Central Mediterranean Naturalist, 2002, 3(4):149-152

Parasites and Pests of Medical Significance in the Maltese Environment - a historical review of culprit species

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ABSTRACT

Parasites or pests with medical significance known to have affected or are affecting the Maltese community are listed. These include several protozoan, helminth and arthropod parasite species. Other arthropod species identified as public health pests in Department of Health publications are also listed.

INTRODUCTION

The biomedical discipline of parasitology has traditionally been concerned only with the parasitic protozoa, helminths, and arthropods. It is generally assumed that the improvements in the general hygiene that have occurred in the second half of the twentieth century in Malta have made human parasitic infestations a thing of the past. The situation was however very much different prior to the mid-twentieth century and parasitology was an important discipline for the Maltese medical profession. In 1837, it was commented that "*taenia and other worms are so frequent, that they are scarcely considered sources of disease*" [Montgomery, 1837]. Even today a number of parasitic species still affect Maltese human hosts.

METHODS

The present study is an attempt to identify the various human parasitic species that have affected the Maltese community throughout the years. The study is based primarily on the 1937-1953 Annual Reports of the Medical and Health Department [M&H, 1937-1953]. Other published sources that deal with aspects of medical parasitology in the Maltese Islands were availed of. More recent parasitic infestations are reported in the Infectious Disease Annual Reports for the period 1991-1999 [DOH, 1991-2000]. Personal experience of medically important parasitic infestations over a near twenty-year period was also considered.

SYSTEMATICS

Protozoa

♦ *Giardia lamblia*

This species is usually weakly pathogenic or non-pathogenic to humans. With marked infestation, the large numbers of parasites attached to the bowel wall may cause irritation and low-grade inflammation of the intestinal mucosa, with consequent acute or chronic diarrhoea.

Examination of faeces carried out in 1940 revealed one case of *Giardiasis* cysts [M&H 1937-1953]. The species has been identified in returning tourists particularly from India and Pakistan [personal observation]. Two cases of *Giardiasis* infection were reported in the 1991-1999 Infective Disease Reports [DOH, 1991-2000].

♦ *Trichomonas vaginalis*

This species restricts itself to the genitourinary system causing marked local symptoms. Sexual intercourse is the usual form of transmission of the infection, but it can also be transmitted by contaminated towels, etc.

The species is a common cosmopolitan parasite of both males and females in Malta, though its prevalence may have decreased in recent years [personal observation].

♦ *Leishmania infantum*

The genus undergoes a complex life-cycle with alternating sexual and asexual reproductive phases involving two host [man or dog, and the sandfly *Phlebotomus sp*.]. Only the first stage, the nonflagellated amastigote, occurs in the mammalian host.

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Visceral Lieshmaniasis is the classically described form of the disease in Malta; however in recent years *Cutaneous Lieshmaniasis* has been described [Vella-Briffa, 1985]. The 1991-1999 Infective Disease Reports records 71 cases of *Visceral Lieshmaniasis* infection and 121 cases of *Cutaneous Lieshmaniasis* [DOH, 1991-2000].

L. infantum zymodeme MON 1, was found to cause human and canine visceral leishmaniasis. *L. infantum* MON 78, which has so far been isolated only in Malta, was the agent of human cutaneous leishmaniasis. Both zymodemes were isolated from the same sandfly species *Phlebotomus perniciosus* [Gradoni, 1991].

♦ *Entamoeba histolytica*

This species is a parasite commonly found in the large intestine of humans. Invasion of the intestinal mucosal lining results in ulceration causing dysentery.

The endemicity of *Enteramoeba* was only confirmed after the 1913 epidemic. During the period 1941-45, a total of 313 cases were found to be positive on pathological faecal examination [M&H, 1937-53]

♦ *Toxoplasma gondii*

This species is a coccidian protozoan of worldwide distribution that infects a wide range of animals and birds. The normal final host is the domestic cat. Human infections are usually asymptomatic, but can cause severe effects to the fetus when infection occurs during pregnancy.

Toxoplasma screening is usually carried out in Malta in cases of recurrent miscarriages and stillbirths. The prevalence rate of toxoplasma antibodies among Maltese pregnant women had been estimated at 23.8%, with an infective incidence of about 2-3 cases per 1000 pregnancies [Portelli, 1995].

♦ *Plasmodium sp.*

The sporozoan protozoa of this genus are ameboid intracellular parasites of vertebrates, with one habitat in red cells and another in cells of other tissues. Transmission to humans is by the bloodsucking bite of the female mosquito of the genus *Anopheles*.

