



L-Università ta' Malta
Faculty of Science

Department
of Biology

Department of Biology

Museum Newsletter

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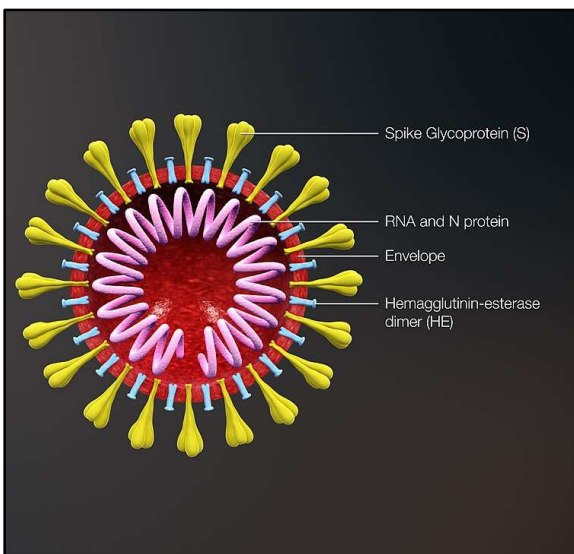
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Curator's Note

What are Corona Viruses? Owing to the current epidemic of a novel Corona Virus we have been bombarded with information (and misinformation) about COVID-19 (**Corona Virus Disease 2019**). I am not going to repeat the recommendations concerning strategies to deal with this worldwide outbreak (whose importance I cannot stress sufficiently), but I will give some biological information about the virus *per se*.

Coronaviruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more severe diseases. Included among the latter are Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). They are placed in four groups, alpha-, beta-, gamma- and delta- CoV). Coronaviruses which can infect humans were first identified in the mid-1960s; prior to the appearance of COVID-19, six coronaviruses that can infect people were known.

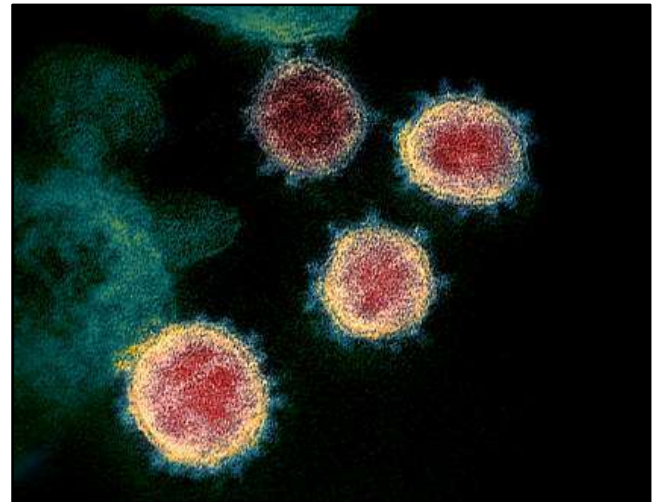
Various classification systems of viruses have been proposed. One such system places the Coronaviruses in the Family Coronaviridae, characterised as being enveloped (enclosed in a **viral envelope**) with an inner **capsid** surrounding the genome. The viral envelope is a lipid bilayer with bulbous surface projections giving the virus particle the appearance of a crown, hence the name. The interactions of these projections or **protein spikes** with the host cell receptor determine the infectivity of the virus.



(<https://www.scientificanimations.com>)

Cross-sectional model of a corona virus particle

When a virus particle enters a host cell it loses its outer envelope and its genome enters the host cell's cytoplasm, where it replicates itself. The daughter virus particles (progeny viruses) are then transported to the cell membrane by the host cell's Golgi bodies and leave the cell by exocytosis, ready to infect another host cell.



NIAID-RML

Transmission electron microscope image of COVID-19 particles

Coronaviruses are zoonotic, meaning they are transmitted between animals and people. Detailed investigations found that SARS-CoV was transmitted from civet cats to humans and MERS-CoV from dromedary camels to humans. The animal source of COVID-19 has not been ascertained, though several possible candidates have been mentioned, including bats and pangolins.

Sara Platto, an animal behavior specialist at Jiangnan University in Wuhan, China (where the epidemic originated), is concerned that the speculation about pangolins being the source could lead to killing of these endangered mammals, as happened with civets following the SARS outbreak. "The problem is not the animals, it's that we get in contact with them," said Platto.

Ferrets, mice and monkeys purposely infected with COVID-19 are being used in research aimed at producing an effective vaccine. Researchers are currently working on vaccine candidates targeting the COVID-19 spike protein. If produced in large quantities, such antibodies could potentially be used to treat new infections before a vaccine is available. Other approaches are also being pursued.

