European key to the genus *Scutellinia*

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Abstract: This key to the genus *Scutellinia* (Cooke) Lambotte is a working key. There are still many avenues to explore and it remains upgradable. It is the result of a deep study of numerous collections, exclusively made for 5 years, representing more than 1500 personal collections, 2500 collections from herbaria all over the world, 80% of known type collections, 80 collections studied under MEB, participation of two phylogenetic studies (integrating personal collections)... Unfinished studies and my personal history explain why some species are marked with a "?" sign and some provisional unpublished names are given. I decided to provide this key to serve as a framework for a future study.
Keywords: Ascomycota, *Pezizales*, *Pyronemataceae*.

Résumé : cette clé des espèces du genre *Scutellinia* (Cooke) Lambotte est une clé de travail. Il reste de nombreuses pistes à étudier et elle reste évolutive. Elle résulte de l'étude approfondie de nombreuses collections : 5 ans d'étude exclusive de ce genre, plus de 1500 récoltes personnelles, plus de 2500 collections d'herbiers du monde entier, 80 % des types existants, 80 collections étudiées au MEB, participation à deux études phylogéniques intégrant des récoltes personnelles... Des études diverses inachevées ainsi que mon histoire personnelle expliquent pourquoi certaines espèces sont suivies d'un « ? » et des noms provisoires (non publiés) sont donnés dans certains cas. J'ai décidé de la mettre à disposition pour qu'elle puisse servir de base à un travail ultérieur.
Mots-clés : Ascomycota, *Pezizales*, *Pyronemataceae*.

Oroimenean – A la mémoire de – In memory of
Amaia Jeannerot †

Eskerrik asko – Remerciements – Thanks
To all who help me by different ways and special thanks to Nicolas Van Vooren for corrections (French and English key), Malcolm Greaves for his correction of the English key, and for translations: Matteo Carbone (Italian), Miguel Ángel Ribes Ripoll (Spanish), Tatiana Bulyonkova (Russian) and Marcel Vega (German).

Abbreviations and annotations:
SWV: spore wall view, means "side-view".
TV: top view, means "face-view".
Q: ratio length/width of spores.
X: mean value.
Complex: means a name which applies perhaps to several species (studies on course).
?: means a species or variety which is uncertain (studies on course).
CB: Cotton Blue.

Q = 1 to 1.2 ..... **Key A**
Q > 1.2 ..... **Key B**

Key A: Species with globose to subglobose spores (Q 1 to 1.2)

1a. Spores with connected ridges *(fig. 1)* ..... ***S. rotundisperma***
1b. Spores with warts as shark fins or spines *(fig. 2)* ..... ***S. legaliae***
1c. Spores with hemispherical or low truncate warts **2**
1d. Spores with high truncate warts **5**

2a. High warts, average > 2 µm high **3**
2b. Warts in general < 2.5 µm high **4**

3a. Spores > 23 µm on average, warts rounded up to 3 µm high *(fig. 3)* ..... ***S. citrina***
3b. Spores 15–19 µm diam., warts up to 4.5 µm high *(fig. 4)* ..... ***S. sinensis***
3c. Spores 21–24 µm diam., same as *fig. 4* ..... ***S. sinensis* var. *megaspora*** nom. prov.
4a. Very heterogeneous warts, hairs exceeding 700 µm *(fig. 5)* ..... ***S. heterosphaera*** nom. prov.
4b. Homogeneous warts rather truncate and low, short hairs < 400 µm, with simple or bifurcate base *(fig. 6)* ..... ***S. barlae***
4c. Homogeneous little warts, very low in SWV max. 1 µm high *(fig. 7)* ..... ***S. hyperborea***
4d. Heterogeneous higher warts, subglobose spores × 15–21 µm *(fig. 8)* ..... ***S. minor***
4e. Rounded low warts, very unevenly dispersed on the spores, see key B *(fig. 29)* ..... ***S. patagonica***

5a. Many truncate warts in SWV, angular in TV *(fig. 9)* ..... ***S. trechispora***
5b. Truncate warts in SWV, lower and rounded in TV *(fig. 10)* ..... ***S. rotadentata*** nom. prov.

Key B: Species with ellipsoid to fusiform spores (Q > 1.2)

1a. Spores with loosening perispore in heated CB **2**
1b. Spores ornamentation as a complete or almost complete reticulum **4**
1c. Not these characters **5**

2a. Spores narrow ellipsoid to fusoid, 23.5–28 × 11.5–15 µm, straight and inflated hairs *(fig. 11)* ..... ***S. mirabilis***
2b. Spores ellipsoid < 25 µm **3**

3a. Reticulum with large crests, short hairs *(fig. 15)* ..... ***S. pseudotrechispora***
3b. Spores ellipsoid to ovoid, 19–24 × 11–15 µm, hairs < 400 µm, curved in the upper third part, heterogeneous rounded to angular large warts *(fig. 12)* ..... ***S. superba***
3c. Spores 12.8–16.2 × 6.8–9.2 µm, short hairs < 150 µm, rather yellow, some with rounded apex *(fig. 13)* ..... ***S. minutella***
3d. Spores 15.6–19.2 × 7.8–11.5 µm, hairs to 400 µm, rather brown *(fig. 14)* ..... ***S. torrentis***

4a. Reticulum with large crests, short hairs *(fig. 15)* ..... ***S. pseudotrechispora***
4b. Spores subglobose, 13.5–17 µm wide, warts looking like round-headed nails, often on acid and peaty soil *(fig. 16)* ..... ***S. decipiens***
4c. Spores ellipsoid, 16.5–23 × 11–13.5 µm (X = 18.5 × 12 µm), with an irregular reticulum, warts ± truncate, often on wood *(fig. 17)* ..... ***S. pennsylvanica***
5a. Spores smooth, little and yellow apothecia, on decorticated wood *(fig. 18)* ..... ***S. setosa***
5b. Spores with large warts (TV diam. > 2 µm) disseminated between smaller ones 6
5c. Not these characters and spores mainly with isolated warts 7
5d. Not these characters and spores mainly with crests even short 14

6a. Q > 1.5, large and very small warts mixed, slightly marginal hairs, > 500 µm, inflated, with a simple or bifurcate large base *(fig. 19)* ..... ***S. heterosculpturata***
6b. Q < 1.4, large and small warts mixed, hairs < 250 µm, spores more widely ellipsoid *(fig. 20)* ..... ***S. variornata*** nom. prov.?

