

***Cyathus striatus* (Huds.) Willd. – AEB 1357 (= PDD 120025)**

Collection site: Callaghan Innovation rose and hebe garden area in front of the F Block building; at the base of the Wainuiomata Hill Road, Lower Hutt

Collection date: 8 January 2023

Substrate: wood chip mulch

Collector and Identifier: Dan Mahoney

Voucher material: Good herbarium material [AEB 1357 (= PDD 120025)] accompanied by 2 Shear's mounting fluid (SMF) semipermanent microscope slides; various in-situ photos using a Samsung Galaxy A70 smartphone camera and microscopic detail of the basidiospores using an Olympus BX51 compound microscope with a DP25 camera; Dan's comments.

Comments: The collection was made following a week of rainy weather in an exposed open area. The original Samsung Galaxy A70 photos were taken before removing the specimen from its position on the wood chip mulch but more in-situ photos were taken at intervals in the lab before the specimen was fumigated. This common species of 'bird's nest' fungi is well-represented online. I found its description on Wikipedia the most complete and have reproduced that coverage on the next 3 pages. Among its best photographs are those by Clive Shirley in his Hidden Forest New Zealand website. Other online sites worth noting are those by Michael Kuo (MushroomExpert.Com with his key to Bird's Nest Fungi in North America) and California Fungi, *Cyathus striatus* – MykoWeb.

Cyathus striatus

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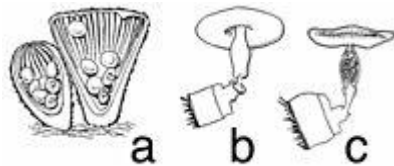
Cyathus striatus, commonly known as the **fluted bird's nest**, is a common [saprobic bird's nest fungus](#) with a widespread distribution throughout [temperate](#) regions of the world. This fungus resembles a miniature bird's nest with numerous tiny "eggs"; the eggs, or *peridioles*, are actually lens-shaped bodies that contain [spores](#). *C. striatus* can be distinguished from most other bird's nest fungi by its hairy exterior and grooved ([striated](#)) inner walls. Although most frequently found growing on dead wood in open forests, it also grows on wood chip [mulch](#) in urban areas. The [fruiting bodies](#) are encountered from summer until early winter. The color and size of this species can vary somewhat, but they are typically less than a centimeter wide and tall, and grey or brown in color. Another common name given to *C. striatus*, **splash cups**, alludes to the method of [spore](#) dispersal: the sides of the cup are angled such that falling drops of water can dislodge the peridioles and eject them from the cup. The [specific epithet](#) is derived from the [Latin](#) *stria*, meaning "with fine ridges or grooves".

Kingdom: Fungi
Division: Basidiomycota
Class: Agaricomycetes
Order: Agaricales
Family: Nidulariaceae
Genus: <i>Cyathus</i>
Species: <i>C. striatus</i>

Taxonomy

Cyathus striatus was first [described](#) by [William Hudson](#) in his 1778 work *Flora Anglica* as *Peziza striata*. [Carl Ludwig Willdenow](#) transferred it to [Cyathus](#) in 1787. The name "*striatus*" refers to the grooves inside the cups.

Description



a) young and mature fruiting bodies in longitudinal section; (b), (c) single peridioles—entire, and in section

The "nest", or [peridium](#), is usually about 7 to 10 mm in height and 6 to 8 mm in width, but the size is somewhat variable and specimens have been found with heights and widths of up to 1.5 cm ($\frac{3}{8}$ in). The shape typically resembles a vase or inverted cone. The outer surface (*exoperidium*) ranges in color from slightly brownish to grayish [buff](#) to deep brown; the exoperidium has a shaggy or hairy texture (a *tomentum*), with the hairs mostly pointing downward. The inner surface of the peridium (the *endoperidium*) is striated or grooved, and shiny. Young specimens have a lid, technically called an *epiphragm*, a thin membrane that covers the cup opening. The epiphragm is hairy like the rest of the exoperidial surface, but the hairs often wear off leaving behind a thin white layer stretched across the lid of the cup. As the peridium matures and expands, this membrane breaks and falls off, exposing the peridioles within. The peridium is attached to its growing surface by a mass of closely packed [hyphae](#) called an emplacement; in *C. striatus* the maximum diameter of the emplacement is typically 8–12 mm, and often incorporating small fragments of the growing surface into its structure. The species is inedible.

