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### Peer review history for:

Adetimehin AD, Mole CG, Finaughty DA, Heyns M. Unidirectional dispersal of blow fly larvae following decomposition fluids from a pig carcass. *S Afr J Sci.* 2024;120(7/8), Art. #17589. <https://doi.org/10.17159/sajs.2024/17589>

#### HOW TO CITE:

Unidirectional dispersal of blow fly larvae following decomposition fluids from a pig carcass [peer review history]. *S Afr J Sci.* 2024;120(7/8), Art. #17589. <https://doi.org/10.17159/sajs.2024/17589/peerreview>

#### Reviewer A: Round 1

**Date completed:** 11 March 2024

**Recommendation:** Accept / Revisions required / **Resubmit for review** / Decline

**Conflicts of interest:** None

Does the manuscript fall within the scope of SAJS?

Yes/No

Is the manuscript written in a style suitable for a non-specialist and is it of wider interest than to specialists alone?

Yes/No

Does the manuscript contain sufficient novel and significant information to justify publication?

Yes/No

Do the Title and Abstract clearly and accurately reflect the content of the manuscript?

Yes/No

Is the research problem significant and concisely stated?

Yes/No

Are the methods described comprehensively?

Yes/No

Is the statistical treatment appropriate?

Yes/No/**Not applicable**/Not qualified to judge

Are the interpretations and conclusions justified by the research results?

Yes/**Partly**/No

Please rate the manuscript on overall contribution to the field

Excellent/Good/**Average**/Below average/Poor

Please rate the manuscript on language, grammar and tone

Excellent/**Good**/Average/Below average/Poor

Is the manuscript succinct and free of repetition and redundancies?

Yes/No

Are the results and discussion confined to relevance to the objective(s)?

Yes/No

The number of tables in the manuscript is

Too few/Adequate/Too many/**Not applicable**

The number of figures in the manuscript is

Too few/Adequate/Too many/**Not applicable**

Is the supplementary material relevant and separated appropriately from the main document?

Yes/No/Not applicable

Please rate the manuscript on overall quality

Excellent/Good/Average/**Below average**/Poor

Is appropriate and adequate reference made to other work in the field?

Yes/No

Is it stated that ethical approval was granted by an institutional ethics committee for studies involving human subjects and non-human vertebrates?

Yes/No/Not applicable

If accepted, would you recommend that the article receives priority publication?

Yes/No

Are you willing to review a revision of this manuscript?

Yes/No

Select a recommendation:

Accept / Revisions required / **Resubmit for review** / Decline

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Yes/No

**Comments to the Author:**

SAJS forensic paper

This brief manuscript describes a phenomenon of body decomposition that is said to be unexpected, namely that blow fly larvae follow a trail of decomposition fluids which, in this case, drained downhill. The authors assert that prior literature – at least four reports – have led to an expectation of unidirectional movement.

The manuscript is clearly written, although it could be more succinct. There is no mention of predominant wind direction and velocity. This information would need to be added. The argument for why patterns of dispersal may differ in EACH GEOGRAPHICAL REGION would need to be made. Perhaps they mean each landscape type? Each dominant rainfall region? Each temperature zone?

The argument for novelty of the reported observations is not well supported. I scanned Two of the four reports that are cited as evidence for unidirectionality. Lashley et al 2018 reports on a massive carcass pile (2700kg) in a flat, wooded area. There are other differences in research design as well. It is hard to imagine that any investigator would fail to discern that an open, sloped area like Table Mountain should be approached differently from a closed, flat area. Another of the cited papers, Goddard et al 2020, notes in its abstract that unidirectional dispersal has been reported in previous research. However, that abstract reads, "These observations contribute to an increasing body of evidence that migrating fly larvae do not always disperse randomly, which may have important implications for the dispersal of carrion-derived nutrients as well as interactions with blow fly predators."