7a. Spores > 24 µm in length, narrowly ellipsoid (Q > 2), 24.1–25 × 10.9–11.3 µm, with homogeneous warts *(fig. 21)* ***S. hirta*** *s.* Kullman?
7b. Spores oblong-ellipsoid and occasionally inequilateral, heterogeneous warts. Hairs 20–50 µm wide, with a rooting base, 2–5 roots *(fig. 22)* ..... ***S. cejpii*** (= *S. hirta s.* Le Gal)
7c. Spores fusoid, ornamentation with densely fine punctuations *(fig. 23)* ..... ***S. macrospora***
7d. Not these characters and Q < 1.8 ..... **8**

8a. Spores ornamented with warts up to 2.5 µm wide and 1–2 µm high **9**
8b. Spores ornamented with smaller tubercles and warts, all hairs < 1200 µm **12**
8c. Spores ornamented with smaller tubercles and warts, some hairs > 1200 µm **18**

9a. Spores broadly ellipsoid (Q < 1.4), between 16–25 × 11–23 µm **10**
9b. Spores more ellipsoid (Q > 1,4) **11**

10a. Marginal hairs, 150 µm max. in length, with a simple base. Spores 17–22 × 12–15.5 µm, ornamentation fairly homogeneous in size *(fig. 24)* ..... ***S. ahmadii***
10b. Marginal hairs 100–450 × 13–27 µm, with a bifurcate base, numerous on margin. Spores 19–24 × 12–16 µm *(fig. 25)* ..... ***S. pseudoumbrarum***?
10c. Marginal hairs with a wide and multifurcate base, 200–700 (–900) × 24–50 µm. Spores broadly ellipsoid 17–25 × 12–17 µm *(fig. 26)* ..... ***S. umbrarum*** complex

11a. Spores ellipsoid, 18–22 × 11–14 µm, ornamented with large tubercles and some more little warts. Marginal hairs slender, inflated, with a wide bifurcate base *(fig. 20)* ..... ***S. heterosculpturata***?
11b. Spores (16.3–) 17.7–19 (–19.6) × (11–) 12.2–13.6 (–14.1) µm. Marginal hairs up to 100–330 (–400) µm in length, with a simple or bifurcate base ..... ***S. parvispora***?

12a. Marginal hairs dense, up to 400 µm, of homogeneous size and shape, spores 19.4–26.5 × 13.8–16.6 µm *(fig. 27)* ..... ***S. nigrohirtula*** complex
12b. Marginal hairs 130–480 × 18–38 µm. Spores broadly ellipsoid, dotted by micro-crests and micro-warts, 22–28 × 15–22 µm *(fig. 28)* ..... ***S. kerguelensis*** complex
12c. Hairs > 500 µm **13**

13a. Spores broadly ellipsoid (Q = 1.2–1.4), 18–23 × 13–19 µm, tubercles and warts heterogeneous and unevenly distributed. Marginal hairs with a wide and multifurcate base, margin with obtuse hairs interspersed *(fig. 29)* ..... ***S. patagonica***
13b. Spores ellipsoid, 17–24 × 12–15 µm, warts evenly distributed on spore wall. Marginal hairs with a bi- or trifurcate base *(fig. 30)* ..... ***S. subhirtella***
13c. Spores 15–20 × 9–12 µm, angular warts well visible at the poles, up to 1.5 µm wide and 1.2 µm high *(fig. 31)* ..... ***S. vitreola***
13d. Spores 19–21 × 12–13 µm, hairs 800–1100 µm, thin base, ornamentation always with angular warts and coalescent crests *(fig. 32)* ..... ***S. pulchrornata*** nom. prov.

14a. Hairs < 1000 µm **15**
14b. Hairs > 1000 µm **18**

15a. Spores inequilateral and/or Q > 1.8 ..... **7**
15b. Some hairs > 500 µm **16**

15c. All hairs < 500 µm **17**

16a. Spores 15–20 × 9–12 µm, angular warts well visible at the poles, up to 1.5 µm wide and 1.2 high *(fig. 31)* ..... ***S. vitreola***
16b. Marginal hairs with multifurcate base, flexuous, up to 600–800 µm. Spores ornamented with warts well visible, with coarse crests, de 20–27 × 12–18 µm *(fig. 33)* ..... ***S. olivascens***
16c. Same but spores 18.8–21.8 × 12.0–13.7 µm ..... ***S. olivascens* var. *minutospora***?

17a. Marginal hairs dense, up to 400 µm, of homogeneous size and shape, spores 19.4–26.5 × 13.8–16.6 µm *(fig. 27)* ..... ***S. nigrohirtula*** complex
17b. Spores fusoid 25.1–31.4 × 11.8–13.8 µm *(fig. 23)* ..... ***S. macrospora***
17c. Marginal hairs 130–480 × 18–38 µm, base bifurcate. Spores broadly ellipsoid, dotted by micro-crests and micro-warts, 22–28 × 15–22 µm *(fig. 28)* ..... ***S. kerguelensis*** complex
17d. Hairs 180–330 × 13–30 µm, with a simple or bifurcate base, spores 18–24 × 12–16 µm ..... ***S. kerguelensis* var. *microspora***?

18a. Small ellipsoid spores, 17–19.5 × 9.5–11.5 µm, Q = 1.6–1.7, warts and short anastomosed crests *(fig. 34)* ..... ***S. colensoi***?
18b. Spores 21.5–27 × 14–17 µm, ornamentation with dense micro-crests *(fig. 35)* ..... ***S. pilatii***
18c. Spores 17–19.5 × 9–12 µm, with rounded ends, punctuated by micro-warts or micro-crests, long and medium hairs alternated, wide multifurcate base; all substrates *(fig. 36)* ..... ***S. crinita***
18d. Spores with obtuse ends, ornamentation with well-marked crests, Q >1.6 (fig. 37) ..... ***S. scutellata*** complex

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Excluded species:
Scutellinia crucipila = ***Cheilymenia crucipila***
Scutellinia tuberculata = ***Scutellinia sinensis***
Scutellinia verrucipolaris = ***Scutellinia cejpii***
Scutellinia claviseta = ***Scutellinia minutella***
Scutellinia scutellata var. *leucothecia* = ***Scutellinia crinita*** with white hymenium due to absence of pigments.
Scutellinia nivea = not a *Scutellinia*, probably a species of genus ***Paratrichophaea***.

Translated versions — French, German, Italian, Spanish and Russian — of this key are available on Ascomycete.org website
https://doi.org/10.25664/KEY-0008

Figures

All pictures made by Beñat Jeannerot

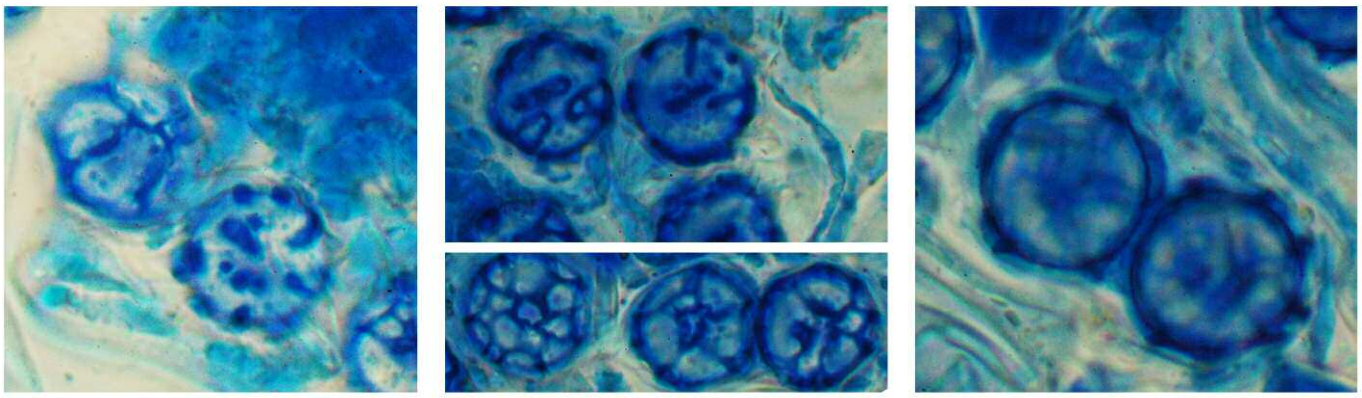

Fig. 1 – *Scutellinia rotundisperma* (holotype, JCD 134-81)

