Crop circles: the dead flies mystery

Anomaly or natural phenomenon?
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by Francesco Grassi
[translated by Paolo Russo]

Many crop circle experts make claims about the phenomenon which are largely based on the following assumption: "Even if a very large number of formations are known to be man-made, there are 'genuine' formations where human ability is not involved. This is the real phenomenon we should study".
However, on closer inspection, you soon realize that nobody ever proposed an ultimate criterion that could be used by anybody entering a new formation in order to understand if it can be unambiguously attributed to human action or not.
When the phenomenon began being reported [post 1980], the leading experts claimed that crop circles could not have been made by man, because "... *it would have been impossible for human beings to move in the wheat fields without leaving trails*".
Actually, you can notice - and anybody could! - straight paths in the fields, the so-called tramlines which are created by farm tractors during seeding. You can easily enter the fields along these paths without leaving trails. The surprising thing is that the experts themselves always advised curious persons to follow these paths in order to avoid damaging the formations!
Nowadays we know about many clearly man-made formations without any evidence of traces of human passing. How can the believers' argument of a non-human intervention in the fields still be upheld?
In the early Nineties the concept of "anomaly" began appearing in the crop circle debate, replacing the "lack of human trails" argument that nowadays nobody mentions any more.

Dead flies: the probative anomaly?

On June 3, 2002, CICAP's editorial office received an e-mail signed by "Almost anonymous observers" with the following contents: "Dear sirs, We are wondering how can you dare comparing your horrible circle (or those CLEARLY made by counterfeiters) to the perfection, the dead flies, the mutations in germination and much more, of the original ones."
It seems, from what they write, that the "Almost anonymous observers" can unambiguously distinguish "genuine" from man-made crop circles. The first criterion they invoke is "perfection", as opposed to the "imperfection" of the CICAP-made formation reported in an article published in the magazine "Focus" of July 1999; the second invoked criterion is based on "dead flies". They also mention "mutations in germination" and other criteria that would allow counterfeited and "genuine" crop circles to be distinguished. The whimsical reference to dead flies cannot help drawing attention; it is easy to guess that this feature should be considered an "anomaly", a probably distinctive sign of the intervention of something mysterious that acts in fields, flattens the stems and can kill flies as a side effect.
Therefore, are dead flies the probative anomaly?

The first source

"On July 17, 1998, the Dutch researcher Janet Ossebaard faced a new mystery related to crop circles: a lot of dead flies were stuck to the seeds of the wheat plants that were inside a circle. [...] The insects' proboscis was firmly stuck to the spikes, and their legs and wings were

completely stretched out as in a spasm. [...] Some flies had literally exploded: legs, parts of the bodies, wings and heads were spread on the spikes [...]. However, other flies were in a perfect condition and looked like they could fly away at any time. Nevertheless, a deeper check revealed that most of them were surely dead. Some of them, although they were stuck to the spikes just like the other ones, were still alive but severely stunned. After being set free from the plants they recovered and flew away after a few minutes. Janet, surprised by her discoveries, collected some of the dead insects and sent them to an expert of the London Natural History Museum. The expert initially suspected that the insects' death could be due to the effects of a fungus (*Entomophtora muscae*) but after deeper analyses this cause was excluded. Such a phenomenon had never been seen before and no satisfactory solution could be devised."
This is what Eltjo H. Haselhoff, Ph.D. in Theoretical and Experimental Physics, reports in his book "*The deepening complexity of crop circles*" (Frog Ltd) in the section entitled "The dead flies enigma" [**translator's note**: the quoted text is actually a translation from the Italian edition of the book].

© Janet Ossebaard
Fig. 1: photograph of dead flies in a crop circle

Janet Ossebaard's testimony is actually rather alarming, because it seems that the mysterious energies kill flies and explode them during the creation of crop circles. However, Haselhoff's book does not contain any photographs of the "*circle*" containing the dead flies (maybe the "Almost anonymous observers" would add the adjective "*perfect*"). The book does not even specify the location where this "*circle*" would have appeared; so, despite these very unusual premises my inquiry began.