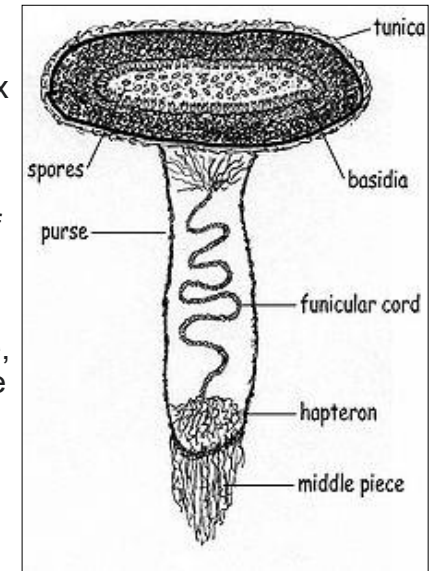
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Peridiole structure

The peridioles are about 1 to 1.5 mm wide and rarely up to 2 mm wide. They are disc-shaped, but may appear angular due to pressure from neighbouring peridioles. Peridioles may be dark, or a drab gray if still covered with a thin membrane called a **tunica**. Peridioles in *C. striatus* are sheathed and attached to the endoperidium by complex cords of **mycelia** known as a **funiculus** in the singular. The funiculus is differentiated into three regions: the basal piece, which attaches it to the inner wall of the peridium, the middle piece, and an upper sheath, called the purse, connected to the lower surface of the peridiole. Inside the purse and middle piece is a coiled thread of interwoven hyphae called the funicular cord, attached at one end to the peridiole and at the other end to an entangled mass of hyphae called the **hapteron**. When dry the funiculus is brittle, but when wet it is capable of long extension.

Microscopic characteristics

The **basidia**, the spore-bearing cells, are club-shaped with long stalks. They typically hold 4 spores that are sessile, that is, attached directly to the surface of the basidium, rather than by a short stalk (a *sterigmata*). **Spores** measure about 15 to 20 **µm** long by 8 to 12 **µm** wide. They are elliptical, smooth, **hyaline**, and notched at one end. During development, the spores are separated from the basidia when the latter collapse and gelatinize along with other cells lining the inner walls of the peridiole. The spores expand in size somewhat after being detached from the basidia.



A peridiole and attached funiculus in cross-section

Habitat and distribution

Cyathus striatus is a **saprobic** fungus, deriving its nutrition from decaying organic material, and is typically found growing in clusters on small twigs or other woody debris. It is also common on **mulch** under shrubs. The features of the microenvironment largely influence the appearance of *C. striatus*; all else being equal, it is more likely to be found in moist, shallow depressions than elevated areas. It is very widespread in **temperate** areas throughout the world, growing in summer and fall. The fungus has been recorded from Asia, Europe, North America, Central America, South America, and New Zealand.

Life cycle

Cyathus striatus can reproduce both asexually (via **vegetative** spores), or sexually (with **meiosis**), typical of **taxa** in the **basidiomycetes** that contain both **haploid** and **diploid** stages. **Basidiospores** produced in the peridioles each contain a single haploid **nucleus**. After the spores have been dispersed into a suitable growing environment, they germinate and develop into **homokaryotic** hyphae, with a single nucleus in each cell compartment. When two homokaryotic **hyphae** of different **mating compatibility groups** fuse with one another, they form a **dikaryotic** mycelia in a process called **plasmogamy**. After a period of time and under the appropriate environmental conditions, fruiting bodies may be formed from the dikaryotic mycelia. These fruiting bodies produce peridioles containing the **basidia** upon which new spores are made. Young basidia contain a pair of haploid sexually compatible nuclei which fuse, and the resulting diploid fusion nucleus undergoes meiosis to produce haploid basidiospores. The process of meiosis in *C. striatus* has been found to be similar to that of higher organisms. **Continued on the next page.**

Spore dispersal

The cone shaped fruiting body of *Cyathus striatus* makes use of a splash-cup mechanism to help disperse the spores. When a raindrop hits the interior of the cup with the optimal angle and velocity, the downward force of the water ejects the peridioles into the air. The force of ejection rips open the funiculus, releasing the tightly wound funicular cord. The hapteron attached to the end of the funiculus is adhesive, and when it contacts a nearby plant stem or stick, the hapteron sticks to it; the funicular cord wraps around the stem or stick powered by the force of the still-moving peridiole (similar to a [tetherball](#)). The peridioles degrade over time to eventually release the spores within, or they may be eaten by herbivorous animals and redeposited after passing through the digestive tract.