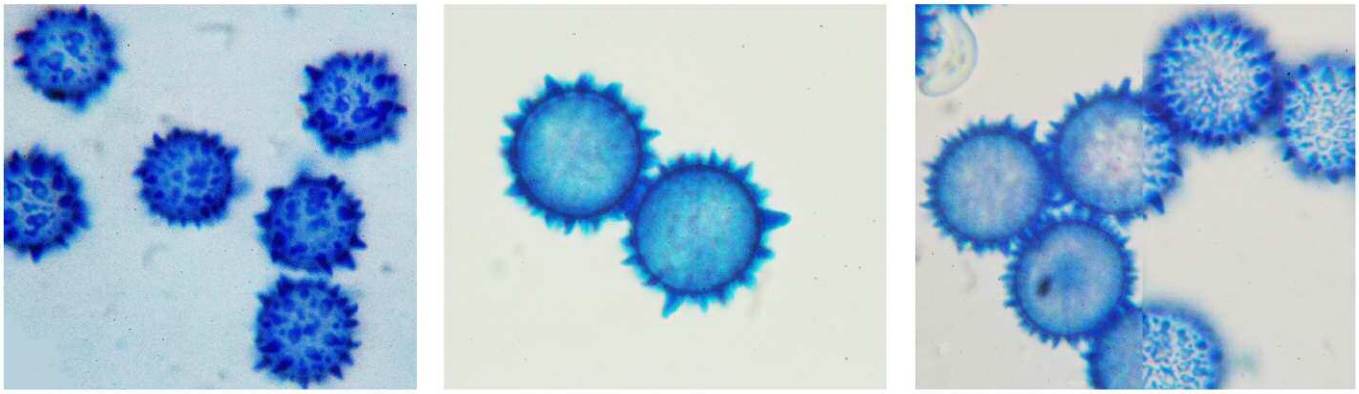

Fig. 2 – *Scutellinia legaliae* (various collections BJ)

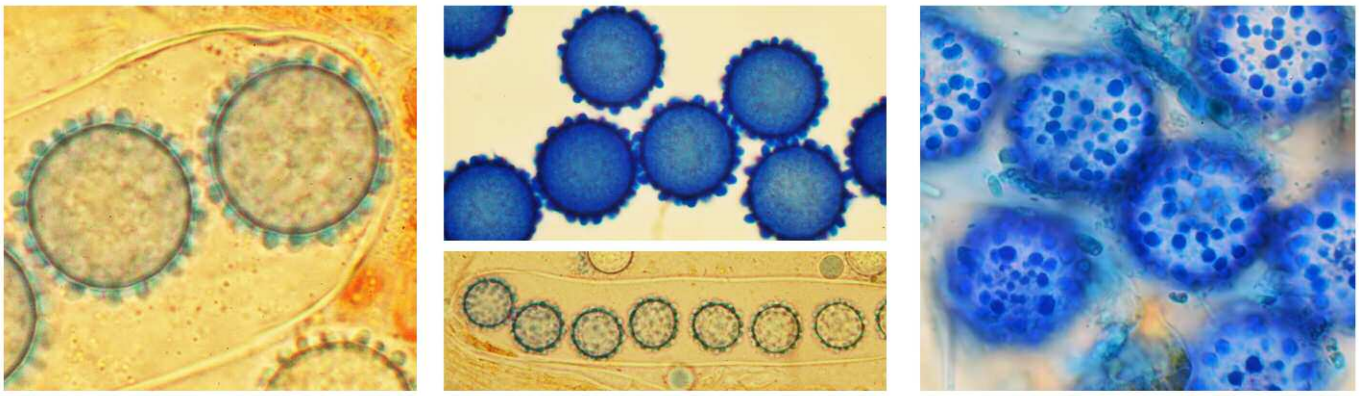

Fig. 3 – *Scutellinia citrina* (various collections BJ)

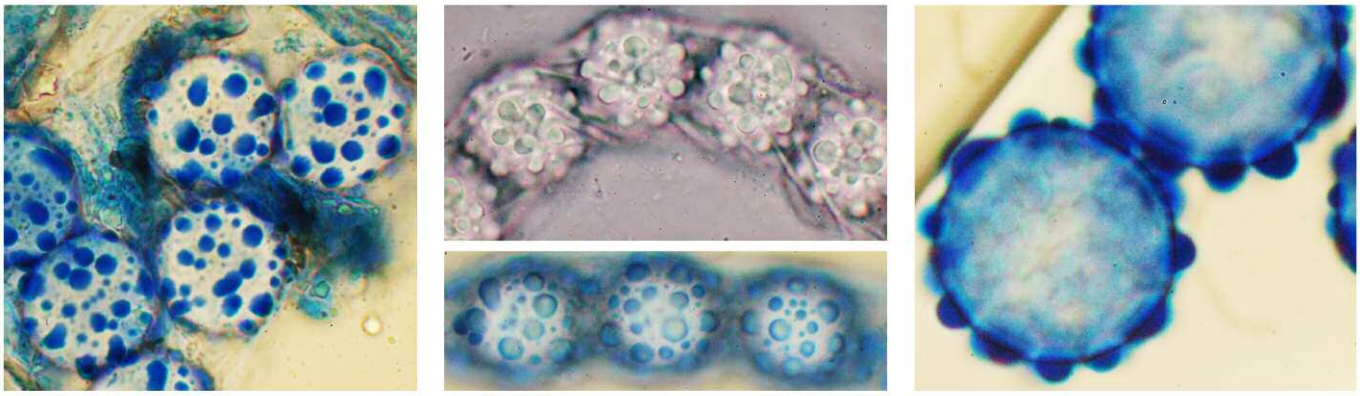

Fig. 4 – *Scutellinia sinensis* (BJ-2013-031)

