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Application of insects to wounds of self and others by chimpanzees in the wild

Alessandra Mascaro^{1,3}, Lara M. Southern^{1,2,3}, Tobias Deschner^{1,4}, and Simone Pika^{2,4,*}

Self-medication refers to the process by which a host suppresses or prevents the deleterious effects of parasitism and other causes of illness via behavioural means¹. It has been observed across multiple animal taxa (e.g., bears, elephants, moths, starlings)², with multiple case studies in great apes^{1,3}. Although the majority of studies on self-medication in primates concern the ingestion of plant parts or non-nutritional substances to combat or control intestinal parasites⁴, more recent examples also report topical applications of leaves or other materials (including arthropods) to skin integuments³. Thus far, however, the application of insects or insect parts to an individual's own wound or the wound of a conspecific has never been reported in non-human primates.Here, we report the first observations of chimpanzees applying insects to their own wounds (n=19) and to the wounds of conspecifics (n=3).

Over a period of 15 months (November 2019 - February 2021), we observed a total of 76 open wounds on 22 different chimpanzees (eleven adult males, two adolescent males, one juvenile male, four adult females, two adolescent females, and two juvenile females; Supplemental information). In 19 events, individuals (five adult males, one adult female, one juvenile female) applied an insect to one of their own wounds using the following behavioural sequence: they first caught an insect, immobilised it by placing and/or squeezing the insect between their lips, placed the insect to an exposed surface of the wound and moved the insect on the surface using their fingertips or lips, and extracted the insect from the wound with the mouth or their fingers (Figure 1; Supplemental videos; additional

videos at https://youtube.com/c/ OzougaSociety). Steps 3 and 4 are often repeated multiple times during each event. Though the insect species utilised has not yet been identified, there are several consistencies across all our observations: the insect appears to be a winged, flying insect, given the fast motion used to catch it; the insect is caught from under a leaf or branch; the insect is small in size ~5mm and usually dark in colour and there was no observation of insect ingestion.

In three other events, we observed different chimpanzees applying or moving an insect not to their own wound, but to the wound of another chimpanzee (Supplemental information). On November 13th 2019, an adult female, Suzee, caught an insect and applied it to an approximately 2cm open flesh wound on the foot of her adolescent son, Sia. Subsequently, she extracted and re-applied the insect two more times using both her mouth and fingers (Supplemental video S2). This was the only event of allo-application involving maternally related individuals.

On October 20th 2020, another adult female, Carol, had been grooming



Figure 1. Application of insect to a wound.

The behavioral sequence of an adult chimpanzee male catching and applying an insect to a wound on his left shin in six frames (A-F). Red circles highlight the object or action of interest in specified frames. (A) The male captures an insect with his left hand; (B) He transfers the insect from the fingers of his left hand to his lips; (C) Keeping the insect between his lips, he moves his head and lips towards the wound; (D) The male applies the insect, which is still between his lips, onto an exposed surface of the open wound on his left shin; (E) He moves the insect on the surface of the wound with the index finger of his right hand; (F) The male closely inspects his wound and continues to groom around it with his left hand.



around the approximately 5cm open flesh wound on the calf of an adult male, Littlegrey. She then caught an insect, and Littlegrey took it from her fingers, put it between his lips and placed the insect to the surface of his open wound. Subsequently, Carol and another adult male, Thea, used their fingers to move the insect on the surface of the wound. A third adult male, Ngonde, then approached them, took the insect out of the wound, placed it between his lips, and re-applied it to the wound. On January 29th 2021, another adult male, Arnold, caught an insect, moved it to his mouth, between his lips and then applied it to the surface of an approximately one cm open flesh wound on the right thumb of Littlegrey. He lip-smacked whilst moving the insect on the surface of the wound with his fingertips.

Given the unambiguous context in which the observed behaviour occurred (injured individuals with open flesh wounds), we suggest that these observations may represent another case of medicative behaviour in non-human animals². Moreover, these observations expand the existing knowledge to include allo-medication of open wounds. However, further systematic research is needed to elucidate the efficacy of the treatment associated with an improvement in healing of wounds, identification of insect species used, and the distribution and acquisition of this behaviour in the Rekambo community.

Furthermore, our observations contribute to the current debate on the existence of prosocial behaviours in non-human species⁵⁻⁷. Prosocial behaviours refer to actions that are intended to benefit another, and seem to be driven in humans by empathic concerns for each other⁶. Prosocial behaviours have long posed a problem for evolutionary theory, because it was not immediately clear why organisms might help others in the face of selection operating in the interest of self. Chimpanzees have been suggested as important candidates for studies into the evolution of prosocial behaviors because they participate in a variety of activities that benefit from cooperation, such as territorial patrols, coalitionary aggression, and hunting8. However, the literature

remains controversial, with some evidence suggesting that chimpanzees lack prosocial behaviours involving the type of empathy that is thought to characterize humans⁷, while others argue that their prosocial tendencies exhibit characteristics consistent with empathy⁵. Hence, our observations may add another facet to the ongoing debate on prosocial behaviors and inspire future studies investigating the behaviours surrounding wound care and the potential medicative function of insect-application.

SUPPLEMENTAL INFORMATION

Supplemental information including one table, methods, detailed descriptions of events and two videos are available with this article online at **Description**.

DECLARATION OF INTEREST

The authors declare no competing interests.

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¹Max Planck Institute for Evolutionary Anthropology, Interim Group Primatology, Deutscher Platz 6, 04103 Leipzig, Germany. ²University of Osnabrück, Institute of Cognitive Science, Comparative BioCognition, Artilleriestrasse 34, 49076 Osnabrück, Germany. ³Joint first authors. ⁴Joint last authors.



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