Do beauty and perfection imply "genuineness"?

My starting points led me to the original article written by Janet Ossebaard [2] entitled: "The Dead Flies Mystery".
Here we can read the original record and examine (with wonder) the "perfect circle" where this whimsical anomaly was reported. The location of the formation is Cherhill in Wiltshire (England); the next figure shows the image that you can see at the following internet address:

http://home.clara.net/lucypringle/photos/1998/uk98cm.html

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Fig. 2: crop circle of the dead flies

I can deduce that - evidently - not all crop circle researchers agree with the statements that the "Almost anonymous observers" sent to CICAP. In fact, the circle of the dead flies is just horrible, and we can just as safely assume that the "Almost anonymous observers" never observed the "perfection" of this formation they apparently consider genuine, otherwise they would never have committed such a "faux pas".
Moreover, the *crop circle* literature seems to lack any detailed previous reports of dead flies as in Janet Ossebaard's description, but I decided to go on with the inquiry anyway. What track should I follow?

The only clue: *Entomophthora muscae*

Going back to the paragraph of Haselhoff's book, I decide to explore the only track available to me, and that is the mysterious reference to the fungus *Entomophthora muscae*.
What are fungi? In simple words we can say that fungi are far more complex organisms than bacteria; they are similar to plants but, as opposed to plants, they cannot synthesize chlorophyl and thus they must fetch nourishment from other life forms. Fungi usually feed on dead organisms, but sometimes they attack and destroy organisms that are still alive.
The research on fungi classified them into different species. The first species of fungus capable of attacking and destroying live house flies and other species of flies was first identified in 1855. Its name is *Entomophthora muscae*.
All fungi defined as *entomophthora* share a common feature: they destroy the insects they attack. In fact the word *entomophthora* derives from the composition of two Greek words: *éntomon* (insect) [from *éntomon* (zôion), literally "internally cut (animal)" (*entémnein* "to carve, to engrave"), that is "whose body is split in segments"] and *phtora* (destruction) [from *phteiro*, to destroy] [**translator's note**: *muscae* is the Latin for "of the fly", from *musca*, "fly"].
But exactly how does the fungus *Entomophthora muscae* behave towards flies?

More evidence of mysteriously dead flies

Thanks to the internet I found testimonies of other people who stumbled upon mysteriously dead flies and reported their perplexity into the net. Here is the first one.
On August 14, 1997, Darin Burleigh sent a message entitled "Flies stuck on leaves" to the

newsgroup *sci.bio.entomology.misc*: "I came across a very curious phenomenon the other day, in Kishwaukee forest preserve, Winnebage County, IL (near Rockford). Hundreds of flies (bee-looking, I don't know the species) stuck [to] the edges of leaves. Really stuck. As if they were all sitting around and suddenly got glued there. They were all dead. Some of them were stuck in clumps".
One of the replies was from by Kathie T. Hodge (August 17, 1997): "Sounds like an epizootic of a fungal disease, most probably caused by *Entomophthora muscae* or one of its close relatives. It often causes rather spectacular mortality events like the one you describe. *E. muscae* infects flies when the spores land on them, then germinate and grow right through the cuticle. The fungus then proliferates inside the fly, essentially devouring it from the inside. Infected hosts often climb up high before death and hang on tight [*author's note: by means of the proboscis*] or are cemented down by outgrowths of the fungus. This is thought to facilitate dispersal of the fungus, which produces forcibly discharged spores. The spore-producing structures emerge from between the abdominal segments after death, shoot off their spores, and then collapse, so in older specimens it is sometimes hard to see evidence of the fungus, and the dead flies look strangely normal, except that they are dead and stuck onto their substrate. [...]".
The second testimony I am quoting is by Jim Ogilvie who on November 18, 1994, posted a message entitled "House flys" (sic) to the newsgroup *sci.bio.entomology.lepidoptera*: "[...] I have noticed that in the fall you will find many dead house flies around the house. They just seem to land, die and stick there. When they die on a window you will always see a spray of material on the glass under the fly. It's like when the fly expired his life force left him and splattered on the glass. What is going on here?".
Among various replies that Jim received, let us carefully read the one sent by Stuart Krasnoff on November 21, 1994: "You're describing flies [...] that have died from infection with a fungus, *Entomophthora muscae*. A fly gets infected when a fungal spore from another infected fly lands on it. The fungus penetrates the fly's cuticle, proliferates inside the fly, and, shortly after the death of the fly, grows out of the cadaver and produces spores that eject in a "shower" which results in the white corona you see surrounding the cadaver on the window glass. Typically the fly will die in an elevated position stuck to the substrate by its proboscis with legs extended, wings raised, and the abdomen tilted upward".
The solution is starting to take shape, but at this point it is better to study more carefully this mysterious fungus whose name is *Entomophthora muscae*.

