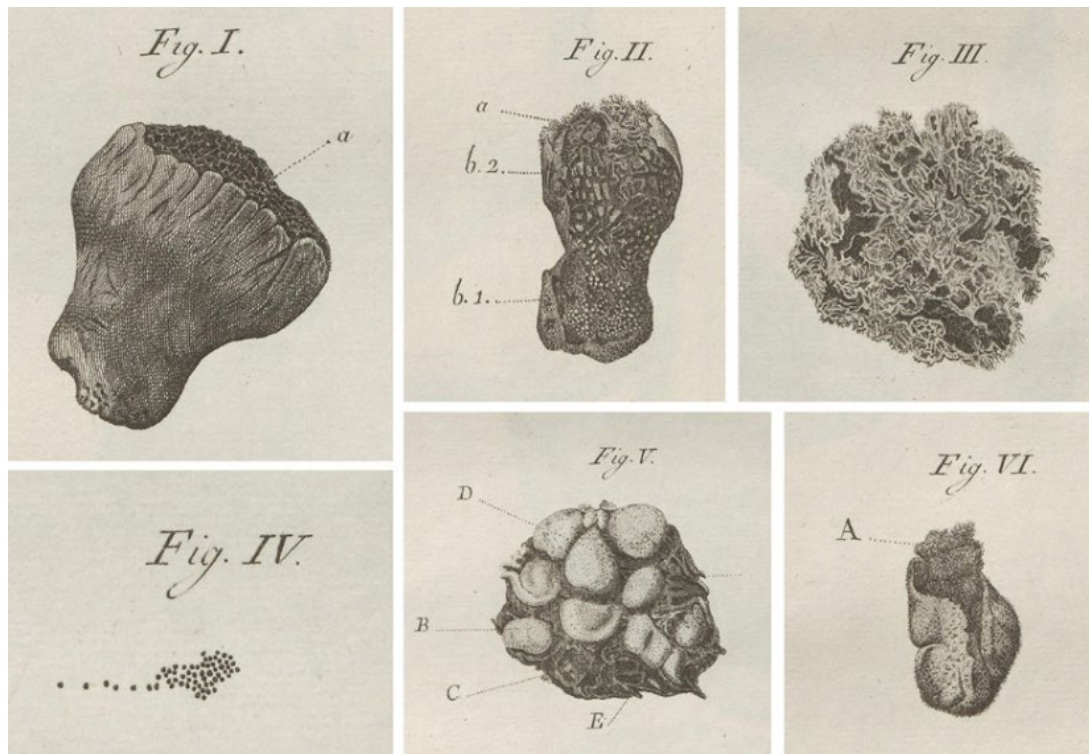


# *Pisolithus arhizus* (Scop.) Rauschert



Scopoli (1786) *Deliciae Florae et Faunae Insubricae* I

*Pisolithus arhizus* is a medium to large-sized species, with a pale whitish to cream coloured peridium, thick pseudostipe with yellowish rhizomorphs, peridioles intertwined with whitish hyphae, and spores that are brown-rust coloured. It often exhibits dark, tar-like patches all throughout the outer side of the peridium, as well as in the pseudostipe surface. This species is mostly found around the Mediterranean region (Spain, Italy, Macedonia, Montenegro, Turkey) (UNITE SH0820233.10FU). It is most often associated with *Quercus*, *Cedrus* and *Pinus* species, with an apparent preference for neutral to alkaline soil.

## ORIGINAL DESCRIPTION:

“*Lycoperdon* (arrizon) ferrugineum, cellulosum: filled with cells of a spongy-filamentous substance.

I found this fungus around Mozzate in dry places in August 1783, while I was alleviating my concerns in the charming and learned company of the illustrious Count Alphonsi Castiglioni. Furthermore, this same illustrious Count sent the fungus to his brother, the distinguished natural history scholar Knight Aloysius Castiglioni, so that its internal substance, subjected to the microscope, could be drawn by the painter. Here are the illustrations and observations that this noble man kindly communicated to me in these letters.

The *Lycoperdon*, which he kindly sent me to observe under the microscope, is exceedingly curious and interesting. The external figure (Fig. I) is not very remarkable and somewhat resembles that of other *Lycoperdon* species. It is entirely dark in color and open at the top, where a fine dark powder mixed with white filaments (Fig. I. a) can be seen.

However, the inside is much more remarkable (Fig. II), since when cut lengthwise one sees the internal substance composed of countless grains (Fig. II. 6), which vary in size and color: smaller grains of yellow color are located toward the base (Fig. II. 6. 1), gradually growing and turning to sulfur color, then darker (Fig. II. 6. 2). These grains are scattered outside with shiny points and internally filled with a substance yellowish or blackish. About two-thirds of the height from the base, the grains dissolve into the aforementioned dark powder mixed with white filaments found at the top.

Under the microscope, this spongy (Fig. III), or rather filamentous, substance appeared formed of countless whitish filaments divided into various small branches all scattered and covered with what was believed to be dust, which was nothing else than an infinity of tiny spherical globules (Fig. IV) that looked like eggs or seeds.

