infrequent nuisance in Florida, although due to its nocturnal feeding habits, that may be missed or misunderstood. The introduction of *A. cantonensis* to main land United States, subsequent dissemination through populations of resident (both indigenous and nonindigenous) mollusks (Teem *et al.* 2013), may pose a bigger threat to humans. Individuals are at risk of infection. Land snails cause not only economic damage, but also slugs, which have been identified as major pest ornamental and field crops in many provinces of the delta region. They like wetter and darker environments, such as greenhouses and farms (Lugma 2007; Ali 2011; Rady *et al.* 2014; Abu Sunna 2016). In recent years, surveys of mollusks have been conducted in various governorates of Egypt, focusing on their eating habits and financial losses incurred by farmers as a result of gastropod damage, as is the case in Ismailia governorate (Al-Oqdah 1984). , and in newly reclaimed lands in the northern region of Egypt (Hashem *et al.* 1992). *Laevicaulis alte* family Veronicellidae is one of the slug species recorded by (Reham Fathey *et al.* 2020).

This investigation was carried out to shed light on first occurrence of the slug *L. floridana* (Leidy) in Egypt.

MATERIALS AND METHODS

Between December 2018 and October 2020, terrestrial mollusks were gathered from nurseries, gardens, and agricultural areas at governorates Cairo, Giza, and Qalyubia. Slug samples were taken in the early morning and evening randomly as slugs were most active, in generally cold and humid circumstances. Larger individuals were typically discovered on attractive plants, but smaller specimens were typically located in humid locations, such as along irrigation tubes, under water taps, in leaf litter, and under stones. Table (1) lists the areas in which this slug appeared on the different hosts. They include Great Cairo-Cairo (Nasr city-new Cairo). Giza (Mansoria-Imbaba-Zamalek-Kerdasa) and Qalyubia (Qalyub-El Qanater El Khayreya-Bahtim). This slug was gathered in cold, overcast weather from the surface of the earth between seedlings and pots for plants in nurseries. The sample were stored in labeled plastic packages coated with damp gauze towels before being moved to the laboratory. Slugs were gathered and stored in packages with damp soil until no

* Corresponding author.

E-mail address: mohmedhamza452@gmail.com

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reaction to outside triggers was obtained. A preliminary identification based on external appearance traits, *Leidyula floridana* (Leidy) and matching with a key to Veronicellid slugs of Florida, according to Modified from (Burch and Van Devender, 1980).

RESULTS AND DISCUSSION

In this investigation, *L. floridana* (Leidy) was recorded for the Frist time in Egypt. Virtually nothing is known about the behavior and description.

Taxonomic information

- Phylum: Mollusca
- Class: Gastropoda
- (Unranked): Clade Heterobranchia
- Clade Euthyneura
- Clade Panpulmonata
- Clade Eupulmonata
- Clade Systellommatophora
- Superfamily: Veronicelloidea
- Family: Veronicellidae
- Genus: *Leidyula*
- Species: *L.floridana*
- Binomial name
- Leidyula floridana* (Leidy)

Description

The average length of 6.5 cm of adult individuals were the average width 2.4 cm while female opening generally less than 1/4 hypnotic width from foot (1,2,3 and 4) dorsum is appear tan, punctate with black, with long median whitey strip *Leidyula floridana* (Leidy) key to veronicellid slug of Florida modified from (burch and Van Devender, 1980).