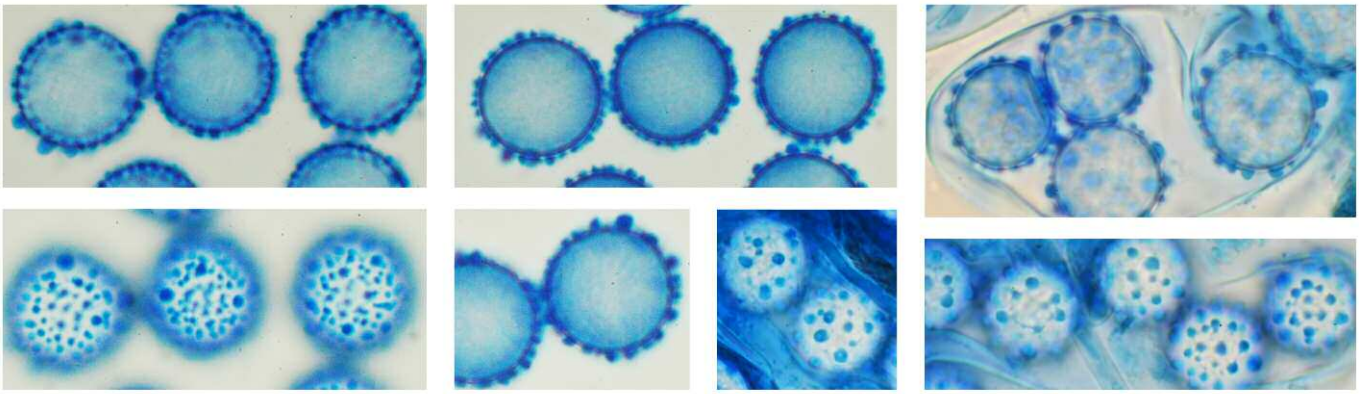

Fig. 5 – *Scutellinia heterosphaera* nom. prov. (BJ-2013-277)

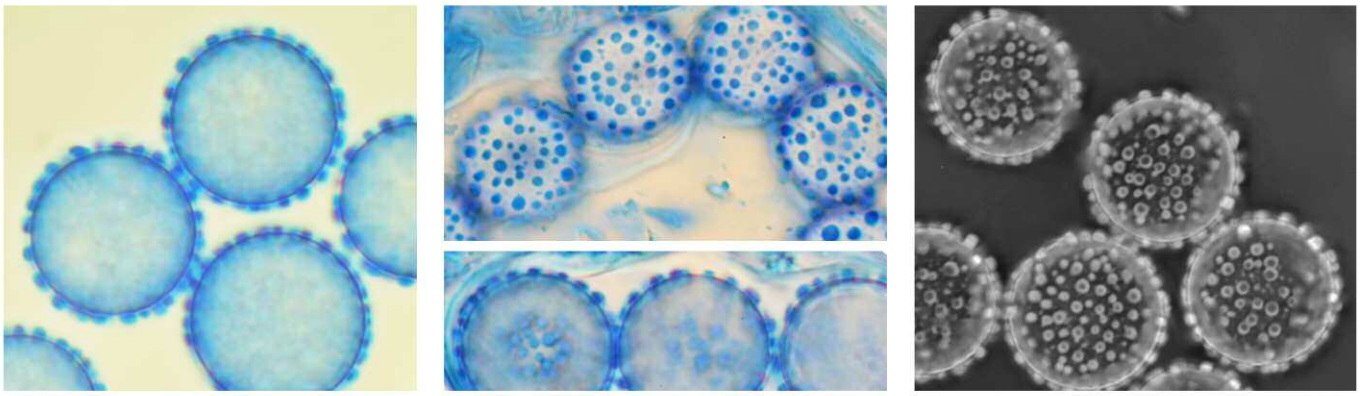

Fig. 6 – *Scutellinia barlae* (various collections BJ)

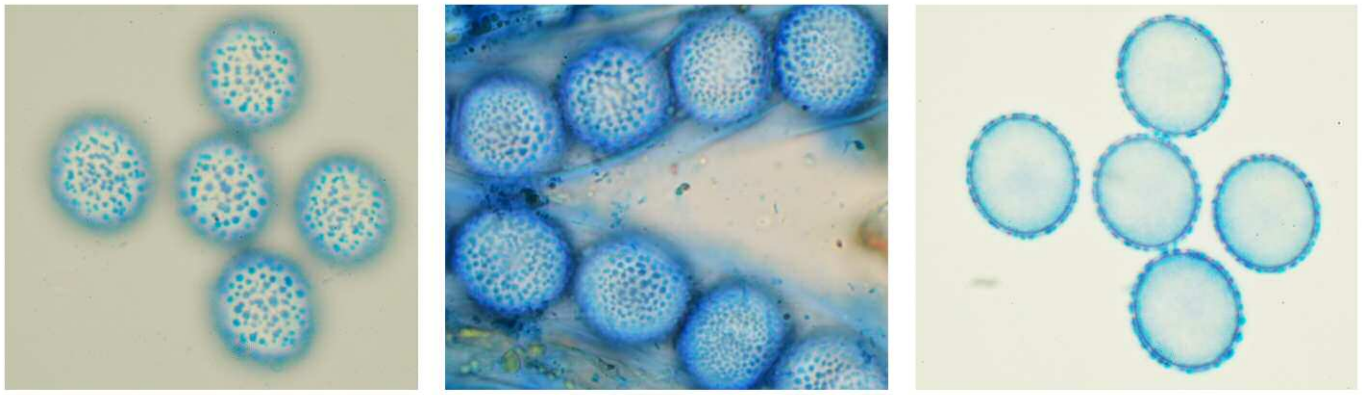

Fig. 7 – *Scutellinia hyperborea* (various collections BJ)

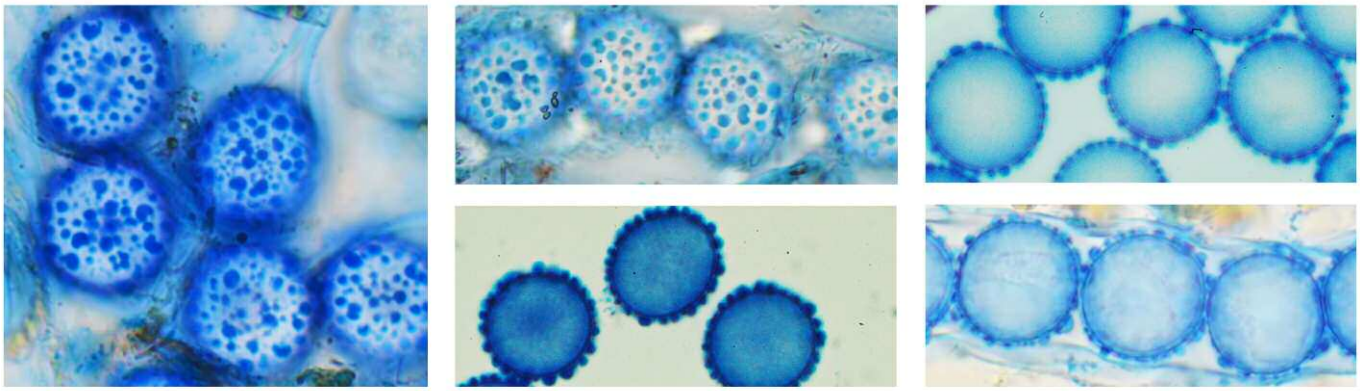

Fig. 8 – *Scutellinia minor* (various collections BJ)

