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PSEUDOMYIASIS WITH CONNECTION TO ORGANIC WASTE – FIRST CASE REPORTED IN CZECH REPUBLIC

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Abstract

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In the April of 2007, pseudomyiasis was detected in alimentary tract of two years old boy from South Moravia (Czech Republic). Contamination was caused by larvae of family Calliphoridae (Diptera), accidentally consummated with half-rotten fruits from bio compost. It is the first recent documented case of pseudomyiasis, and is closely connected with bio waste and ecological waste disposal. Usage of organic waste composting is increasing all around the world, motivated by demand for maximum recycling. While workrooms of bigger compost facilities are usually separated from public, waste containers in front of the houses or small composts in the gardens serving one family are freely accessible to public. These bio composts and waste containers attract many species of insects, especially from order Diptera. so for inhabitants of neighbouring houses this can represent certain health risk. In the location of findings, Dipteras were caught and their species spectrum was evaluated considering their ability to cause myiases or pseudomyiases.

myiasis, pseudomyiasis, bio-waste

Usage of bio waste and compost as a source of organic matter and nutrients is common practice used for improvement of physically chemical attributes of soil, in order to lower the need of inorganic fertilisers. Every year there are more and more towns, which use composting to eliminate bio waste. Only during last year according to Czech News Agency several tens of towns and villages acceded – for example Zlín, Blansko or Praha-Řepy. Processes of decaying and rotting take place with participation of many bacteria and insect, mainly from order Diptera (Laos et al., 2004). Some species come only in search for food, but many of them pass through their complete life cycle from egg to adult in bio wastes. These species are commonly used in forensic science, where they help determine time of death and state post mortem interval more precisely, thus they can be very useful (Byrd and Allen, 2001; Hwang and Turner, 2005). On the other hand virtually all Diptera have the ability to transfer pathogenic spores, especially microbial, and various development stages of endogenous and exogenous parasites. Larvae of some species of Diptera can cause true myiases and pseudomyiases in humans and farm animals. Therefore, development of composting means increasing the importance of issue of health risk connected with these processes.

MATERIAL AND METHODS

In the spring 2007 mother found moving elongated organisms, which looked similar to rice grain, in her's child's excrements. Regarding the fact that the child was otherwise quite well, showed no sign of intestinal problems and there were no more organisms detected, pediatrician put the case aside. However, mother continued trying to find out what the problem was, and approximately week after the discovery she came with the findings to regional veterinarian. He submitted it to the Department of Zoology, Fisheries, Hydrobiology and Apidology of Mendel University of Agriculture and Forestry in Brno. Due to the time passed from discovery to examination and advanced stadium of decaying, it was not possible to precisely determine the objects, but it was possible to identify them as animal tissue. Mother was asked to cooperate, mainly by de-

livering fresh samples in case of further discovery. In the beginning of the summer she delivered fresh excrements of the same child with the same objects to the MZLU in Brno, where evaluation was carried out. Two ivory white object of the size of rice grain with no sign of moving were separated out of the excrement, rinsed several times and plunged into spirit solution.

In the same time sampling of adults and larvae of Diptera was done in the compost in the place of boy's residence in the interval of six weeks and species spectrum was determined (Doskočil, 1977). Consequently, potential risk of causing pseudomyiases and myiases was evaluated for each species.

RESULTS AND DISCUSSION

Objects were examined by light microscope and determined according to Doskočil (1977). It was found out that pseudomyiasis was caused by two larvae of Diptera, Calliphoridae. Species of detected adults and larvae are shown in Tab. 1. They were mainly of family Calliphoridae and genus Sarcophaga. Several live larvae of various species of Diptera were let to pass through their live cycle to adult stage, so the determination of larvae detected in boy's excrements could be done. After comparison of posterior spiracles of detected larvae with posterior spiracles of larvae kept in lab, detected larvae were assigned to *Calliphora vicina*.

I: *Species and families of Diptera determined by sampling on bio-compost*

Species	sampling 10. 7. 2007		sampling 20. 8. 2007		earlier documented myiasis and pseudomyiasis
	larvae	adults	larvae	adults	
Calliphoridae	**yes**	**yes**	**yes**	**yes**	Herman et al., 2000 Labud et al., 2003
Calliphora vicina Robineau-Desvoidy, 1830		yes		yes	Delhaes et al., 2001 Smith, 1986
Calliphora vomitoria (Linné, 1758)				yes	Smith, 1986
Protophormia terra-novae (Robineau-Desvoidy, 1830)				yes	Klotzbach, 2004
Lucilia sericata (Meigen, 1826)		yes		yes	Yaghoobi, 2005
Lucilia caesar (Linné, 1758)		yes			Knippling, 1937
Scatophagidae		**yes**	**yes**	**yes**	Kenney et al., 1976
Scatophaga stercoraria (Linné, 1763)		yes	yes	yes	
Bercaea haemorrhoidalis (Fallén, 1816)				yes	Sherman, 2000
Sarcophaga carnaria (Linné, 1758)				yes	Stevens and Wallman, 2006
Muscidae		**yes**	**yes**		Seghal et al., 2002
Musca domestica (Linné, 1758)		yes	yes		Seghal et al., 2002
Fannia canicularis (Linné, 1761)				yes	Perez and Mouffok, 1999
Muscina stabulans (Fallén, 1823)				yes	DeFoliart and Pelton, 1955

Blowfly larvae (Diptera: Calliphoridae) fulfil an important ecological function in the decomposition of animal remains. They are also used extensively in forensic entomology, predominantly to establish a minimum time since death, or a minimum post-mortem interval, using the larval length as a 'biological clock' (Donovan et al., 2006).