Then I observed those grains (Fig. V) that fill two-thirds of the internal substance of the *Lycoperdon*. The smallest ones located toward the base are yellowish-white in color (Fig. V-B), nearly oval in shape, scattered in a dense dark mucilage almost black. On the outside, they are covered with small transparent yellowish spheres (Fig. V-D), some appearing to have a stalk and easily detached with slight friction, revealing the underlying substance of the grain, which is a darker yellow mucilage (Fig. V-E) scattered with tiny globules.

Moving towards the top of the fungus, the dark mucilage in which the grains are scattered condenses and shrinks, becoming thinner and dried at the upper part, finally becoming a very thin skin in which, like small cells, the grains remain enclosed. These grains, now longer, bigger, and more mature (Fig. VI), are also covered by the yellowish small spheres that do not seem as thick and appear attached to the grain surface by a very thin tissue. The mucilaginous substance, which internally formed those at the base, has changed into a spongy coffee-colored substance (Fig. VI-A), closely resembling that covering the upper part of the fungus.

These grains and this spongy substance are not new discoveries. The diligent Micheli recognized both in his famous work (*Nova Plantarum Genera*) in his two genera of *Lycoperdon* and *Lycoperdoides*. Regarding the first genus, he says: "The pulp is more or less spongy and divided into two substances: the lower remains unchanged for a long time, and the upper, partly forming filaments and partly almost invisible seeds, quickly dissolves with maturity." That is the spongy substance described above. He then moves to *Lycoperdoides* and gives the following characteristics: "*Lycoperdoides* differs from *Lycoperdon* by having a single cortex and uniform substance. On top, this spongy substance is absent, replaced by cells with numerous seed globules stored inside, intertwined and connected like a placenta." And these are the grains enclosed in cells..

From all this, it appears that this would be a genus between *Lycoperdon* and *Lycoperdoides* if these two genera had not been united by later botanists.

Micheli thus considered as seeds both the tiny grains attached to the filaments in the spongy *Lycoperdon* substance and the globules inside the grains found in *Lycoperdoides*. Therefore, this fungus reproduces by seeds attached to the filaments and by those inside the grains. Or more reasonably, one might suppose that the latter are not seeds but new fungi growing inside their mother fungus while the seeds at the top spread to produce new fungi.

I am led to believe this by the great similarity of the spongy substance of the fungus with that of the grains enclosed within it. It may seem odd that I consider this fungus species not only oviparous but even viviparous. Haller also believed that Linnaeus' *Peziza lentifera*, a fungus described by Micheli as *Cyathoides*, produced seeds viviparously, consisting of some bodies shaped like a lens with a stalk, which, scattered on the ground, grow into new fungi. I submit all this to the careful judgment of Your Excellency and consider myself fortunate if these observations help to shed some light on the obscure generation of these little-known vegetable kingdom beings.

The genuine characters of fungi are not only founded on what is apparent to the senses, but also on their structure, even the smallest parts examined with care, which botanists call flowers or fruits. The very diligent Micheli labored much in this, and had his steps followed by others, many discoveries would have been made in the history of fungi, now buried in darkness. Certainly, genera like *Boletus*, *Mucor*, and *Lycoperdon* are still imperfectly understood. Not all *Boletus* have pores underneath, nor all *Mucor* have stalks or split similarly. Nor every round fungus filled with powdery seeds belongs to the genus *Lycoperdon*; *Mucor* is also a round body splitting open, filled with cellular or filamentous substance with tiny particles adhering. Gleditsch's "Methodus fungorum" (page 158) led to many controversies and disputes about fungal genera, which later time will resolve.

We still do not know if fungi belong to the plant kingdom or the animal kingdom. Undoubtedly, Hedwig condemned all who denied fungi as plants and ascribed them to animals. However, the esteemed men Linnaeus, Büttner, Minchhausen, and recently Weisius have presented enough reasons to question whether fungi belong to plants or animals. Moreover, Ellis places fungi in the animal kingdom because it yields volatile alkali upon distillation; the large *Lycoperdon* described by Clusius and others, demonstrated by the presence of this volatile alkali salt, is argued to belong to the animal kingdom. Also supporting this view are worms nesting in decaying fungi, the cadaverous odor they emit, and the fiber orientation differing from any plant. Did not the distinguished Necker recently show that Linnaeus' *Peziza* multiplied viviparously by stalked lenticels? Does not the celebrated Pallas still doubt if Corallines and Sertularians are plants or animal dwellings? How similar are the forms of some fungi to certain zoophytes! Who has yet shown that no animal-

cules exist in fungi that can attribute to them such precocious growth and unique structure? Many mysteries remain undiscovered, which time alone will reveal!

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KEY REQUIREMENTS:

We are looking for a reference specimen for *Pisolithus arhizus*, collected around Mozzate (Lombardy region, Italy); however, collections from all northern Italy territories are welcome. The collection should be well documented, with pictures of the outside of the specimen as well as the longitudinally cut basidiome, and a good habitat description with at least potential hosts identified (*Quercus*, *Cedrus*, *Pinus*, others) and coordinates.

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