Reported cases of malaria are generally exogenous cases imported from overseas. During 1991-1999, a total of 17 cases of exogenous malaria were reported [DOH, 1991-2000]. However a case of endogenous malaria has been reported in the past, while the *Anopheles* mosquito has been reported to breed in Malta [M&H, 1937-53].

Helminths

♦ *Taenia ?saginata*

♦ *Taenia ?solium.*

The Tapeworm is a gastrointestinal parasite that has a world-wide distribution and is transmitted to the human host by eating undercooked beef or pork. The Maltese preference of eating well-cooked meat protects against outbreaks of the disease, though uncooked sausages may be a source of infection. Faecal examination in 1940 showed eggs of *Taenia* in one case [M&H, 1937-1953]

♦ *Ascaris lumbricoides*

The Roundworm is a small intestine parasite of world-wide distribution. It is transmitted by eating viable eggs from contaminated food or soil.

The first documented record of an epidemic infestation in Malta occurred during the insurrection of the Maltese against the French rulers at the end of the nineteenth century [Robert, 1804]. The infestation is still occasional encountered in individual patients [personal observation].

♦ *Enterobius vermicularis*

Pinworm infestation usually occurs by anal-oral self-contamination and through contamination by food-handlers. It has a world-wide distribution.

The infection is the commonest helminthic infestation present today in the Maltese community [personal observation].

♦ *Trichuris tricuria*

The Whipworm has a world-wide distribution and is transmitted by ingestion of contaminated food. During the period 1940-41 faecal examinations carried out by the Pathology Department revealed two cases showing eggs belonging to this species [M&H, 1937-1953].

Arthropoda

Class: ***Insecta*** (insects)

♦ ***Dictyoptera***

The cockroach species have become particularly adapted to the human environment and have colonised and flourished in artificial pseudotropcal situations. They have become important domestic pests and can be a cause of food poisoning and other enteric infections.

Three cockroach species of public health importance have been described from the Maltese Islands [Sultana, 1995].

- *Blatta orientalis*
- *Periplaneta americana*
- *Supella supellectilium*

- ***Diptera***

This Order includes several fly and mosquito species. Fly species have become closely associated with humans and have adapted to the human domestic environment. They are thus of public health importance as pests and potential carriers of disease organisms causing food poisoning and other enteric infections. Forty-four species of Calliphoridae, Fanniidae and Muscidae have been identified in the Maltese Islands [Schembri et al, 1991; Ebejer and Gatt, 1999]. They include the following species that are considered public health pests:

- *Musca domestica*
- *Calliphora vicina*
- *Lucilia sericata*
- *Fannia canicularis*
- *Stomoxys calcitrans*

Mosquitoes are fluid feeders, the males on nectar and plant exudates, while the females are blood-suckers. Besides being a source of irritation because of the reaction of the host to the injected anticoagulant saliva, mosquitoes can also transmit disease. Several species have been reported from the Maltese Islands, particularly during research on the transmission of Brucellosis [Horrocks & Kennedy, 1906].

- *Culex pipiens*
- *Culex fatigans* = *C. quinquefasciatus*
- *Culex spathipalpis* = *C. longiareolata*
- *Stegomyia fasciata* = *Aedes aegypti*
- *Acartomyia zammitii* = *Aedes zammitii*

Other additional species reported in the 1941-42 Medical & Health Report [M&H, 1937-1953] include:

- *Theobaldia annulata* = *Culiseta annulata*
- *Anopheles maculipennis*

A review of the Culicidae species recorded from the Maltese Islands [Gatt, 1996] confirms the presence of six species previously recorded including:

- *Aedes zammitii* (Theobald)
- *Culex pipiens* Linnaeus
- *Culiseta longiareolata* (Macq.)
- *Anopheles maculipennis* Meig.
- *Culex laticinctus* Edwards

Four other Culicidae species have been identified from Malta:

- *Aedes caspius* (Pallas)
- *Aedes detritus* (Haliday)
- *Culex hortensis* Ficalbi
- *Uranotaenia unguiculata* Edw.

The presence of two previously recorded species could not be substantiated.