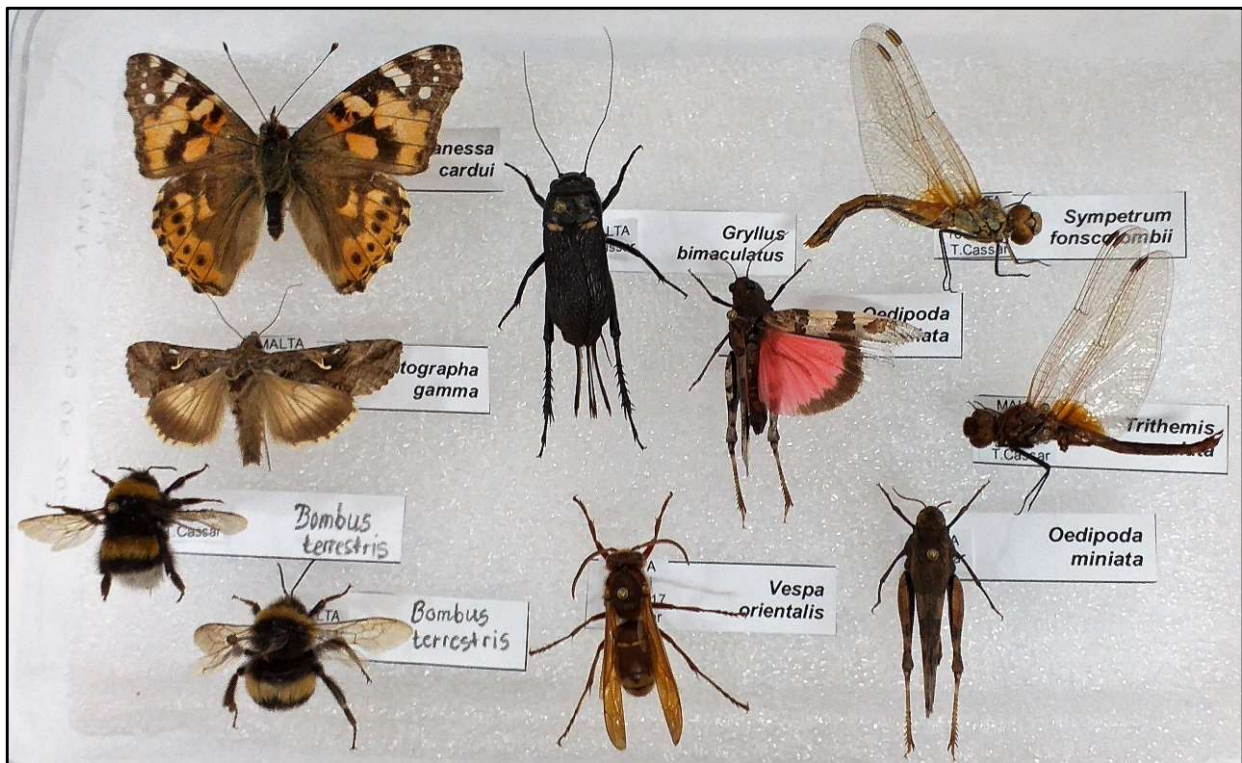
(This article is based on various online sources)

News

Recent acquisitions by the museum: An immaculately mounted and labelled collection of Maltese insects was donated to the museum by first year undergraduate Thomas Cassar. The collection comprised:

Odonata: *Sympetrum fonscolombii*; *Trithemis annulata* **Hemiptera:** *Cicada orni* **Mantodea:** *Mantis religiosa* **Orthoptera:** *Gryllus bimaculatus*; *Eyprepocnemis plorans*; *Oedipoda miniata*; *Platycleis intermedia*; *Sphingonotus ?caerulans* **Coleoptera:** *Ocyopus olens* **Lepidoptera:** *Vanessa cardui*; *Autographa gamma*. **Hemiptera:** *Bombus terrestris*; *Vespa orientalis*

Donations to the museum are always welcome and will of course be fully acknowledged.



Part of the insect collection donated by Thomas Cassar

Specimen of the month

Still on an entomological note, I have this month selected an invasive alien insect pest which has been causing havoc to palm trees since its introduction in 2007 - the Red Palm Weevil (RPW), *Rhynchophorus ferrugineus*. The RPW is one of the largest members of the coleopteran Superfamily Curculionoidea (weevils). Formerly classified in the Family Curculionidae, it has now been placed in the Family Rhynchophoridae.

R. ferrugineus is native to southern Asia and Melanesia and was introduced to the Arabian Gulf countries in the mid-1980s. It reached Europe in the

mid-1990s when it was imported with a consignment of palm trees from Egypt. It has since spread to Italy in 2004, Canary Islands in 2005, Balearic Islands, Cyprus, France and Greece in 2006 and Turkey and Malta in 2007.