The piece appears to be a side-bar to research that has been published recently in Int J Legal Med (2022). It would be much more appropriate for a regionally oriented forensic science journal if such existed. It could also be quite suitable as a letter to the editor of SAJS. It does not, in its current form, reach the bar of relevance to be a full article in SAJS.

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### Author response to Reviewer A: Round 1

This brief manuscript describes a phenomenon of body decomposition that is said to be unexpected, namely that blow fly larvae follow a trail of decomposition fluids which, in this case, drained downhill. The authors assert that prior literature – at least four reports – have led to an expectation of unidirectional movement.

AUTHOR: The result presented in our manuscript was part of the outcomes of a decomposition study focusing on the diversity, abundance, and successional patterns of insects on a decomposing 60 kg adult-sized pig carcass deployed in the summer seasonal period. While there are a few studies (at least four that we are aware of) in the literature documenting the phenomenon of unidirectional en masse dispersal of blow fly larvae from decomposing pig carcasses, our observation of such phenomenon in our

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study area (i.e., Table Mountain National Park) was entirely unexpected during the decomposition study. This was because we have carried out several decomposition trials (n = 13) within the study area between 2020 and 2022 using neonate and adult pig carcasses, and we did not observe the en masse dispersal of numerous blow fly larvae previously on the pig carcass, moving away from it in a single direction, together with the flow of decomposition fluids.

The manuscript is clearly written, although it could be more succinct.

AUTHOR: Significant efforts were made in ensuring that the manuscript was succinctly written with all the important information to ensure that it clear and easily understood by expert and non-experts in forensic entomology. Thus, no changes in the composition and structure of the manuscript were made, other than the new revisions/additions included, in the revised manuscript.

There is no mention of predominant wind direction and velocity. This information would need to be added.

AUTHOR: The predominant wind direction and speed have been included in the revised manuscript (see the last sentence in paragraph 1). In spite of this inclusion, we are of the opinion that in our study, the topography of the study area and its associated force of gravity alongside the saturated cadaver decomposition island are the major factors contributing to the downhill flow of the decomposition fluids oozing out from the pig carcass and the ensuing unidirectional en masse dispersal of blow fly larvae observed (Gomes and Zuben, 2005; Gomes et al., 2006; Goddard et al., 2020). Other factors that may considerably contribute to this unique phenomenon are selected weather conditions (i.e., temperature, humidity, photoperiod), landscape factors (i.e., vegetation cover, soil type and conditions) and parasite-predator pressures (Gomes and Zuben, 2005; Gomes et al., 2006; Heinrich, 2013).

The argument for why patterns of dispersal may differ in EACH GEOGRAPHICAL REGION would need to be made. Perhaps they mean each landscape type? Each dominant rainfall region? Each temperature zone?

AUTHOR: The reason why we suggested the need for the understanding of the timing and dispersal pattern of post-feeding fly larvae in each geographical region is because different locations, regions and/or countries have different weather conditions (e.g., temperature, rainfall, humidity, and photoperiod), landscape and habitat types (e.g., vegetations, forest types, soil types and conditions), all of which exert a considerable influence on the decomposition rate/pattern of vertebrate remains, vertebrate scavenger assemblage and behavior, alongside the development, breeding behavior, assemblage, and activities of carcass-associated insects (Gomes and Zuben, 2005; Gomes et al., 2006; Matuszewski et al., 2008; Gallagher et al., 2010; Lewis and Benbow, 2011; Heinrich, 2013; Cruise et al., 2018; Finaughty, 2019; Adetimehin, 2023; Thümmel et al., 2024).

The combination and interaction of these factors may potentially exert an influence on the dispersal pattern of carcass-associated larvae, which admittedly, and in line with other similarly cited studies, is difficult to explain.

Additional information (as detailed above) explaining the need for the understanding of the timing and dispersal pattern of post-feeding fly larvae in each geographical region has been included in the revised manuscript for clarity (see paragraph 9).

