

# THIS ARTICLE IS PART OF THE SERIES – We bring light in the dark of „black powders“

## Part 3/5: The raw materials' modes of action and their differences

In the following five contributions, we will explain the differences between humic substances, charcoal and clay minerals, which are often equated by their appearance. Part 1 and 2 describe the different processes involved in the formation of these substances as well as their extraction and processing. In this third part we will discuss their mode of actions.

### Humic substances

Humic substances own a broad spectrum of functions. Due to the complexity in their chemical structure, the mechanisms of action in humic substances are diverse (see figure 1). On the one hand, they are able to adhere to the intestinal wall and protect the mucosa. On the other hand, they neutralize pollutants and pathogens. In addition, humic substances are known to increase the existence of beneficial gut bacteria, such as lactobacilli.

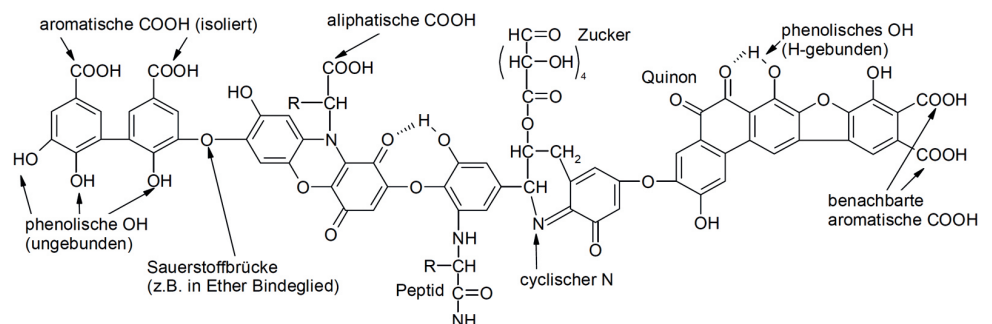
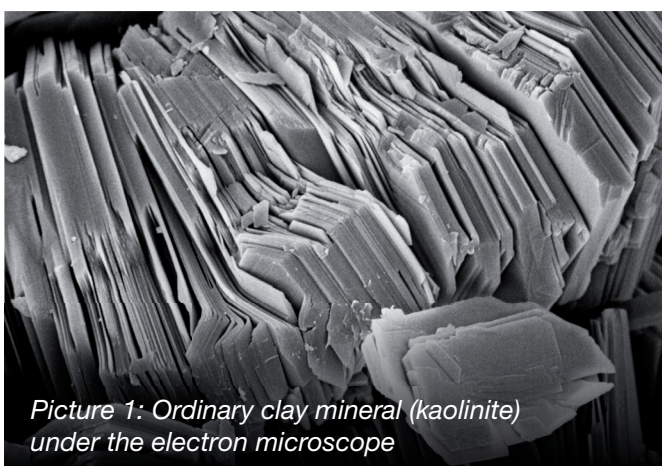


Figure 1: The chemical structure of humic acids according to STEVENSON (1994)



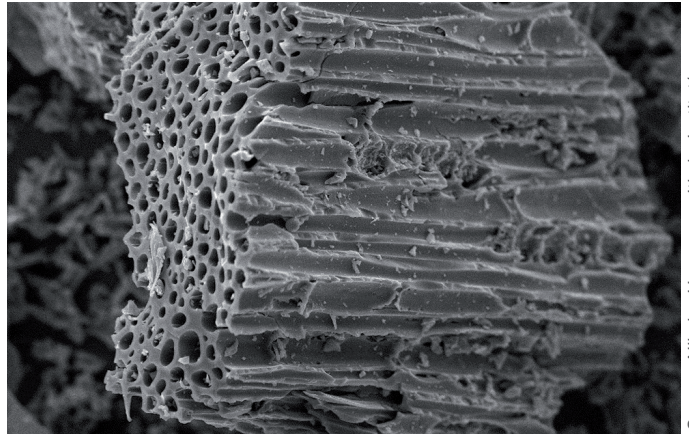
Picture 1: Ordinary clay mineral (kaolinite) under the electron microscope

### Clay minerals

Clay minerals are able to bind (myco-) toxins, heavy metals and plant metabolites in the gut. The ability to bind depends on many factors. These include, for example, the chemical structure of clay minerals, the exchange capacity as well as the surface properties and the fine porosity of the clay particles. The microscope picture shows the different layers of a clay mineral, which form the large surface (see picture 1). →

## Charcoal

Charcoal is characterized by a particularly big surface area and accordingly by a high binding capacity. Under the microscope, the enormous pore volume can be seen (see picture 2). These properties allow the binding of pollutants, such as bacteria and toxins, but also of nutrients and water in the intestine. The binding itself is non-selective (sponge effect). Unlike humic substances, clay minerals do not adhere to the intestinal mucosa.



Source: Nikolas Hagemann, Ithaka Institut/  
Universität Tübingen

Picture 2: Pore structure of the charcoal under the electron microscope

## WH67®

The WH67® humic acids are formed by the waterinsoluble fraction of humic substance and remain in the intestine. Due to the special structure, the particles adhere to the intestinal wall and form a fine protective layer over the intestinal villi. Thus, the risk of the intestinal villi getting stuck is reduced and the intestinal blood barrier is supported. WH67® acts selectively and inhibits gram-negative bacteria and their metabolites (endotoxins) through chemical complex formation. However nutrients are not bound and can be absorbed unhindered. In addition, WH67® humic acids, due to their special chemical properties, attach themselves to inflamed areas in the intestine and reduce them. How exactly WH67® works in the gut is shown in figure 2.

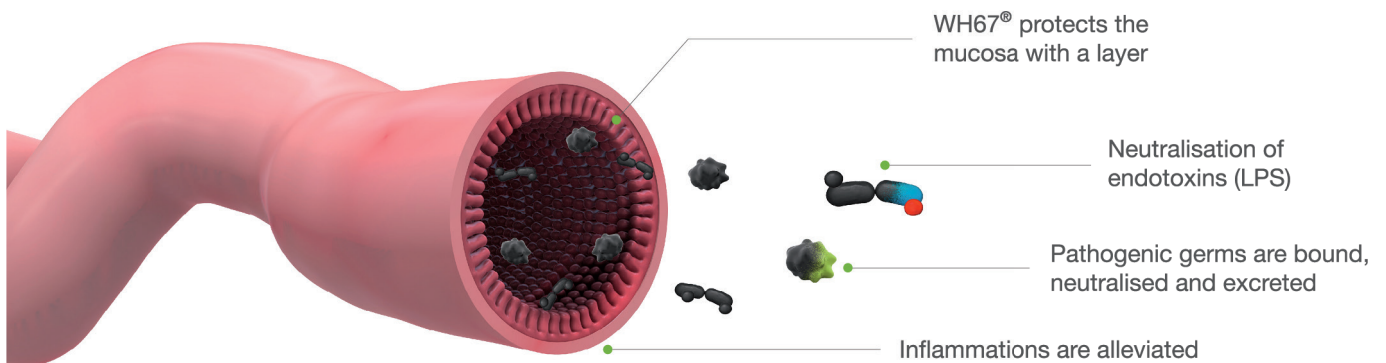


Figure 2: How WH67® works in the gut.

## Conclusion

Regarding the mode of action, humic acids are much more versatile than clay minerals or charcoal. The special treatment of WH67® also makes it able to strengthen important functions of the intestine for more vitality and performance.



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