Similar species

[Cyathus stercoreus](#) is similar, but grows in dung and its cups are not grooved.



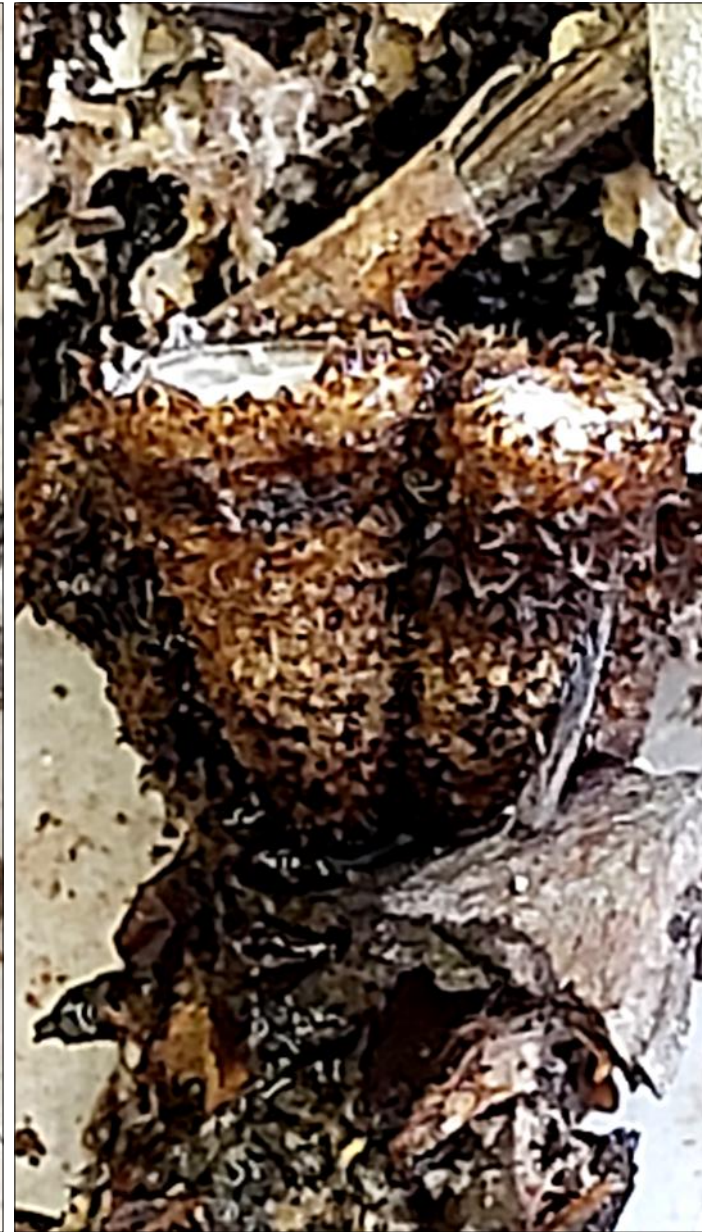
An in-situ field view of a portion of the large fruiting of *Cyathus striatus* on the wood chip mulch in front of the Callaghan Innovation F Block building, using a Samsung Galaxy A70 smartphone camera. The next 2 pages represent closeup photos from this field of view. Not far away from this on the mulch was a large fruiting of *Fuligo septica*.



Closeup photos (reoriented) from the field of view on the previous page.



Another closeup photo from the field of view on the page before last.



An in-situ lab view of a small portion of the large fruiting of *Cyathus striatus* from the wood chip mulch. Emphasizing the "nest" or peridium – in closed overhead view (left photo) and in open side view (right photo). Note the exoperidium has a brownish shaggy or hairy texture (a tomentum), with the hairs mostly pointing downward.