The argument for novelty of the reported observations is not well supported. I scanned Two of the four reports that are cited as evidence for unidirectionality. Lashley et al 2018 reports on a massive carcass pile (2700kg) in a flat, wooded area. There are other differences in research design as well. It is hard to imagine that any investigator would fail to discern that an open, sloped area like Table Mountain should be approached differently from a closed, flat area.

AUTHOR: While it is expedient that such phenomenon of unidirectional en masse dispersal of blow fly larvae would likely occur on a sloped area such as Table Mountain, in our case, it was entirely unexpected as we did not observe such in all our previous decomposition trials (n = 13) within the study area between 2020 and 2022 using neonate and adult pig carcasses.

We are of the opinion that our observation on the unidirectional en masse dispersal of blow fly larvae in the flow of the decomposition fluids should be reported based on the findings for the local/regional

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context and that practitioners in medico-legal death investigations within the location/region should be made aware of such behavior of blow fly larvae and possible implications for the estimation of minimum post-mortem interval when using cadaver-associated entomological evidence. This is crucial owing to the influence of local and regional weather conditions, landscape and habitat types on the behavior and activities of carcass or cadaver-associated flies as previously mentioned.

Another of the cited papers, Goddard et al 2020, notes in its abstract that unidirectional dispersal has been reported in previous research. However, that abstract reads, "These observations contribute to an increasing body of evidence that migrating fly larvae do not always disperse randomly, which may have important implications for the dispersal of carrion-derived nutrients as well as interactions with blow fly predators."

AUTHOR: While the reviewer quoted a section from Goddard et al. (2020) abstract stating that there is an increasing body of evidence that migrating fly larvae do not always disperse randomly, it is worth mentioning that in the introduction of the same paper, the authors stated that "there have been two reports of massive and synchronized dispersal of blow fly larvae from decaying pigs. One was during a mass mortality study in Mississippi, USA using 725 kg/20 m<sup>2</sup> of carrion and the other utilized 6 replicates of 14–18 kg pigs in Ohio".

The "increasing body of evidence" that Goddard et al. (2020) was referring to is actually two of the only three articles that was published at the time of the authors' paper publication, and this generally remains a novel phenomenon, if one keeps in mind the huge number of decomposition studies described in the forensic entomology and taphonomy literature. Furthermore, Goddard et al.'s paper in 2020 was the fourth to describe this phenomenon.

The piece appears to be a side-bar to research that has been published recently in Int J Legal Med (2022).

AUTHOR: The observations in our paper published in 2022 in the International Journal of Legal Medicine is considerably different from the observation presented in our submitted manuscript to the South African Journal of Science as it focuses on the necrophagous and predator behavior of ants (*Crematogaster cf. liengmei*) on decomposing **neonate pig carcasses** across multiple seasons. The observation in this current manuscript was recorded during a decomposition study on the diversity, abundance, and successional patterns of insects on a decomposing **60 kg adult-sized pig carcass** deployed in the summer seasonal period.

It would be much more appropriate for a regionally oriented forensic science journal if such existed. It could also be quite suitable as a letter to the editor of SAJS. It does not, in its current form, reach the bar of relevance to be a full article in SAJS.

AUTHOR: To the best of our knowledge, there are no regionally oriented forensic science journal. We strongly believe that our manuscript and the way the observation is being presented will appeal to the general scientific community in South Africa and more specifically, to forensic entomologists, pathologists, anthropologists, and crime scene investigators who are frequently involved in medico-legal death investigations and time since death estimations within the country and region where the decomposition study was conducted. Thus, the reason we submitted it (initially) to the South African Journal of Science as a **Research Letter** and not a full article.

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#### **Reviewer D: Round 1**

**Date completed:** 22 March 2024

**Recommendation:** Accept / **Revisions required** / Resubmit for review / Decline

**Conflicts of interest:** None

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Does the manuscript fall within the scope of SAJS?