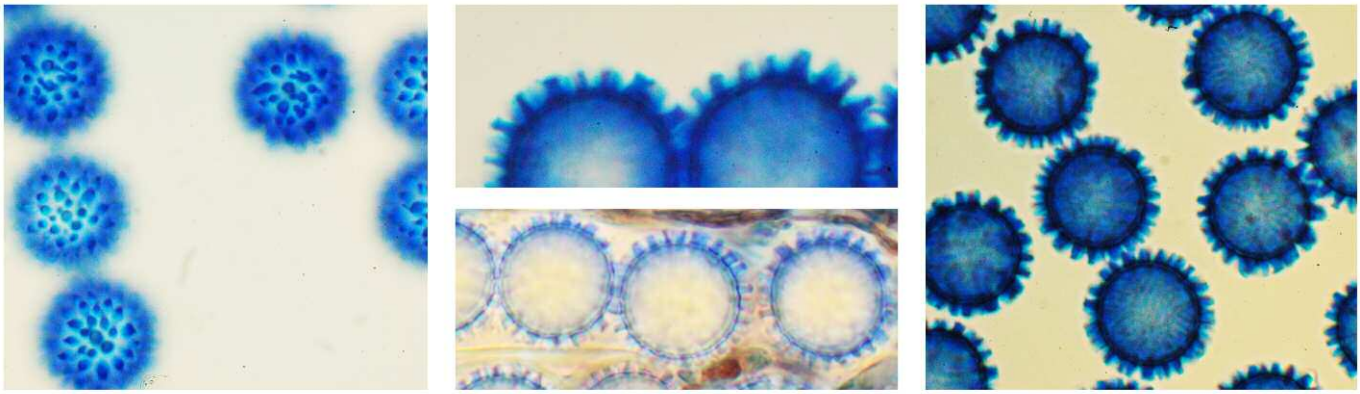

Fig. 9 – *Scutellinia trechispora* (various collections BJ)

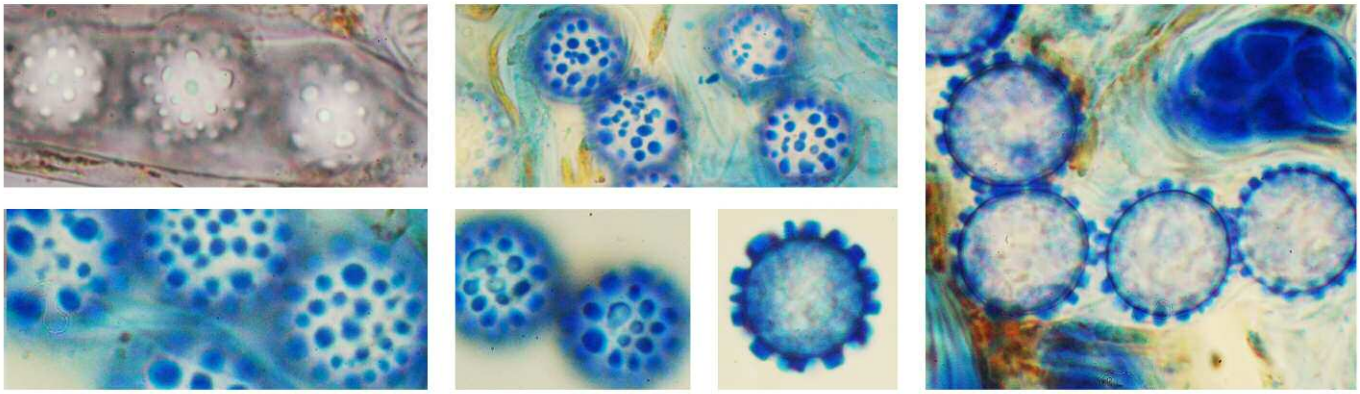

Fig. 10 – *Scutellinia rotadentata* nom. prov. (BJ-2013-034)

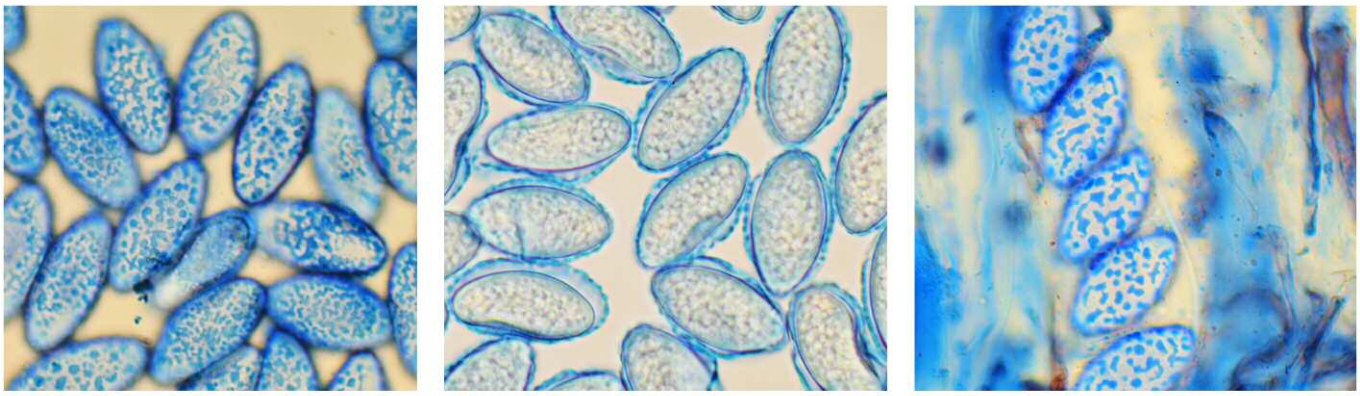

Fig. 11 – *Scutellinia mirabilis* (various collections BJ)

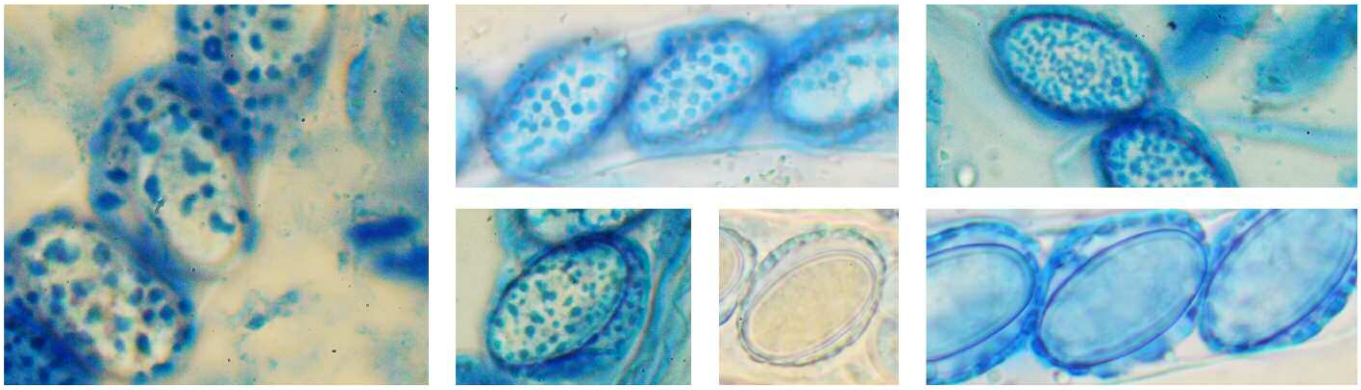

Fig. 12 – *Scutellinia superba* (lectotype PRM 150964 and isotype CUP 63169)