Myiasis and pseudomyiasis are infestations of life humans and other vertebrates by Diptera larvae, which, for at least certain part of time, feed on live or dead cells, liquid body substances or ingesta (Seghal et al., 2002). Recently reported *C. vicina* myiasis cases show that myiasis is not exclusive to tropical lands bur occurs also in temperate European countries

and can occur especially in the warm seasons, when there are a lot of flies (Delhaes et al., 2001).

Myiases occur, when eggs of Diptera are laid in surface wounds or hair smudged by excrements or urine. In our latitude, species most often infected by these myiases are rabbits and sheep. Myiases can also occur after consummation of already hatched larvae of some species of Diptera, when larvae try to complete their life cycle in body cavities or viscera of vertebrates. If the larvae just passively come through the alimentary tract, host is affected on minimum level and larvae usually come out of the body with excrements without troubles. These cases we call pseudomyiases (Kenney et al., 1976; Sartain a Sartain, 1978; Manrique et al., 1999).

Insect of the family Calliphoridae is one of the most abundant among those founded in rotting and decaying waste. Hwang and Turner (2005) discovered, that species from this family form 78,6% of all Diptera, when examining necrophagous Diptera in London and surroundings. Among Diptera, the most abundant was *Calliphora vicina* (46,9%). Also blowfly *Phormia regina* of the same family belongs to species commonly used for determination of PMI and to species causing secondary myiases in livestock (Byrd and Allen, 2001). Pseudomyiasis in livestock can also be caused by other species of Diptera.

Manrique et al. (1999) mention case of young Simmental bullock, in which 20 larvae of *Hermetia illucens* in fourth stage were detected by dissection of alimentary tract. There were inflamed spots and haemorrhages on the mucous membrane of the gut. Intestinal human myiases are usually phenomena caused by eating food contaminated by eggs or larvae. Patients usually have no symptoms and larvae are painlessly secreted with excrements. However, in some cases passage of larvae through intestine is attended with some symptoms (Seghal et al., 2002).

In relation to consummation of contaminated fruit, literature mentions pseudomyiases caused by *Dacus dorsalis* Hendel (Diptera,Trypetidae) (Khan and Khan, 1981) or by species of the genera *Anastrepha* (Diptera, Tephritidae) (Jiron and Zeledon, 1979). On the contrary, pseudomyiases caused by *Eristalis tenax* are usually stated to be connected with lack of hygiene. Two cases of such pseudomyiasis were noticed in 2005 in Brazil, with noteless clinical symptoms, infected persons did not show any symptoms of mental illness. Both cases were closely associated with hygiene (Garcia-Zapata, 2005). Similar case is described Mulcuoglu et.al. (2005), this time urinary myiasis.

Fly larvae of the genus *Sarcophaga* can be inflictors of both pseudomyiasis and true intestinal myiasis. Kenney et al. (1976) founded larvae in different stages of life cycle and in quite high numbers, therefore it was probably true intestinal myiasis. Common housefly – *Musca domestica* was already founded to be the inflictor of human intestinal myiasis in two cases (Seghal et al., 2002).

Infestation of body by fly larvae does not always indicate pathological process. Some larvae can be used therapeutically, to remove dead tissue off the wounds, eczemas or ulcer diseases, through which they support healing. This medical use of larvae is getting popular all around the world, because it is efficient, safe and simple (Herman et al., 2000). Of course larvae used in such ways have to be sterile, and must not be taken from the wild, because wild larvae as well as adults can transmit many pathogenic organisms. Maldonado and Centeno (2003) in their study by monitoring the ability of transferring pathogens distinguished three groups of family Calliphoridae (Diptera). Low ability of transferring have for example species *Phaenicia cluvia* and *Musca domestica*, mediate *Cochliomyia macellaria*, *Chrysomya albiceps* and *Sarconesia chlorogaster*. *Calliphora vicina* and *Lucilia sericata* then represent species with highest risk of transference.

SOUHRN

Pseudomyiáze larvami dvoukřídlých (Diptera) v souvislosti s bioodpady – první záchyt v České republice

Pseudomyiáze dvouletého chlapce z jižní Moravy (Česká republika) byla zachycena v dubnu 2007. Onemocnění bylo vyvoláno larvami druhu *Caliphora vicina* (Diptera), které byly náhodně pozřeny s nahnilým ovocem z biokompostu. Jedná se o první recentní dokumentovaný případ pseudomyiáze, který je těsně spojený s fenoménem zakládání biokompostů a likvidováním bioodpadů ekologickým způsobem. Kompostování biologických odpadů má celosvětově vzrůstající tendenci v návaznosti na požadavky recyklace maximálně možného počtu komodit. Zatímco větší kompostárny jsou většinou oddělené svým provozem od veřejnosti, sběrné nádoby na ulicích a nebo malé biokomposty na zahradách, sloužící potřebám jedné rodiny, jsou veřejnosti volně přístupné. Tyto biokomposty a sběrné nádoby jsou lákadlem pro různé druhy hmyzu, především pro mnoho zástupců řádu dvoukřídlí (Diptera). Pro obyvatele přilehlých domů může blízkost těchto dvoukřídlých přinášet různá zdravotní rizika. V místě nálezu byl proveden odchyt dvoukřídlých a vyhodnoceno jejich druhové spektrum s ohledem na jejich schopnost vyvolat myiáze nebo pseudomyiáze. Na základě zjištěných údajů se jeví obecně velmi vhodné při zakládání a provozování biokompostů zvážit jejich dostupnost pro veřejnost a dosažitelnost obydlí dospělými zástupci dvoukřídlých.

myiáze, pseudomyiáze, dvoukřídlí, bioodpady

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