Yes/**No**

Is the manuscript written in a style suitable for a non-specialist and is it of wider interest than to specialists alone?

Yes/**No**

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Does the manuscript contain sufficient novel and significant information to justify publication?  
**Yes/No**

Do the Title and Abstract clearly and accurately reflect the content of the manuscript?  
**Yes/No**

Is the research problem significant and concisely stated?  
**Yes/No**

Are the methods described comprehensively?  
**Yes/No**

Is the statistical treatment appropriate?  
 Yes/No/**Not applicable**/Not qualified to judge

Are the interpretations and conclusions justified by the research results?  
**Yes/Partly/No**

Please rate the manuscript on overall contribution to the field  
 Excellent/**Good**/Average/Below average/Poor

Please rate the manuscript on language, grammar and tone  
 Excellent/**Good**/Average/Below average/Poor

Is the manuscript succinct and free of repetition and redundancies?  
**Yes/No**

Are the results and discussion confined to relevance to the objective(s)?  
**Yes/No**

The number of tables in the manuscript is  
 Too few/**Adequate**/Too many/Not applicable

The number of figures in the manuscript is  
 Too few/**Adequate**/Too many/Not applicable

Is the supplementary material relevant and separated appropriately from the main document?  
**Yes/No/Not applicable**

Please rate the manuscript on overall quality  
 Excellent/**Good**/Average/Below average/Poor

Is appropriate and adequate reference made to other work in the field?  
**Yes/No**

Is it stated that ethical approval was granted by an institutional ethics committee for studies involving human subjects and non-human vertebrates?  
**Yes/No/Not applicable**

If accepted, would you recommend that the article receives priority publication?  
**Yes/No**

Are you willing to review a revision of this manuscript?  
**Yes/No**

Select a recommendation:  
 Accept / **Revisions required** / Resubmit for review / Decline

With regard to our policy on ‘Publishing peer review reports’, do you give us permission to publish your anonymised peer review report alongside the authors’ response, as a supplementary file to the published article? Publication is voluntary and only with permission from both yourself and the author.  
**Yes/No**

**Comments to the Author:**  
 I would suggest exchanging the word "carcass" for "cadaver" throughout. I don't know how it works in Africa, but in some other places, we tend to reserve the words "cadaver" and "corpse" for human remains, while "carrion" or ""carcass" is used for animal remains. Just a preference.

Line 36-37, the author says they used an "adult-sized" pig carcass. Would it be possible to include initial mass in kg?

line 62: dipterous does not need to be capitalized.

Line 72: consider rewording "is plausibly due to" as "has been hypothesized to be due to the"

Line 76: can delete "are triggered to"

Lines 109-111: the authors cite a follow-up study using electrical conductivity. Would it be possible to include those values. I know that they might be reserved for a separate publication, and if so, then could that publication be cited?

Figure 1b shows the stream of decomposition fluids, but it is very difficult to make out if there is actually a maggot mass migrating through there. It would be good to have a picture of the actual migrating maggots and not just a video.

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### Author response to Reviewer D: Round 1

I would suggest exchanging the word "carcass" for "cadaver" throughout. I don't know how it works in Africa, but in some other places, we tend to reserve the words "cadaver" and "corpse" for human remains, while "carrion" or "carcass" is used for animal remains. Just a preference.

AUTHOR: The word "cadaver" has been replaced with "carcass" throughout the revised manuscript (including the manuscript title, acknowledgement draft, and supplementary information draft) where appropriate.

Line 36-37, the author says they used an "adult-sized" pig carcass. Would it be possible to include initial mass in kg?

AUTHOR: The initial mass of the pig carcass in kg has been included in the revised manuscript (see the first sentence in paragraph 1).

line 62: dipterous does not need to be capitalized.

AUTHOR: The suggested change has been made in the revised manuscript (see the second sentence in paragraph 3).