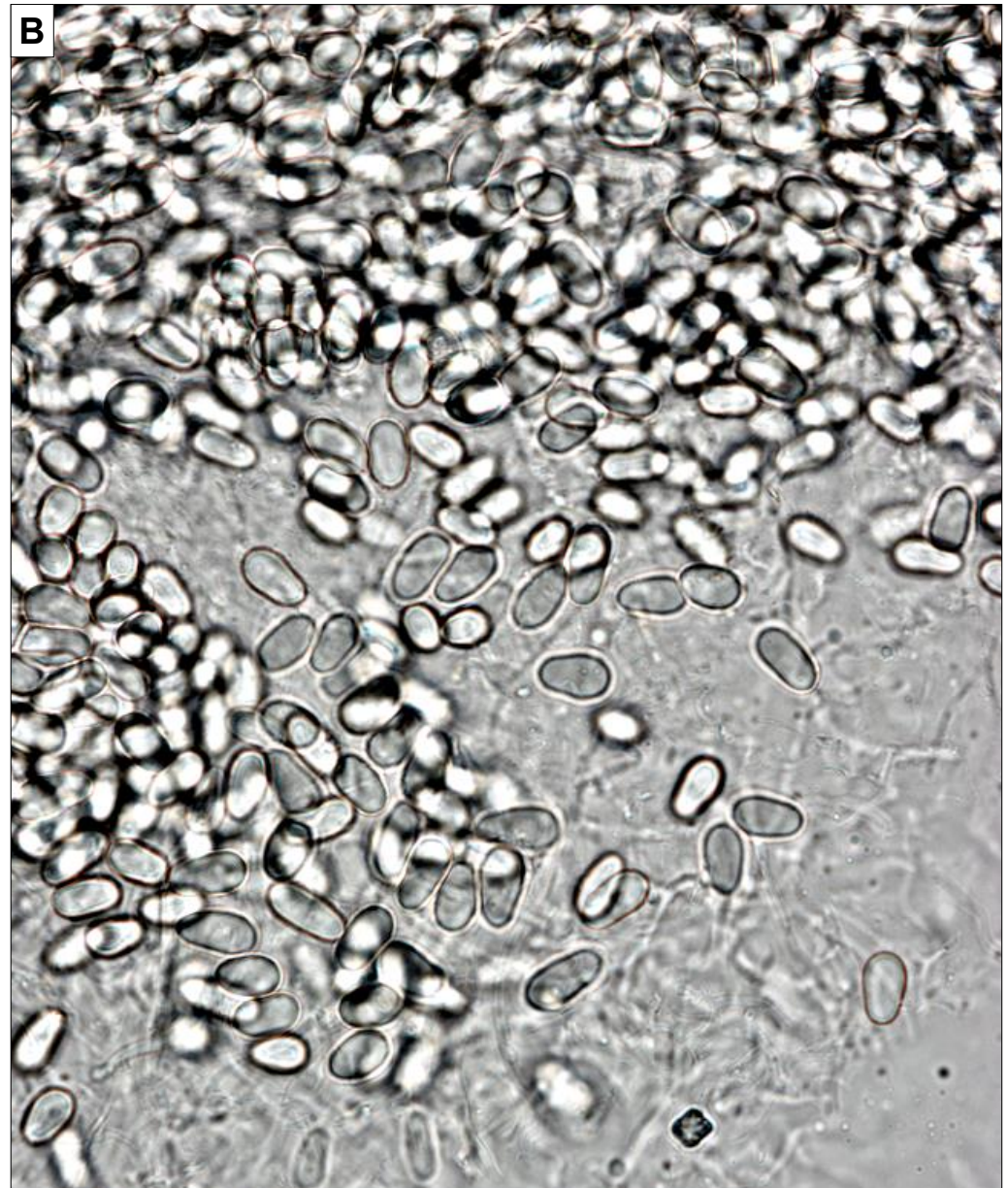
