

# First forensic record of *Sarcophaga caerulescens* in Switzerland

Claude Wyss<sup>1</sup>, Sylvain Chaubert<sup>1</sup>, Daniel Cherix<sup>2</sup> & Thomas Pape,<sup>3</sup>

1: Criminal police, Centre Blécherette, 1014 Lausanne, Switzerland

2: Museum of zoology, Pl. Riponne 6, 1014 Lausanne and Department of Ecology and Evolution, University of Lausanne, 1015 Lausanne, Switzerland

3: Naturhistoriska riksmuseet, 104 05 Stockholm, Sweden

## Introduction

Time elapsed since death, or post-mortem interval (PMI) is a matter of crucial importance in the investigations of homicide and other untimely deaths. Even when the cause of death is natural, time of death can have important implications. The only way to estimate PMI when death goes back more than 60 hours is the presence of necrophagous flies (Calliphoridae and Sarcophagidae). Naturally this is possible with fly species from which development under several temperatures is known.



Fig 2

## Crime scene

On 8<sup>th</sup> July, a corpse was discovered hanging from a tree branch at the edge of a forest. His legs and knees were in contact with the ground.

The altitude of the crime scene was 660 meters a.s.l. and the temperature at the time of discovery was 20.3°C (see Fig 1, 2). During our investigation at the crime scene, we collected several

flying insect species including blowflies. Among this material the following adult specimens of forensic importance were identified: *Lucilia caesar*, *Lucilia illustris* and *Calliphora vomitoria* (see Table 1). This material was found on the body and within the immediate surroundings. Moreover we also collected many eggs and larvae. Numerous batches of eggs were present on the corpse (Fig 3) and within the clothes. No pupae was found at crime scene.

## Laboratory

Adults of the different species caught at crime scene were mounted and labelled in order to allow identification to species level. Eggs and larvae were rapidly brought back to the laboratory to be reared under known conditions (23°C). They were fed with pig's meat. Their development was checked every day.

## Determination of Post-Mortem Interval

On 19<sup>th</sup> July, the first species of adult flies emerge in our laboratory. These flies were identified as *Lucilia caesar*. Eleven days later (30<sup>th</sup> July), a second species appeared belonging to the genus *Sarcophaga* (Fig 4). These specimens belonged to *Sarcophaga caerulescens*, Zetterstedt, 1838. Discovered for the first time on a corpse in Switzerland. No adults of this species were collected at the crime scene.

Meteorological data related to the crime scene were obtained from a nearby weather station and used to determine the temperature at the crime scene before the corpse was found. According to our development tables with regard to *Lucilia caesar* we could estimate that flies were first present on 1<sup>st</sup> July (+/-24 hours) when they start egg-laying (Table 2). Other evidences showed that this person disappeared on the afternoon of July 1<sup>st</sup>.

## Discussion

For the first time we reared a new species of *Sarcophaga* of forensic importance. In our case, with a mean temperature of 22.5°C, total development time was 30 days. If flies of this genus seem to be predominant on human bodies located in indoor habitats in the southeastern U.S. (see Byrd and Castner, 2002), they are rather rare or at least not frequently observed in Europe (see Introna et al., 1998 with a probable misidentification). Nevertheless Grassberger and Reiter (2002) were the first to provide valuable data on *Liopygia* (= *Sarcophaga*) *argyrostoma*, with a total development time of 31.3 days at 20°C. In all our case studies (152), we found flesh flies on only 30 occasions (about 20%). Their presence is restricted to summer months (June to September) with a peak in August (about 40%). Where flesh flies were collected, five cases are located in the country side and 25 in houses. Identification of these specimens is under way.

There is a real need for detailed studies on development of these species (with correct identification) which could help investigators in determining PMI.

### References cited:

Grassberger M. and Reiter C., 2002, Effect of temperatur on development of *Liopygia* (= *Sarcophaga*) *argyrostoma* (Robineau-Desvoidy) (Diptera: Sarcophagidae) and its forensic implications. *J. Forensic Sciences* 47(6):1332-1336

Introna F, Campobasso CP, Di Fazio A, 1998. Three case studies in forensic entomology from Southern Italy. *J. Forensic Sciences* 43(1): 210-214

Table 1

Species	Female	Male	Total
Diptera			
<i>Lucilia caesar</i>	42	1	43
<i>Lucilia illustris</i>	0	2	2
<i>Calliphora vomitoria</i>	3	0	3
<i>Hydrotaea dentipes</i>	9	1	10
<i>Hydrotaea ignava</i>	5	0	5
<i>Hydrotaea irritans</i>	0	10	10
<i>Muscina prolapsa</i>	0	1	1
<i>Muscina assimilis</i>	1	0	1
<i>Muscina stabulans</i>	1	0	1
Sepsidae sp	1	0	1
<i>Megaselia rufipes</i>	1	0	1
<i>Prophila</i> sp	8	1	9
Hymenoptera			
<i>Alysi</i> sp			1
Colcoptera			
<i>Hister unicolor</i>			2
<i>Necrophorus vespilloides</i>			1
<i>Necrophorus investigator</i>			1
<i>Oiseoptoma thoracica</i>			1
<i>Thanatophilus rugosus</i>			1

List of adult insects collected at the crime scene



Fig 1



Fig 3: Posterior face of the knee covered with myriads of eggs of Calliphoridae

Table 2 Determination of PMI

July / August	Outside T° Celsius	Inside T° C°	Indice 9	Total of degree C° (Indice 9)	
1	21.5	23	12.5		begin of <i>Lucilia caesar</i>
2	21.5	23	12.5		
3	18.5	23	9.5		
4	18.5	22	6.5		
5	19.5	22.5	10.5		
6	17.5	22	8.5		
7	18.5	22.5	9.5		
8	23	24	14		body removal
9	23.5	24	15		
10	23.5	22.5	13.5		
11	21	22.5	13.5		
12	22	23	14		
13	18	22	13		
14	19.5	22	13		puparia
15	20	22	13		
16	20	22	13		
17	17.5	21.5	12.5		
22	21.5	22.5	13.5		
23	23	23.5	14.5		
24	20.5	23	14		
25	19.5	22.5	13.5		
26	21.5	22.5	13.5		
27	22.5	22.5	13.5		
28	25	24	15		
29	27.5	25.5	16.5		
30	26.5	25.5	16.5		<i>Sarcophaga caerulescens</i> emerge
31	20.5	23	14		



Adult specimen of *Sarcophaga caerulescens* and male copulatory organ (lateral view)

Fig 4