Line 72: consider rewording "is plausibly due to" as "has been hypothesized to be due to the"

AUTHOR: The suggested change has been made in the revised manuscript (see the second sentence in paragraph 4).

Line 76: can delete "are triggered to"

AUTHOR: The suggested change has been made in the revised manuscript (see the third sentence in paragraph 4).

Lines 109-111: the authors cite a follow-up study using electrical conductivity. Would it be possible to include those values. I know that they might be reserved for a separate publication, and if so, then could that publication be cited?

AUTHOR: The electrical conductivity of the soil within the dispersal trail of the blow fly larvae and decomposition fluids and that of the control soil have been included in the revised manuscript (see the second sentence in paragraph 8).

Figure 1b shows the stream of decomposition fluids, but it is very difficult to make out if there is actually a maggot mass migrating through there. It would be good to have a picture of the actual migrating maggots and not just a video.

AUTHOR: Close-up pictures showing some of the larvae within the stream of the decomposition fluids oozing out of the pig carcass have been included in the revised manuscript (see page 9).

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### General Response to Reviewers Round 1

We wish to thank the editors and reviewers for their comments, and we trust that they have been addressed appropriately. We hope that you find our revised manuscript ready for publication.

References cited here:

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associated with decomposing pig carcasses on the Table Mountain National Park of the Western Cape Province of South Africa [Dissertation]. Cape Town: University of Cape Town; 2023.

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## Reviewer A: Round 2

**Date completed:** 23 May 2024

**Recommendation:** **Accept** / Revisions required / Resubmit for review / Decline

**Conflicts of interest:** None

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Does the manuscript fall within the scope of SAJS?

**Yes/No**

Is the manuscript written in a style suitable for a non-specialist and is it of wider interest than to specialists alone?

**Yes/No**

Does the manuscript contain sufficient novel and significant information to justify publication?

**Yes/No**

Do the Title and Abstract clearly and accurately reflect the content of the manuscript?

**Yes/No**

Is the research problem significant and concisely stated?

**Yes/No**

Are the methods described comprehensively?

**Yes/No**

Is the statistical treatment appropriate?  
Yes/No/**Not applicable**/Not qualified to judge

Are the interpretations and conclusions justified by the research results?  
**Yes**/Partly/No

Please rate the manuscript on overall contribution to the field  
Excellent/Good/**Average**/Below average/Poor

Should this manuscript be expanded and considered rather as a Research Article?  
Yes/**No**

Please rate the manuscript on language, grammar and tone  
Excellent/**Good**/Average/Below average/Poor

Is the manuscript succinct and free of repetition and redundancies?  
**Yes**/No

Are the results and discussion confined to relevance to the objective(s)?  
**Yes**/No

The number of tables in the manuscript is  
Too few/Adequate/Too many/**Not applicable**

The number of figures in the manuscript is  
Too few/**Adequate**/Too many/Not applicable

Is the supplementary material relevant and separated appropriately from the main document?  
**Yes**/No/Not applicable

Please rate the manuscript on overall quality  
Excellent/**Good**/Average/Below average/Poor

Is appropriate and adequate reference made to other work in the field?  
**Yes**/No

Is it stated that ethical approval was granted by an institutional ethics committee for studies involving human subjects and non-human vertebrates?  
Yes/No/**Not applicable**

If accepted, would you recommend that the article receives priority publication?  
Yes/**No**

Are you willing to review a revision of this manuscript?  
Yes/**No**

Select a recommendation:  
**Accept** / Revisions required / Resubmit for review / Decline

With regard to our policy on '[Publishing peer review reports](#)', do you give us permission to publish your anonymised peer review report alongside the authors' response, as a supplementary file to the published article? Publication is voluntary and only with permission from both yourself and the author.  
**Yes**/No

**Comments to the Author:**  
The manuscript is improved, and the commentary in response to previous review comments is well reasoned.

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**Reviewer C: Rounds 1 and 2**

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