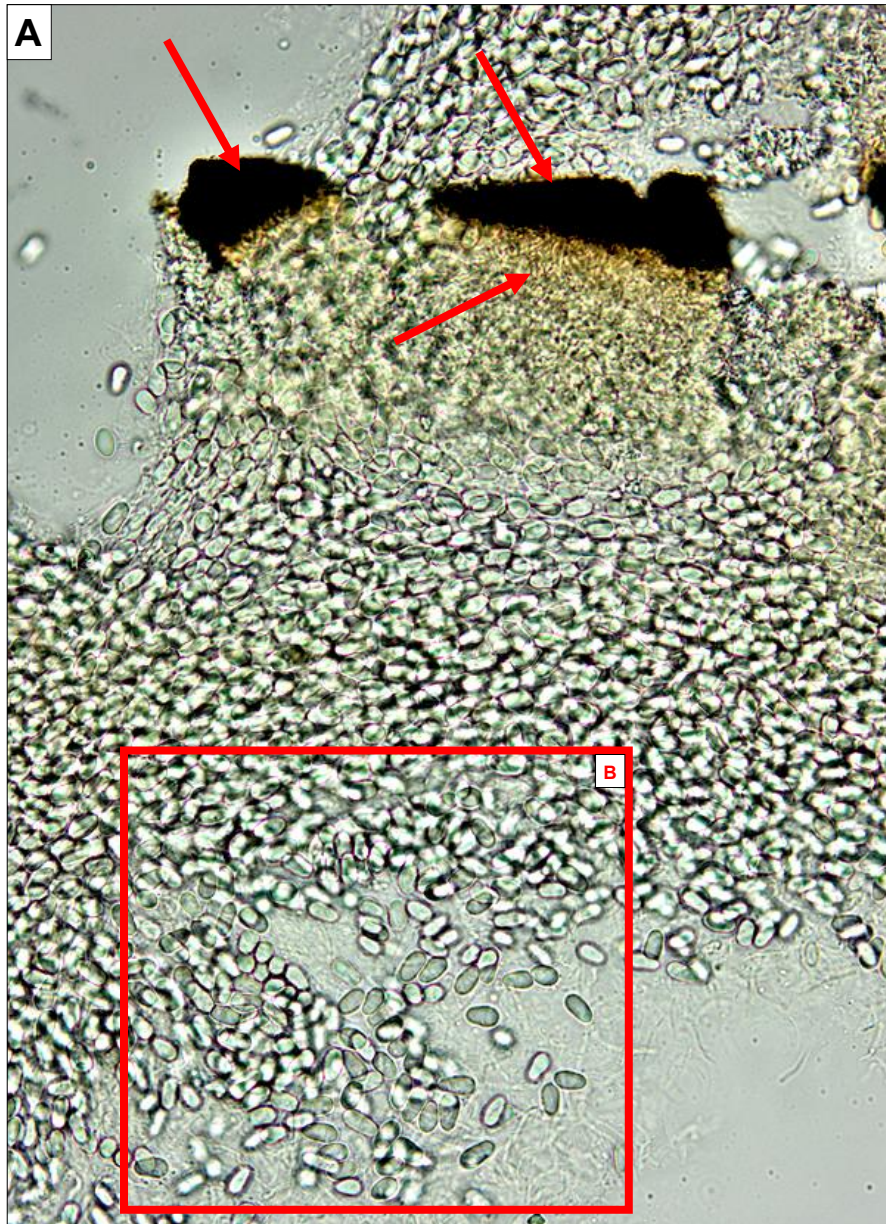