- *Aedes aegypti* (Linnaeus)
- *Culex quinquefasciatus* Say

Important Diptera vectors of human protozoal parasites described from the Maltese Islands include:

- *Anopheles maculipennis* Meig

Anopheline larvae were collected from the ditches at Salina and Chadwick Lakes "Wied il Qlieja". Malaria contracted locally in 1904, 1919 and 1941 is known to have occurred in the region [M&H 1937-1953]. The species has not been recorded since 1943 and is considered extinct on the Islands [Gatt, 1996].

- *Phlebotomus sp.*

The Sandfly species of the Maltese Islands were identified and their life history studied in 1910 [Newstead, 1912; Marett 1913]. They were found to belong to the species:

- *P. papatasii* Scop
- *P. perniciosus* n.sp. Newstead
- *P. minutus* Rond.
- *P. nigerrimus* n.sp. Newstead

The species that transmits visceral and cutaneous *Lieshmaniasis* was identified in 1946 as *Phlebotomus papatasi* [M&H 1937-53]; while the pathological role of the sandfly species *P. perniciosus*, suggested in 1912, was reconfirmed in 1991 [Gradoni, 1991].

- ***Siphonaptera***

Fleas were closely monitored since they were considered a valuable index of the spread of plague epidemics. The Medical & Health Reports repeatedly give flea indexes and lists of flea species identified on rodents and other animals including cats and dogs. The rodent flea also helps the spread of murine typhus. During 1991-1999, a total of 331 individuals were reported to have suffered from murine typhus [DOH, 1991-2000]. The recorded rodent flea species include:

- *Pulex irritans*
- *Leptopsylla segnis*

- *Xenopsylla cheopis*
- *Nospsyllus fasciatus*

[Zammit, 1918].

Other flea species that may readily feed on humans in the domestic environment include the cat and dog flea:

- *Ctenocephalides felis*
- *Ctenocephalides canis*

♦ ***Hemiptera***

The Hemiptera are generally plant feeders, however two families of "bugs" comprise species whose mouth-parts have become adapted to feeding on blood.

Bedbugs are temporary ectoparasites of humans and when not feeding on blood will hide in cracks, crevices and other harbourages in human habitations. The *Cimex* bedbug was noted to affect a household of low socio-economic status in the early 1970s [personal observation]

- *Cimex ?lectularius*
- *Cimex ?hemipterus*

♦ ***Anoplura***

Lice are permanent ectoparasites of warm-blooded animals and are characteristically specific in their choice of host. Since they cannot survive for more than one day or two away from their chosen host, each species is confined to a particular mammalian or avian host.. The human body louse can transmit typhus fever. The head and pubic louse do not transmit disease. Human lice species recorded in the Maltese Islands include:

♦ *Pediculus humanus capitis*

Head lice are transmitted by personal contact and by objects such as combs and hats. The number of children found to have head lice infestation in 1948 amounted to 1691 [M&H 1937-53]. It is common among school children in Malta without regard to social status [personal observation].

♦ *Pediculus humanis corporis*

Body lice are uncommon under good hygienic conditions. They are rarely seen in the Maltese community [personal observation]

♦ *Phthirus pubis*

The crab louse is usually transmitted venereally. It is rarely seen in the Maltese community [personal observation].

Class: ***Arachnida***

Ticks and mites are bloodsucking parasites of a variety of warm-blooded animals, especially cattle, sheep, deer and dogs. Occasionally they may be picked up by humans after walking through an infested area or when in close proximity to an affected animal. Ticks can transmit a number of diseases, including tick-borne typhus. Several ticks were found on rats in Malta, the commonest being *Laelaps echidninus*, which does not bite man [Zammit, 1918].

Tick-borne typhus during the period 1991-1999 was reported to affect 80 individuals [DOH, 1991-2000].

♦ *Sarcoptes scabiei*

This mite causes a transmissible skin infection characterised by superficial burrows, intense pruritus and secondary infection. Scabies is readily transmitted by skin-to-skin contact with an infected individual. The 1937-39 Medical & Health Reports documented 97 cases of scabies that were seen in the Dermatology Outpatients Department of the Government Hospital. A serious outbreak of scabies was reported during the Second World War resulting from the poor hygienic conditions of the wartime communal shelters. During 1940-42 the Medical & Health Reports document 836 cases of scabies [M&H, 1937-53].

Class: ***Chilopoda***

Centipedes usually have two strong pointed teeth that deliver a poison strong enough to kill its prey. *Scolopendra cingulata* is a particularly large species found in the Maltese Islands that can deliver a particularly painful bite to humans.

Acknowledgements

Thanks are due to David Dandria and Dr. Walter Bonnici for help in tracing relevant important references.

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