***Entomophthora muscae*: phases and details**

Entomologists have split the attack by *Entomophthora muscae* into six well definite phases[3]:

1. **Infection phase.**

Infection takes place through the insect's integuments, i.e., percutaneously. A conidium (i.e. a cell that detaches from the vegetative body of the fungus in order to originate a new individual) sticks to the insect's cuticle, germinates, and perforates the cuticle by enzymatic action.

2. **Lipolytic phase and localized development at the primary focus of infection in the fat body of the host.**

After penetration into the host organism the fungus at first grows slowly and does not spread within the insect body. At this time the parasite secretes very active lipases which very actively digest fats.

3. **Colonization of host body by generalization of infection.**

The fungus rapidly spreads within the host body by means of the rapid proliferation of

numerous hyphae (unicellular or multi-cellular filaments that make up the body of superior fungi). As a result, the fungus penetrates into all major sections of the host body (the abdomen, thorax, and head) irrespective of the infection site. During this phase the fungus utilizes nutrients that were accumulated during the previous phase without actively digesting the host's tissues.

4. **Proteolytic phase.**

After colonization of the host's whole body or at least of its abdomen, the fungus secretes very active proteolytic enzymes; it penetrates into the muscles and other tissues of the insect and very rapidly destroys the whole contents of its body. At the end of this phase, the contents of the host body are transformed into a milk-white fluid, a suspension of fat droplets and hyphal bodies of the fungus. At this time the body of the infected insect is like a thin-walled bag filled with liquid, and the body is soft and flabby.

5. **Phase of host's body mummification.**

After completion of proteolysis, hyphal bodies of fungus suspended in fluid contents of the host's body rapidly absorb the surrounding liquid and grow quickly to form a spongy entanglement. The consistency of the body changes from flabby to rigid. At the end of this phase the infected parts of the host's body well strongly from the pressure of the mass of the parasite's mycelium; these parts of the insect extend and expand in their entirety.

6. **Sporulation.**

This phase ends when fungal hyphae, after piercing the host's integument and growing outside, originate a final explosion of spores. These form a "sprinkle", a corona of "white matter" on the substrate where the fly died.

Fig. 3: fly "exploded" at the end of the sporulation phase

Flies infected by *Entomophthora muscae* usually die in elevated positions, with the proboscis extended and stuck to the substrate, legs extended, the abdomen tilted with respect to the substrate and wings raised above the level of the thorax. This particular position favours two behaviours in yet uninfected flies, since the dead fly looks like eating or willing to copulate. Thus, uninfected flies approach the dead fly and get infected because they are attracted either by the food or sexually. Another interesting detail is that insects that have not yet died can be easily captured; if they are freed from the substrate and stimulated, they can still perform some actions typical of their species, such as "to fly" in the case of flies or, for example, "to

jump" in the case of locusts.
Researchers Krasnoff, Watson and Gibson of the entomology department of the Cornell University of Ithaca, NY, video-recorded and analysed the behaviours of flies before and after their death, focusing on four characteristic events[4]:

1. last locomotory movement
2. last extension of the proboscis towards the substrate
3. start of upward movement of wings
4. end of upward movement of wings

This analysis showed that the sequence is chronologically well defined and strongly stereotyped. The average time between the last locomotory movement and the end of the upward movement of wings is 85 minutes, the average time between the start of the upward movement of wings and the end of the upward movement of wings is 15 minutes.

