

## FORENSIC ENTOMOLOGY: BIOTIC TRACES IN DOMESTIC ENVIRONMENT

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The Indoor Dust Direct Examination (E.D.P.A.®) is a method widely used to detect the presence in a confined environment of arthropods, both infesting and of health interest, through the study of their traces (1,2). For its correct application, the dusts are generally collected after a period of two or three days, during which no cleaning is carried out, to get a certain parasitological uniformity in the various domestic environments.

The study of house dusts carried out over the years has led to refine the E.D.P.A.® technique, so that its application can be taken into consideration in fields other than those strictly parasitological ones for which it was initially developed.

One of those of particular interest is the forensic field, where this technique can be used to help investigators in identifying important traces on the crime scene.

To this aim, in September-December 2017, the dusts collected in 20 houses located in the area of Perugia (Central Italy) were examined at the Urania Research Center. For each house the dust of 2 bedrooms were analysed, for a total of 40 samples.

In 22 samples the presence of the so-called "mite of the mattress" (*Dermatophagoides farinae*) was detected, with a charge ranging between 82 and 110 mites/g of dust. In 11/22 positive rooms, new samples were taken for three days (one sampling every 12 hours) after having washed the entire floor surface, while in the remaining 11 rooms only the central part of the floor was washed and the dust samples were collected separately from the washed surface and from the uncleaned perimeter.

The results obtained were particularly interesting: the E.D.P.A.® was negative in the 36 hours following the cleaning in the 11 fully washed rooms and in the samples collected at the central area of those washed only partially; afterwards the *Dermatophagoides* mites were found again in increasing numbers, up to a maximum of 43 mites/g at the end of the third day. On the other hand, the sampling performed on the unwashed internal perimeter showed a similar concentration of mites (75-98 mites / g) compared to the initial sampling.

During those tests it was noticed that something similar happened with other important traces present in indoor dusts, such as pollens, feces of woodworm, animal hair and skin scales.

An area of the cleaned floor can therefore be easily highlighted for an alteration of the traces or, at least, for their non-homogeneity. A comparison can be done between the density of the acarofauna and of the other traces present in different areas of the crime scene, in particular around the victim or, in any case, on the site where the crime is supposed to have been committed and along the perimeter of the room. This may provide diagnostic data able to clarify if the crime scene has been altered by environmental clean-up operations.

The various dust samples can also contain skin scales or other traces that may have different origin and that, once isolated by means of the E.D.P.A.®, can be made available to the investigators for further and more detailed investigations.

[1] Principato M., Moretta I., Stingeni L., Lisi P., Caraffini S., Assalve D., Hansel K., Principato S., Masini P., Pivotti I. 2014. Artropodi di interesse dermatologico in ambiente confinato. Universitas Studiorum S.r.L. Casa Editrice, Mantova.

[2] Stingeni L., Bianchi L., Hansel K., Neve D., Foti C., Corazza M., Bini V., Moretta I., Principato M. 2017. Dermatitis caused by arthropods in domestic environment: an Italian multicentre study. *Journal of European Academy of Dermatology and Venereology* 2017; 31: 1526-1533.