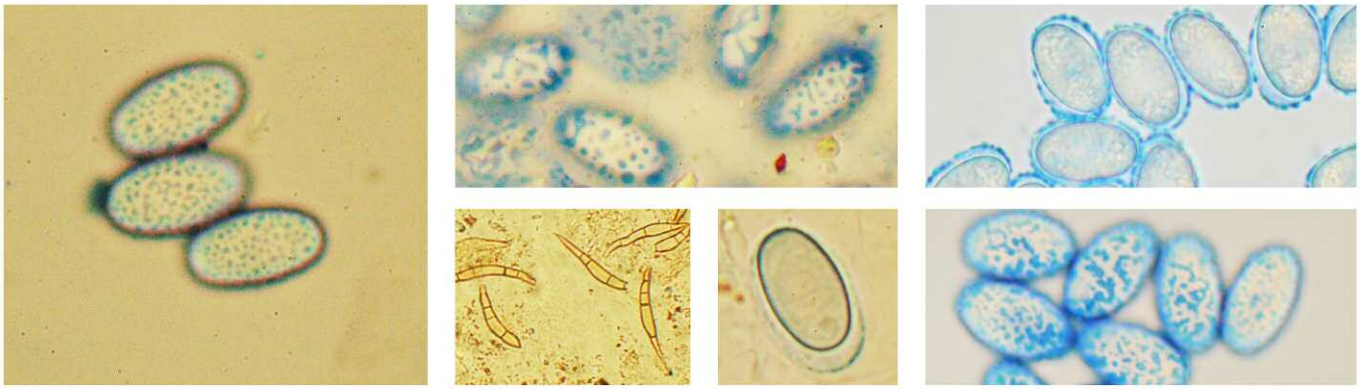

Fig. 13 – *Scutellinia minutella* (various collections BJ)

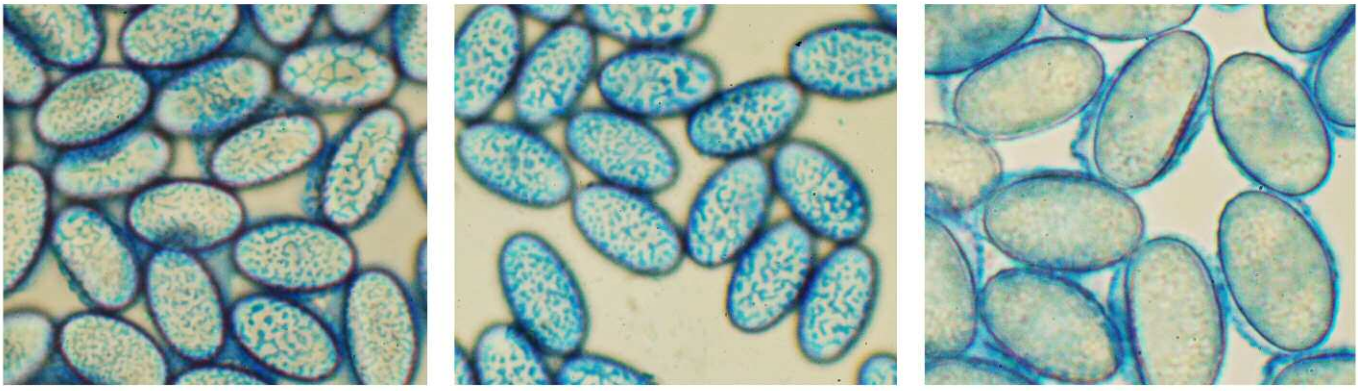

Fig. 14 – *Scutellinia torrentis* (various collections BJ)

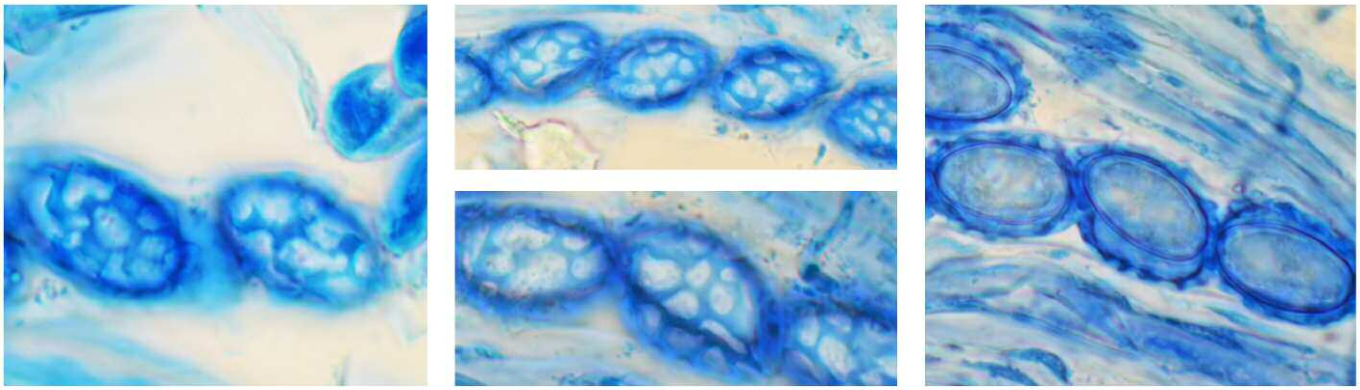

Fig. 15 – *Scutellinia pseudotrechispora* (various collections BJ)

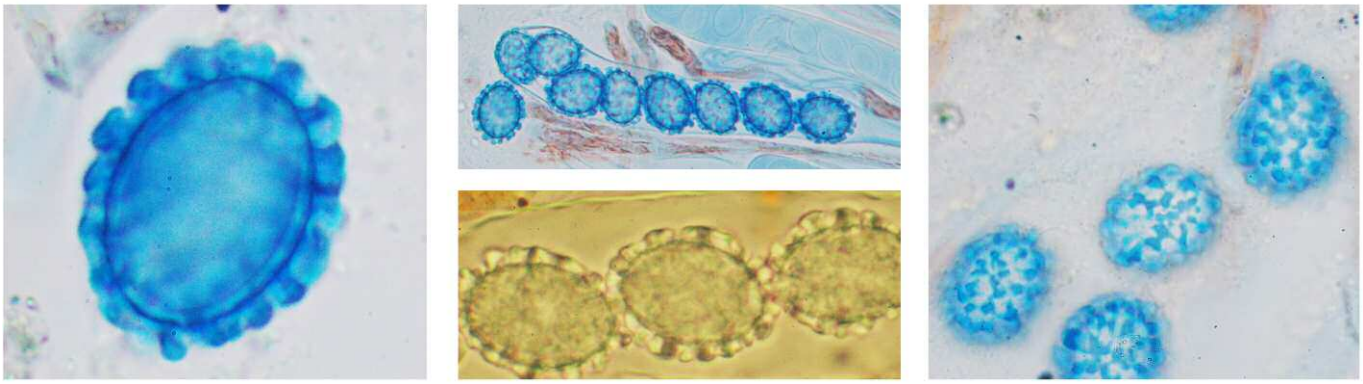

Fig. 16 – *Scutellinia decipiens* (various collections BJ)