A really unexpected crucial event

It is known that luck helps the daring; I would add that it mostly helps those who pay an educated attention to what they see. When I returned home from my Christmas holidays (January 2003) I was astonished when I found a dead fly stuck to the internal surface of the door of the French window of my bedroom.
The fly had a stuck proboscis, extended wings and "something" whitish leaking from the abdomen: all typical symptoms of a death caused by *Entomophthora muscae*.
Thanks to the precious help by Marco Morocutti, Electrical Engineer and full member of CICAP, I recorded the finding with some close-up photographs where you can clearly see the fly's proboscis extended and stuck to the door by particles of the fungus, the body and wings positioned as expected and the fungus leaking from the abdomen.

Fig. 4: detail of the proboscis stuck to the substrate

I detached the fly from the substrate and put it in a sterile container, then I brought it to the mycology department of the University of Pavia for a deeper analysis; I'll report the results later on.

Fig. 5: detail of the fungus leaking from the abdomen of the fly. Notice the raised wings

Contacts with Janet Ossebaard and Bert Janssen

At this point of the inquiry I directly contacted Janet Ossebaard, the most important witness of the phenomenon, in order to explicitly ask her about the laboratory evidence, quoted in Haseloff's book, that would rule out *Entomophthora muscae* as a natural cause of the death of flies.
Janet very kindly replied that she did not have the reports, but they were probably part of the material left to her colleague Bert Janssen, another crop circle researcher. Anyway, Janet sent me the photographs she took in 1998. One of them looked particularly interesting.
I therefore contacted Bert Janssen. He kindly replied too. He told me that the reports were really with him, but they were packed in some box of his before moving house and were not easy to find.
I then asked Bert if he could remember exactly what was written in the report of the British laboratory. His reply was: "*The flies were partially covered with* ***some kind of white substance*** *which indicated that the cause of death was a fungus. But the white substance also pointed in the direction of poisoning with a pesticide. It turned out that neither had caused the death of the flies. No pesticide remains were found and if the flies had been killed by a fungus, there should have been some kind of indicator which was missing and therefore their death could not have been caused by a fungus*".
It is interesting to find out that "*the flies were partially covered with some kind of white substance*", because this detail - a critical one in my opinion - had never been reported earlier anywhere. The absence of the indicator of the fungus, as recalled by Bert, is interesting as well.

The missing indicator and the probative photograph

I left aside the mycological results of the fly that I found and sent off for analysis, since they represented another crucial event in this investigation.
But what does this analysis consist of? The objective is to identify a development in vitro of the fungus leaking from the insect's abdomen. A sample of the fungus was collected and put on a culture substrate.
The fungus was given time to grow, then the result was checked with a microscope. The expected result was the growing of *Entomophthora muscae*, the "*expected indicator*", in Bert's

words. The analyses of the fly I found took well over two months to develop and showed only two specific fungi: *Alternaria* and *Cladosporium*. But there was no trace of *Entomophthora muscae*. How can that be possible?
They explained to me that, after being killed by *Entomophthora muscae*, the fly can be invaded by other fungi that usually cannot attack live insects. In these conditions, *Entomophthora muscae* may ***not*** show up so easily "in vitro" (moreover, this particular fungus is very hard to develop "in vitro").
Therefore, in my case too the expected indicator turned out to be missing, but that did not justify any mysterious conclusion. The fungus *Entomophthora muscae* just did not show up in vitro, but was undoubtedly the cause of the death of that fly, since all the symptoms of infection were present. Anyway, the attempt to obtain developments of *Entomophthora muscae* did not end and will go on.
The infection is very evident also in one of the photographs that Janet sent me, where you can clearly notice the fly's abdomen expanded and streaked because of the fungus.