Fig. 1. The general shape of adult *Leidyula floridana* and the average length



Fig. 2. Side view of the rear of the *Leidyula floridana*



Fig. 3. Genital pore view of the rear of the *Leidyula floridana*



Fig. 4. Ventral view of the rear of the *Leidyula floridana*

Habitat and behavior

Since the circular on the slugs of Florida (Stange, 1978) additional information on the occurrence of veronicellid slugs at Florida has been gathered. This new information includes the range extension of the Paraguayan slug, *Angustipes ameghini* (Gambetta) into the original county (Gilmore, 1982), and the introduction of Mexican slug *Leidyula moreleti* (Crosse and Ficher) into Orange County (Deisler and Phelps, in press). Two additional counties (Alachua and Pinellas) can also be added to the range of the Paraguayan slug based on surveys made in Okda (1984). Nomenclatural changes have been adopted following Thome (1975). The Table (1) shows the places of emergence and spread of the slug in Greater Cairo Cairo (Nasr city-New Cairo). Giza (Mansoria-Imbaba-Zamalek-Kerdasa) and Qalyubia (Qalyub-El Qanater El Khayreya-Bahtim). In nurseries this slug has been previously found under different ornamental plant species from some nurseries located in the Cairo governorate (Mohamed and Ali 2013).

Table 1. shows the places of emergence and spread of the slug in Greater Cairo.

GOV.	Population density	Location	Geographical co-ordinates
Cairo	*	Private property nursery EL saada green 13 Elnaser road Nasr city	30°06.7791"N 31°32.2643E
	*	Private property nursery greenhouse Elnaser road Nasr city	30°06.7446"N 31°32.2142E
	**	Private property nursery Egyptian green abas Elaquad Nasr city	30°05.2705"N 31°33.7975E
	**	Private property nursery El Araby 82street Amen Masaken Osman Nasr city	30°05.2742"N 31°33.7481E
	**	Private property nursery Basmla 2b street Bn Ishaq abas elaquad Nasr city	30°05.2571"N 31°33.6579E
	**	Private property nursery El hawary street Hanen Ishaq Nasr city	30°05.2232"N 31°33.2425E
	***	Private property nursery zohor El Salam eighth district Nasr city	30°04.5335"N 31°35.6626E
	**	Private property nursery Andalusia, the tenth district Nasr city	30°04.6683"N 31°35.9095E
Qalyubia	***	Porto Cairo 90 North, the beginning of New Cairo	30°02.7335"N 31°497323E
	**	Agricultural Horticulture Research Institute El Qanater El Khayreya (Tropical Fruit Research Station)	30°11.601"N 31°06.693' E
	***	Private property nursery El Ahaly village in El Qanater El Khayreya, Qalyubia	30°11.878"N 31°06.732' E
Giza	**	Private property nursery 11Abdel Ghani Badawi Bahtim	30°12.3251"N 31°26.1869'E
	***	Private property nursery- Al-Bustan -Abu Al-Ghait- Al-Qanater Al-Khairia	30°15.0071"N 31°17.7718'E
	**	Private property nursery, Kerdasa,	30°03.248"N 31°05.891' E
	***	Abo Rawash, El Saliba district, near the road leading to El Mansouria,	30°05.975"N 31°04.717' E
	**	Private property Al-Rawda nursery Saft Al-Laban Imbaba	30°03.0029"N 31°16.5124'E
	**	Private property Nursery Aya -Al-Safa-Mohamed Mazhar -Al-Zamalek	30°066133"N 31°22. 3165'E

Note: (*) = sum slugs of 3 to 5 in plot 50 x 50 cm²; (**) = sum slugs of 6 to 10 in plot 50 x 50 cm²; (***) = sum slugs of 50 x 50 cm² plot exceeds 10 individuals.

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تسجيل البزاقة *Leidyula floridana* (Leidy) لأول مرة في مصر

محمد حمزة عواد عبد الباري

قسم الحيوان الزراعي والنيماطودا – كلية الزراعة بالقاهرة – جامعة الأزهر

تم رصد تلك البزاقة *Leidyula floridana* (Leidy) في مشاتل مختلفة في العديد من المحافظات المصرية (القاهرة و الجيزة و القليوبية) حيث تعتبر افة زراعية ضارة للغاية بالانتاج الزراعي وكذا تم تسجيلها في مناطق زراعية مختلفة مثل الحدائق و المشاتل و المناطق الزراعية . و تعرف تلك البزاقة باسم بزاقة الاوراق الجلدية في فلوريدا و تم تسجيلها على نباتات الزينة في جنوب فلوريدا وقد تم تسجيل معلومات هامة عن التوزيع التاريخي لتلك البزاقة في المناطق الزراعية المصرية .