Another in-situ lab view of a portion of the large fruiting of *Cyathus striatus* from the wood chip mulch. Emphasizing the open 'bird nests' (= peridia) with their grooved (striated) inner walls and their 'eggs' (= peridioles) within. Left to right photos show increasing magnifications.

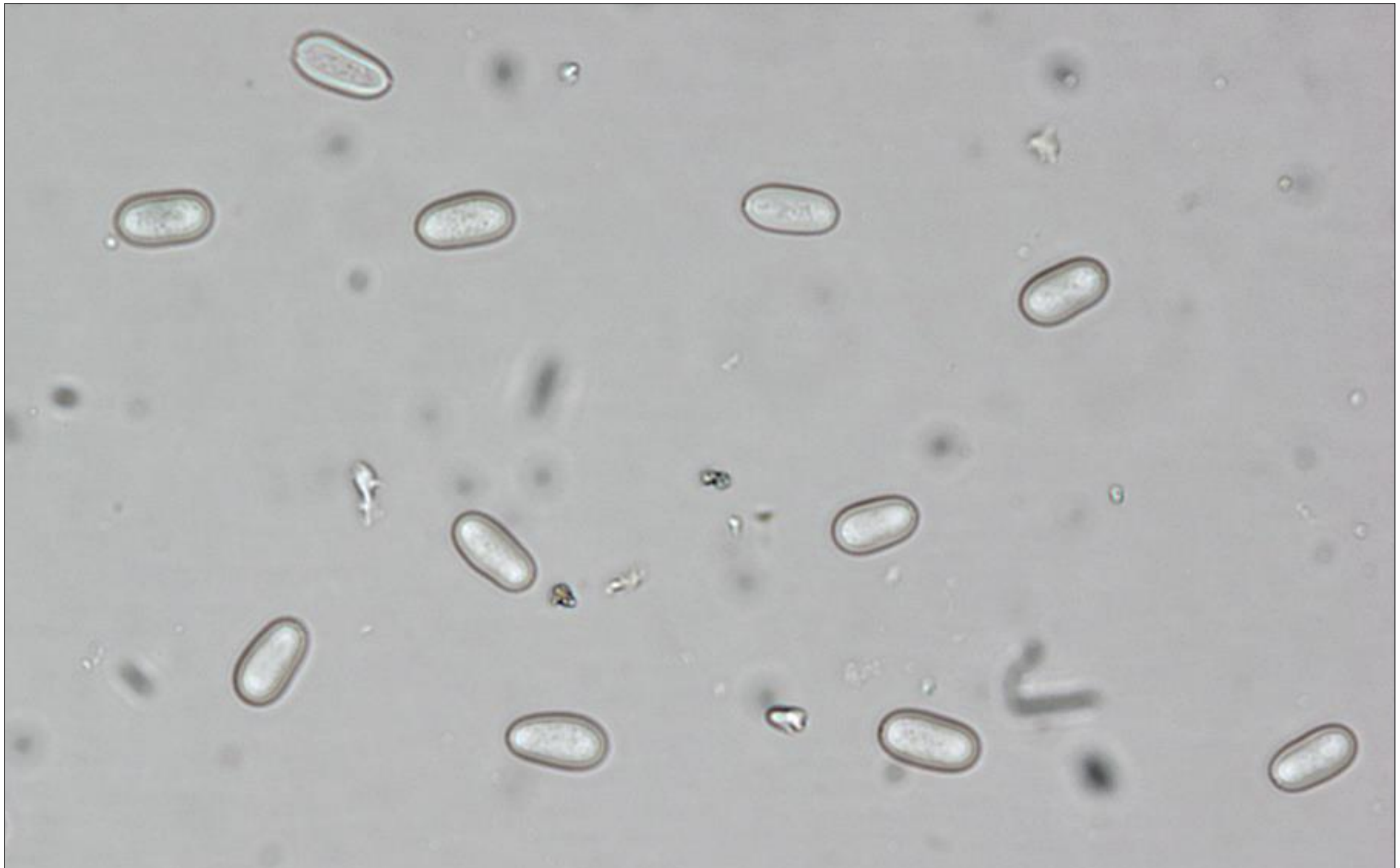


Another in-situ lab view. Here emphasizing the 'bird nest' lid, technically called an epiphragm, i.e., a thin white membrane that covers the 'nest' opening and protects the developing peridioles within. Right photo is a higher magnification.

