Harvestmen (Arachnida) are usually found on leaf litter, leaves, tree trunks and caves (Curtis & Machado 2007). They feed on live, dead and fresh or decomposing animals, fungi and plant matter such as flowers and fruits (Acosta & Machado 2007). Most of these arachnids are nocturnal and do not rely on mechanoreception at a distance or vision to find food. In the suborder Laniatores, individuals tap their surroundings with the first and second pair of legs when foraging. On the distal parts of the legs there are setae responsible for contact mechanoreception and chemoreception (Willemart et al. 2009). There is no electrophysiological or histological evidence of olfactory receptors in Laniatores (Willemart et al. 2009).

Among the 4,200 laniatorid species (Kury 2011), only Iporangaia pustulosa Mello-Leitão, 1935 (Gonyleptidae) has been subjected to experimental tests on food detection at close range by olfaction: the results suggest that they are attracted only to decomposing prey, a strong odored food (Willemart & Cheolini 2007). Because the crickets were very small, we used two crickets per trial (adult crickets are 2.5 cm long). Before running the trials, we starved the animals for eight days. We ran the trials at night, between 6 p.m. and 1 a.m. We recorded the animals using a Sony Handycam HDR-XR550/
night shot positioned above the arena forming a 90 degree angle with it. We cleaned the arena thoroughly with alcohol 70% and changed the paper towel after each trial.

In order to identify whether or not the animals would behave differently according to the stimulus provided, we counted the time that the tested animal had its pedipalps and at least one leg I on or touching the lateral of the box (cf. WILLEMART & CHELINI 2007). Individuals that did not display this behavior in any of the treatments were not included in the analyses. Because we did not have a sufficient number of individuals and did not want to split them in three treatments and therefore reduce the sample size, we used a repeated measures design, using the same individual in a random order in randomized hours of the night, and in such a manner that the number of individuals tested in each treatment, each day, was the same (MARTIN & BATSON 2011). We compared the three treatments using a non-parametric Friedman test followed by post hoc Student-Newman-Keuls (SNK) (ZAR 1999). We also quantified and compared among treatments (comparison by Friedman test followed by SNK when necessary): the number of times the animals extended their pedipalps and the time spent with the pedipalps extended, since this is their typical behavior when they attempt to capture prey.

Our results show that *D. pectinifemur* stays longer (in seconds) on the non-rotten odor than on the rotten odor or control ($\chi^2 = 6.32, DF = 2, p = 0.026, SNK p < 0.05$) (Fig. 1). There was no difference between the rotten odor and control (SNK $p > 0.05$) and no difference between males and females (Mann-Whitney between treatments: $p > 0.05$). The median number of times the harvestmen extended the pedipalps was 0 (max:10; min:0) for the rotten odor; 1 (max:20; min:1) for the non-rotten odor; 0 (max:14; min:0) for the control, the difference being non-significant ($\chi^2 = 4.5, DF = 2, p = 0.105$). The median time the animals spent with their pedipalps open was 0 (max: 128; min: 0) for the rotten odor; 4 (max: 391; min: 0) for the non-rotten odor; and 0 (max: 260, min: 0) for the control ($\chi^2 = 6.59, DF = 2, p = 0.037$; SNK test, however, did not detect differences between groups).

This is the first experimental evidence that a harvestman detects weak odors, namely a non-rotten dead prey, by olfaction. This result was somehow unexpected because WILLEMART & CHELINI (2007) had reported that the laniatorid *I. pustulosa* detects dead prey by olfaction only if it was rotten, and because olfactory receptors are still unknown in this suborder.

In the absence of olfactory receptors, the contact chemoreceptors sensilla chaetica could potentially detect strong odors in high concentrations (CHAPMAN 1998). For example, MACHADO et al. (2002) reported laniatorid harvestmen detecting the strong odor of defensive secretions from conspecifics at close distance. But this is unlikely to happen with prey that exudes a weak odor, such as non-rotten dead crickets, suggesting that olfactory receptors are present in laniatorid legs. Sensilla basiconica on the dorsal region of first tarsi and second pair of legs (absent in tarsi III and IV) (WILLEMART et al. 2007, 2009) are potential candidates. Their external morphology resembles olfactory receptors found in other taxa (STEINBRECHT 1984, ZHANG 2013), but only histological sections or electrophysiological studies could definitely answer the question.

Laniatorid harvestmen do not use their pedipalps to detect prey but to capture them. Pedipalps were extended for longer in the non-rotten treatment odor, again suggesting more interest in this type of prey ($p = 0.037$), even though the differences were non-significant in the post hoc tests ($p > 0.05$). Showing more interest in non-rotten than in rotten crickets using olfactory cues may be related to a choice of food with better quality, which has been shown in other taxa (EGAS et al. 2003, SMOES et al. 2012). It could also suggest that this species has a tendency towards capturing live prey instead of rotten items. Unfortunately, we cannot further discuss these two hypotheses because there are no data on the feeding habits or the physiology of feeding in *D. pectinifemur*. Our results also suggest that we should not generalize results for the whole suborder: *I. pustulosa* was only attracted to rotten crickets and in *D. pectinifemur* there was no difference between the time spent on rotten prey and control. This may also reflect a difference on the diet or the microhabitat of these two species. Whereas at least adults of *I. pustulosa* inhabit the vegetation, *D. pectinifemur* leaves on the leaf litter, where decomposing items are abun-
First experimental evidence that a harvestman detects odors of non-rotten dead prey by olfaction

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LITERATURE CITED