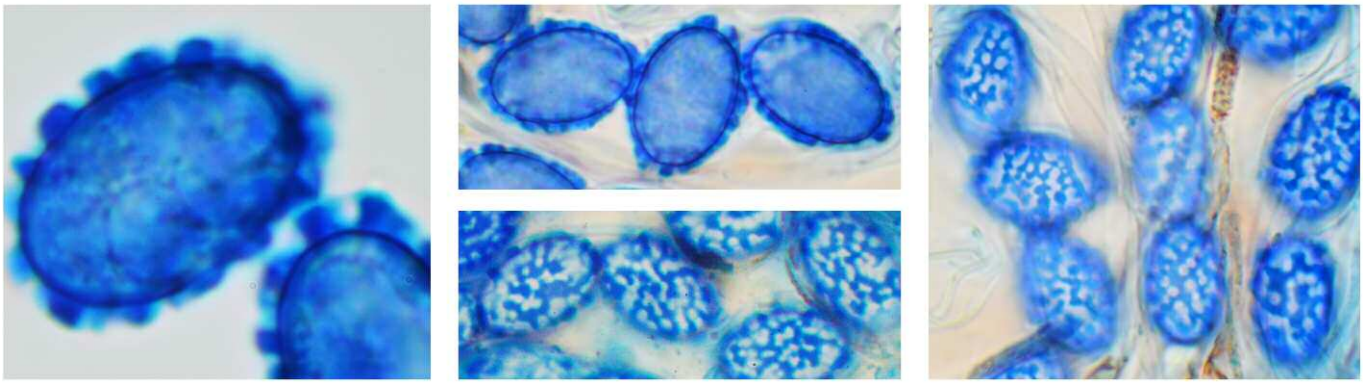

Fig. 17 – *Scutellinia pennsylvanica* (various collections BJ)

Fig. 18 – *Scutellinia setosa* (various collections BJ)

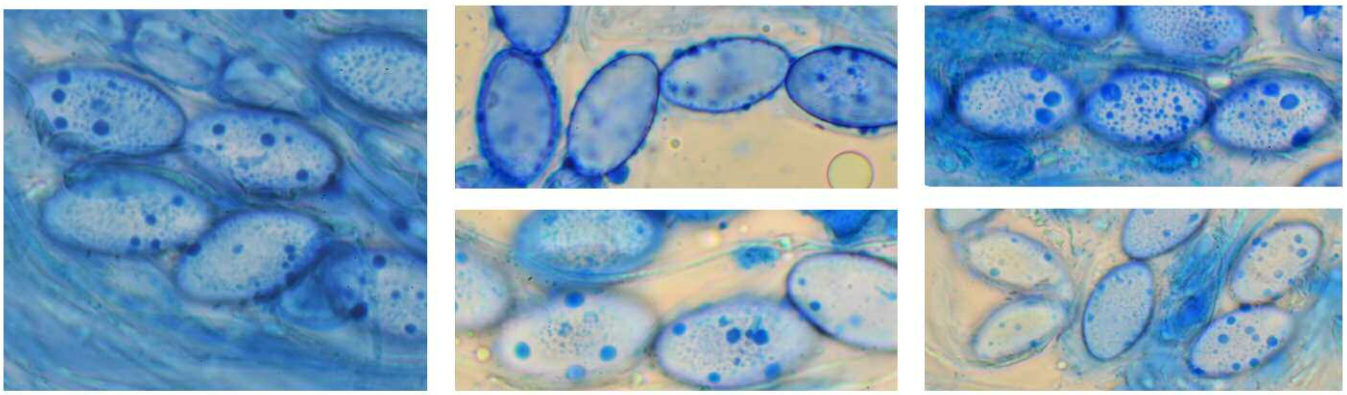

Fig. 19 – *Scutellinia heterosculpturata* (*typus* and various collections BJ)

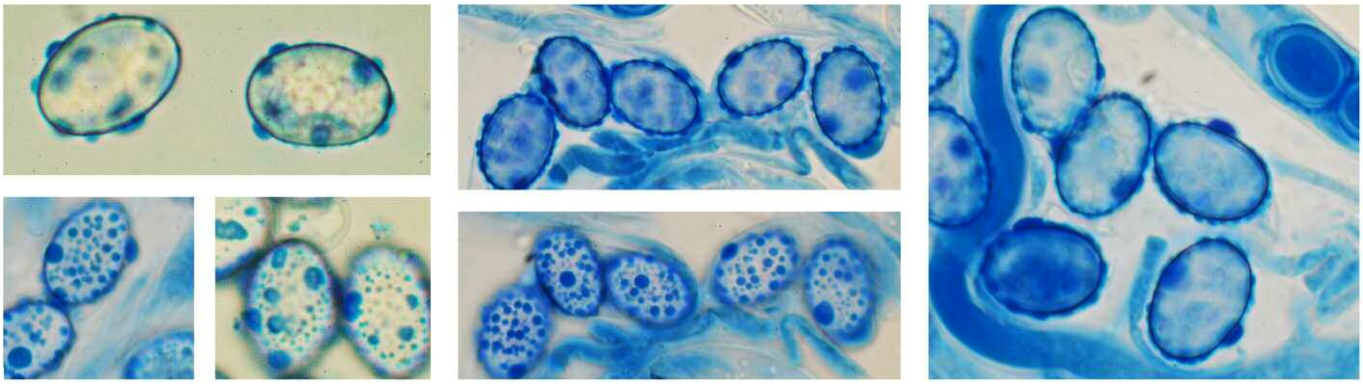

Fig. 20 – *Scutellinia variornata* nom. prov. (various collections BJ)

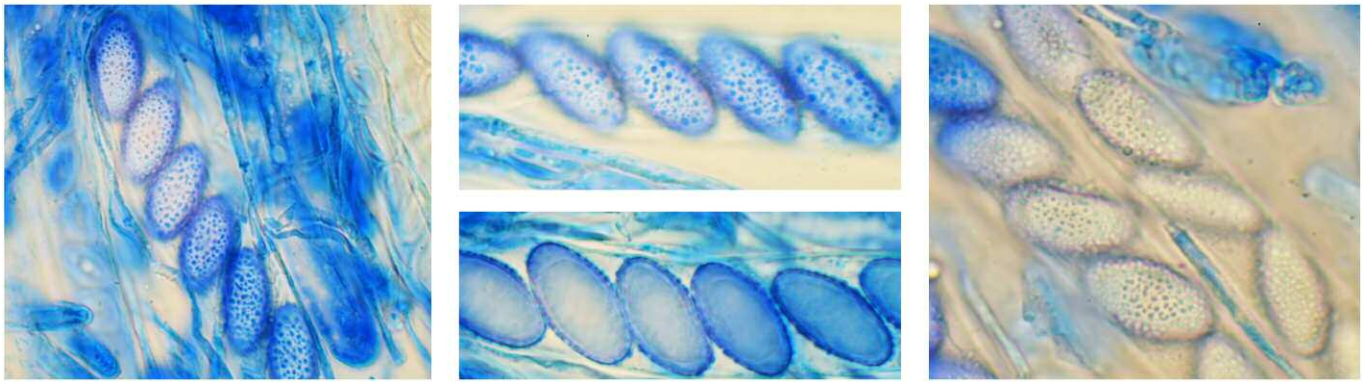

Fig. 21 – *Scutellinia hirta* s. Kullman? (various collections BJ)