Fig 6: detail of the abdomen expanded and streaked because of the fungus and raised wings

After a more careful inspection you realise that the flies in Janet's photographs are not "house flies". A deeper inquiry made me realise that those flies are part of the large family of *Anthomyiidae*, whose grubs attacks seeds or roots and may damage agriculture. There are many internet references that try to reassure alarmed gardeners and farmers who find this type of fly with the proboscis stuck to the stems, since they look like they were damaging the plants by feeding on their sap.

Push the fly into the microwave-oven

After a careful reading of Haselhoff's book, you realise that he has some interest in reporting

Janet's finding. The alleged "explosion of flies" is mostly important as an evidence for the conclusion he wants to bring the reader to, i.e. that *BOLs* ("Balls Of Light") are acting on fields during the formation of "genuine" crop circles. He also thinks that BOLs irradiate stems, thereby producing "anomalous" stem node lengthening and "expulsion cavities". "Expulsion cavities" would consist of holes in the nodes, just as if little explosions had happened there (hence the similarity with exploded flies) after strong and sudden stem heating due to BOL radiation.
Haselhoff's studies actually follow biophysicist William C. Levengood's data and studies of the early 1990s. According to Levengood, on the contrary, all these phenomena would be caused only by microwaves emitted by just as mysterious and imaginary "plasma vortices". However, Haselhoff does not insist on just microwaves as Levengood does; he leaves the door open to the whole frequency spectrum of electromagnetic waves. Anyway, all this encourages people to think that "some electromagnetic waves" or microwaves are involved in the formation of crop circles.
In order to verify whether microwaves can blow flies up, I made an experiment. I captured some flies and put them into small glass containers closed with a thin plastic sheet (of the type used for food). I used my microwave oven "Whirlpool MT263", setting the power to 650 watts and the maximum irradiation time to 40 seconds; the dish was rotating. Every 10 seconds I checked the condition of the fly.
The conclusions are absolutely clear and reproducible:
- death usually occurs in the first 20 seconds
- flies do *not* explode
- the proboscis does not stretch and is not stuck
- wings do not raise

Fig 7: fly irradiated in the microwave oven. Notice the proboscis is not stretched and the normal rest position of wings

Thus flies in microwave ovens do not blow up like pop-corn, but in the meantime the legend has already evolved; flies have turned into the generic "insects" (even sociologist Roberto Pinotti reports it in the foreword to Haselhoff's book) and in some cases the explosion has even become an "implosion".

Conclusions

While I am writing this article, almost a year has passed since the beginning of the inquiry. Although the most plausible cause of the death of the flies in the Cherhill formation of July 1998 was already perfectly clear to me after just a few weeks (since I read the treatise on

Entomophthora muscae[3]), I had to follow various paths in order to complete the whole puzzle.
The world of paranormal, ufology, and of those who write about things like crop circles, is always full of "working hypotheses", of words like "if" and "might" that keep the door to mystery steadily open. Although lots of articles and arguments are supplied, it is hard to find studies that dig deeply enough and get over the classical few ingredients that can always lure those readers who already have an inclination to keep mysteries just as they are or to explain them with other mysteries. On the contrary, the purpose of my inquiry was to go as deeply as possible into a very specific subject with the only goal of casting as much light as possible on it. I hope I could correctly convey the spirit and results of my inquiry. It would be interesting to devote some room to critical considerations about the obtained results and about the methods and times necessary to achieve them, but maybe it is better to leave all that to the reader's intelligence.

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Notes and Bibliography

1. Special "crop circles" of CICAP: http://www.cicap.org/crops/en
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