

The authors have the outstanding aim to collect existing knowledge on pathogen-elicited behavioral patterns, mainly focusing innate aversion and aversive associative memory. The search criteria in the literature is clear and adequate, however, it lacks important keywords, which caused gaps in the collection of essential papers. Although the overview of the scoped phenotype is satisfying, definitions need to be clarified.

Strength of the study is the thorough and elegantly limited collection of neuronal circuits, which is a novelty in my opinion. The goals do not meet the Discussions, some phenomena, definitions and references are employed wrongly, which are suggested to be fixed.

Majors:

1. I find title 3 (line 68) too general and redundant since any kind of behavior (via motoneurons) guided by the nervous system. Besides, I would extend the chapter with a new sub-chapter, detailing the role of the cell autonomous processes. The nervous system intends to monitor inner and outer environment, which means physiological state (of non-neuronal cells) can alter behavior. In this scenario, there is essential role of DAF-16/FOXO, ATFS-1, SKN-1/Nrf2 stress pathways and the PMK-1/p38 MAPK, ZIP-2 immune pathways. I request at least to mention these pathways in pathogen (damage) recognition and behavior.
2. It seems to me that authors are not familiar with the meaning of PAMP and DAMP. These definitions need to be clarified. I would rather skip the phrase PAMP – other studies are also cautious about it –, since the mentioned neuronal receptors are cannot be considered as PRR. Furthermore, the most recent understanding classifies the pathogen invasion induced damage in core cellular processes as „Surveillance immunity” or „Effector-triggered immunity” which is not reminiscent to DAMP recognition.
3. I strongly suggest to re-compose chapter 3.1.2 because i) the chapter distinction is not adequate –intestinal epithelial cells are the site of pathogenic disruption of mitochondria –, ii) the mentioned pathways (UPR^{MT} and ZIP-2) are responsive to the disruption of cellular/mitochondrial processes, not DAMP, and iii) description of „immune surveillance” cries for clarifications (ZIP-2 induces series of effectors not only irg-1, mentioning SKN-1 and PMK-1 would be essential). With it, please fix Figure 1 (replace DAMP, include other canonical stress/immune pathways, “Recognition” instead of “Detection” and proper segmentation of text boxes).
4. The paragraph in lines 185-197 mixes things. Firstly, I suggest rephrasing: physiological state / stress resistance may govern (not only manipulate) aversive memory and behavior. An enhanced innate immune response is a consequence of changing in physiological state (for instance by pathogenic damage). I think mitochondrial damage induced behaviors in reference 36 is one excellent example. It is also essential to mention that these behavioral responses elicited by extraneuronal cells, like in case of *P. aeruginosa*, *P. alcalifaciens*, *B. thurigiensis* and *M. nematophilum* exposure or RNAi targeted core cellular processes. (An extended version of line 264-267 sentence may be replaced to this paragraph).
5. English of chapter 4 is not satisfying. I recommend shorter sentences and avoid non-professional phrases like “it is not difficult to see from...”. It would also be plausible to refer to neuroendocrine regulations (not only neuronal circuits) since the text and Figure 2 collects plenty of these.

Minors:

6. Does the phrase „Behavioral immunity” exists in *C. elegans*? If not, it is important to mention this, and create definition. If there is, it requires a reference and a definition anyway.
7. Authors sometimes refer generally to “pathogens” when the reference specifies one or few. I’d like to ask to specify the pathogen in every case instead of generally speaking.
8. It is also improving easy-to-read English if you remove “the” anywhere you can.
9. I recommend pathogen recognition, or distinction in line 114 and everywhere else.
10. Species and genes in *italics* for instance *Serratia marcescens* or *irg-1*.
11. Erase extra characters in line 184.