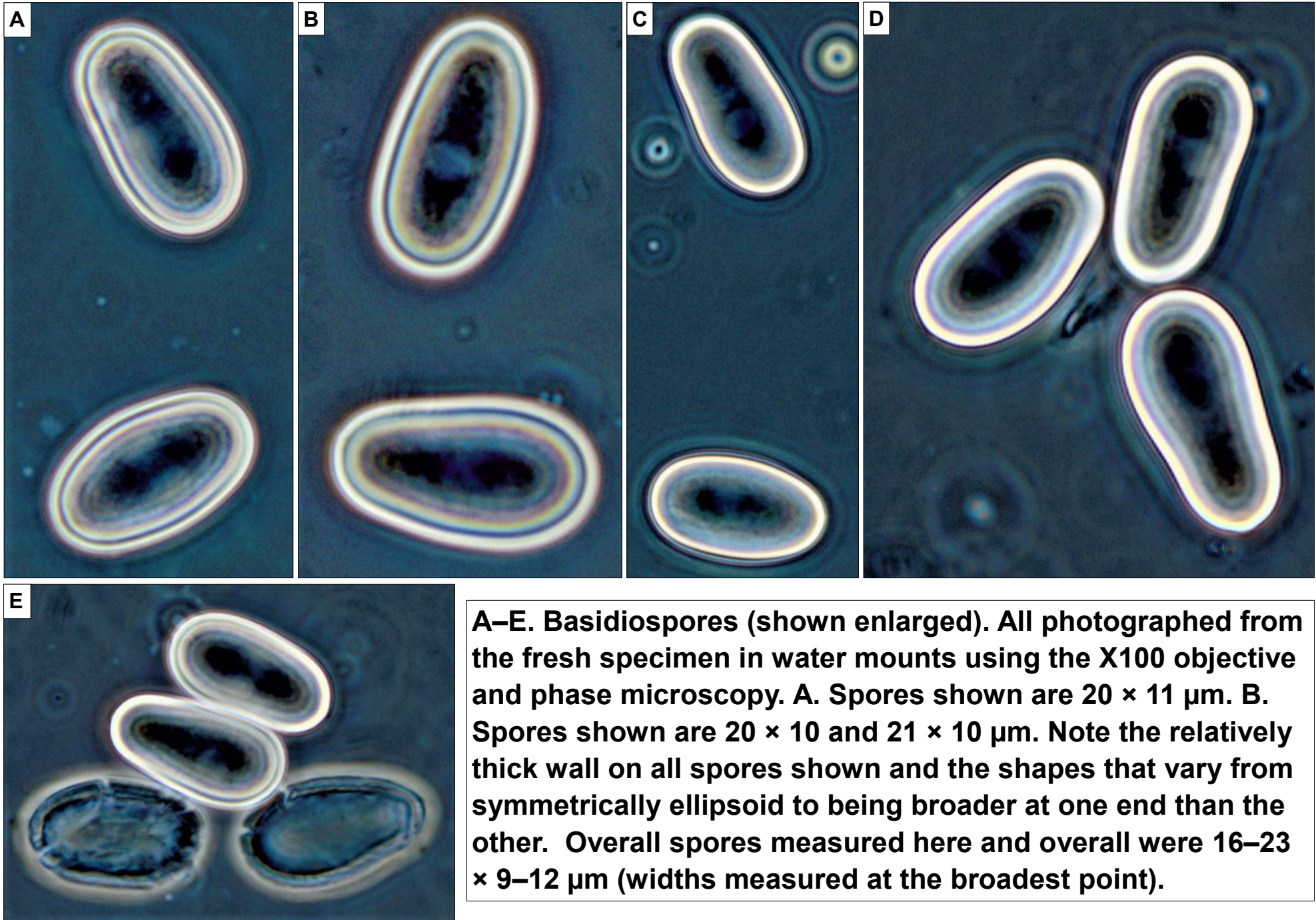




A–B. Peridiole section squash in SMF as seen under the X20 objective ‘A’ and X40 obj. ‘B’ using brightfield microscopy. A. The red square ‘B’ insert represents the magnified portion shown in ‘B’. Note the numerous free basidiospores (clearest in ‘B’) and a small portion of the peridiole wall in ‘A’ – the latter arrowed.



Basidiospores from the peridiole section squash in SMF seen under the X40 objective on the previous page – but here seen more clearly. Note their slight shape differences & their thick, smooth cell walls.





An in-situ lab view of the slime mold *Fuligo septica* seen not far from *Cyathus striatus* on the same substrate. Ironically, I collected another specimen of *F. septica* [see the external link to the datastore under PDD 111879 (= AEB SM87)] on property adjacent to Callaghan Innovation. That collection on 18 March 2018 at the Rishworth Reserve was also on chipped wood and bark mulch in a pile of mulch near the Waiwhetu Stream.