Like all weevils, the RPW has an elongated rostrum. It is reddish brown in colour with ridged elytra and a variable number of black spots on the pronotum. Males differ from the larger females in having a shorter, thicker rostrum, besides other less conspicuous differences. There is great variation in the number and arrangement of the black pronotal spots.



Photos: Steve Mizzi

Male (1) and female (2) Red Palm Weevils



Specimen of the Red Palm Weevil at the DoB Museum

The RPW is a pest of palm trees, causing serious economic damage in date-palm growing areas. Here in Malta the pest is most frequently found on the Canary Island Palm (*Phoenix canariensis*), which is widely grown as an urban decorative tree, although it has also been recorded on other species of palm.

After mating, the females deposit their eggs (ca. 80) in holes bored in the plant tissue. They hatch after 4 - 5 days and the emergent larvae use their strong mandibles to excavate a gallery, usually at the base of palm fronds, but later moving towards the trunk. The larvae moult 9 times and on reaching maturity after

115 days, they construct cocoons from palm fibres in which they pupate. The pupal period lasts ca. 30 days and the adults emerge and leave the host tree. In the Mediterranean the whole cycle lasts 5 – 6 months. Infected trees show little detectable symptoms at first but when the larvae reach maturity the fronds start to wilt, eventually collapsing and leading to the death of the trees.



Larva, pupa and adult RPW



An infected Canary Island Palm near death

The RPW It has had a devastating effect on the palm trees growing in the Maltese Islands. By the end of 2016 4,865 trees had succumbed; the mortality reached a peak in 2010, when 1067 deaths were recorded and declined in the following years. The vast majority of dead trees were Canary Island Palms (*Phoenix canariensis*); other dead species included the indigenous Mediterranean dwarf palm (*Chamaerops humilis*), the Date Palm (*Phoenix dactylifera*) and the Mexican Fan Palm (*Washingtonia robusta*)¹. Mizzi *et al.* published a paper² about the RPW in Malta based on an undergraduate dissertation by Steve Mizzi.

¹ Source: *Plant Health Directorate, Malta.*

² Mizzi, S., Dandria D., Mifsud, D & Longo, S. (2009) The Red Palm Weevil *Rhynchophorus ferrugineus* (Olivier, 1790) in Malta (Coleoptera: Curculionidae) *Bulletin of the Entomological Society of Malta* Volume 2 111 -121

Reference Collections

Maltese Spiders

In 2018 David Dandria deposited a collection of Maltese spiders (Arachnida: Araneae) in the DoB Museum. The collection consists of 479 specimens preserved in 70% ethanol. 248 are identified to species level, 98 to genus level while 133 still await identification. 29 families are represented.

Maltese araneids have been little studied and, as can be seen from the above numbers, much remains to be done in this field. Erich Kraitsir published an important paper³ in 1996 in which he listed 109 species, including descriptions of five species new to science. In 2005 Dandria *et al.* published a paper⁴ which included a checklist of Maltese araneids numbering 137 species in 31 Families. Seven of these species are endemic to the Maltese Islands. The most recent publication⁵ which gives a more complete account of the Maltese spider fauna is that by Pfliegler *et al.* in which 149 species are listed.



Quote of the month

Very few species have survived unchanged. There's one called *Lingula*, which is a little shellfish, a little brachiopod about the size of my fingernail, that has survived for 500 million years, but it's survived by being unobtrusive and doing nothing, and you can't accuse human beings of that.

Sir David Attenborough

Left: Some of the species in the spider collection:

Top, l – r *Tegenaria parietina*, *Argiope lobata*
Centre l - r *Cyrtophora citricola*, *Larinioides cornutus*

Bottom l – r *Dysdera crocata*, *Pisaura mirabilis*

Department of Biology Museum

Curator: David Dandria

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³ Kraitsir, E. (1996) Ein Beitrag zur Kenntnis der Spinnen-Fauna der Maltesischen Inseln (Chelicerata: Araneae) *Ann. Naturhist. Mus. Wien* 98B 117 - 156

⁴ Dandria, D., Falzon, V. & Henwood, J. (2005) The current knowledge of the spider fauna of the Maltese Islands, with the addition of some new records *The Central Mediterranean Naturalist* Vol 4 Part 2 121 - 129

⁵ Pfliegler, W.P., Schönhofer, W., Niedbała, W., Vella, P., Sciberras, A & Vella, A. (2017) New records of mites (Acari) and harvestmen (Opiliones) from Malta with a preliminary checklist of Maltese Arachnida. *Soil Organisms* 89 (2) 85 - 110