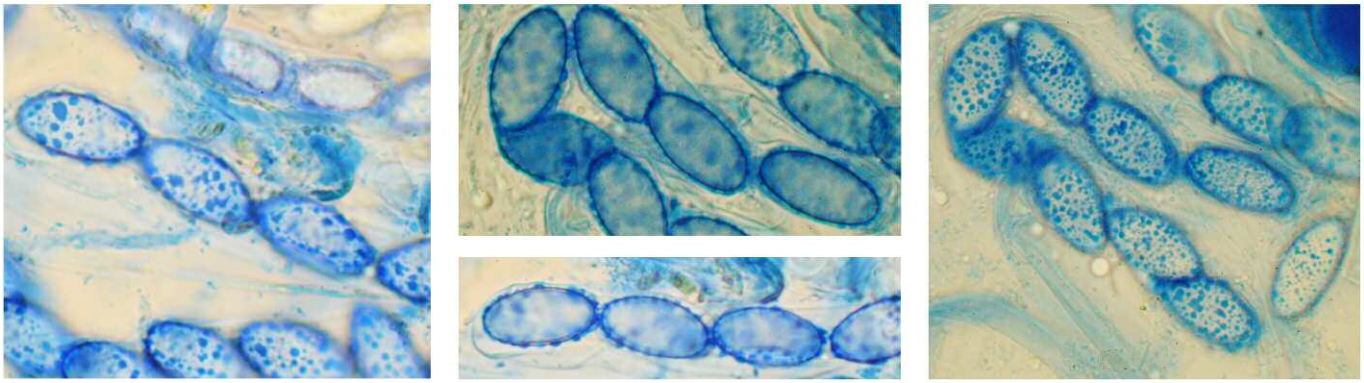

Fig. 22 – *Scutellinia cejpii* (various collections BJ)

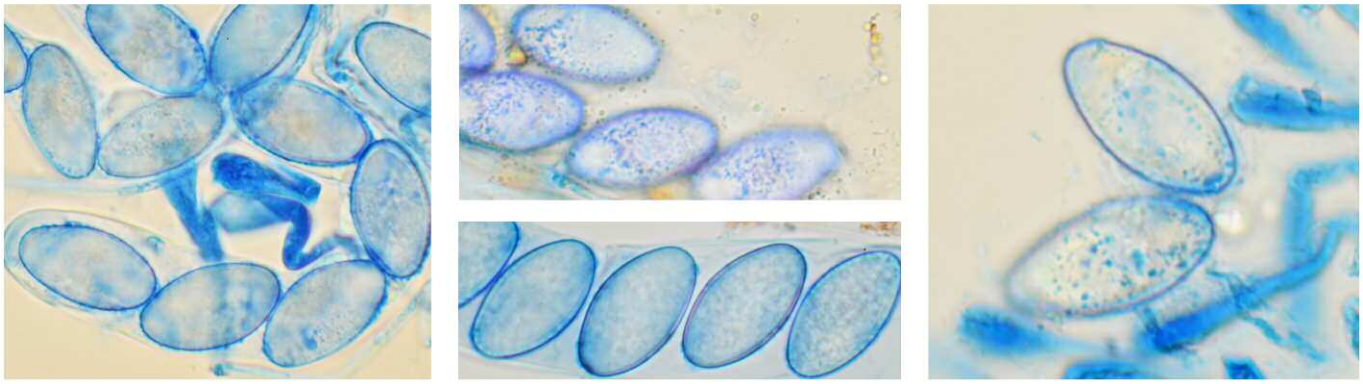

Fig. 23 – *Scutellinia macrospora* (various collections BJ)

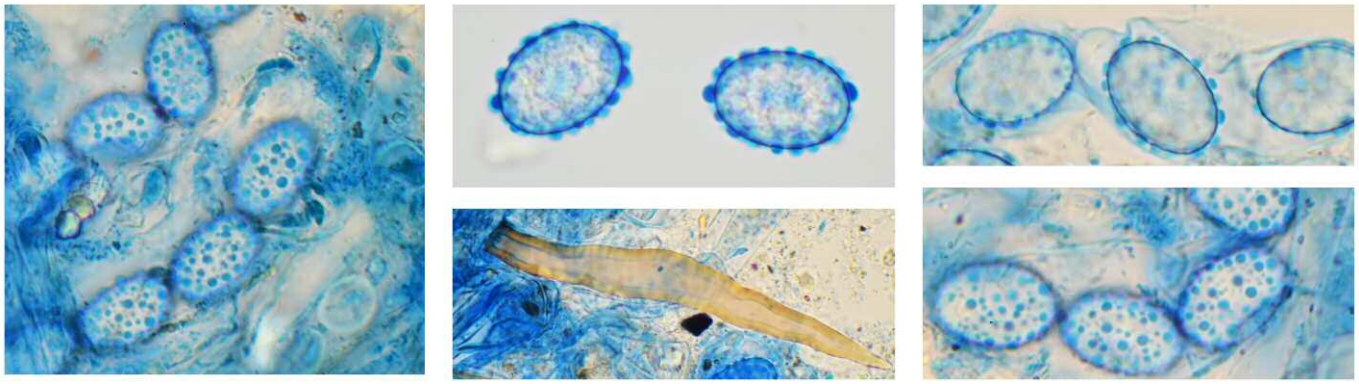

Fig. 24 – *Scutellinia ahmadii* (various collections BJ)

Fig. 25 – *Scutellinia pseudoumbrarum*? (isotype CUP-63167)

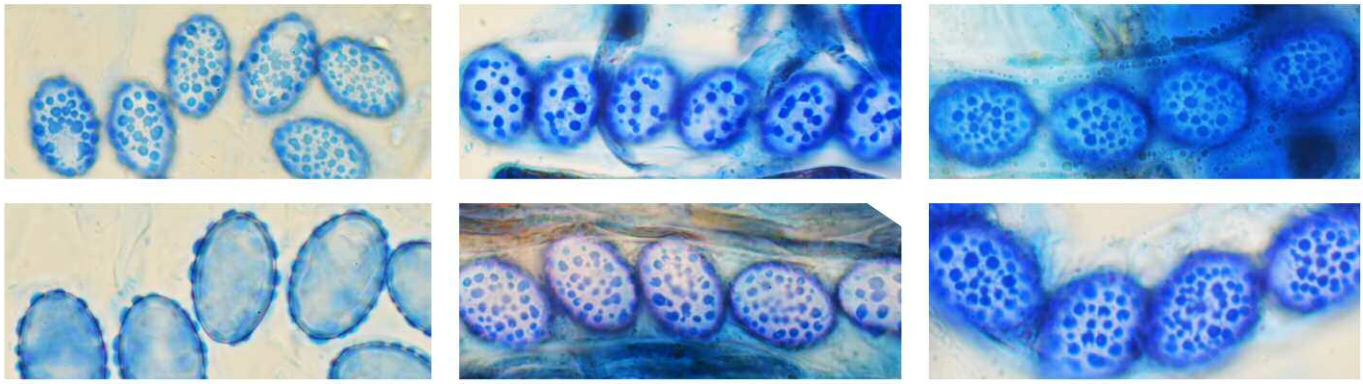

Fig. 26 – *Scutellinia umbrarum* complex (various collections BJ)

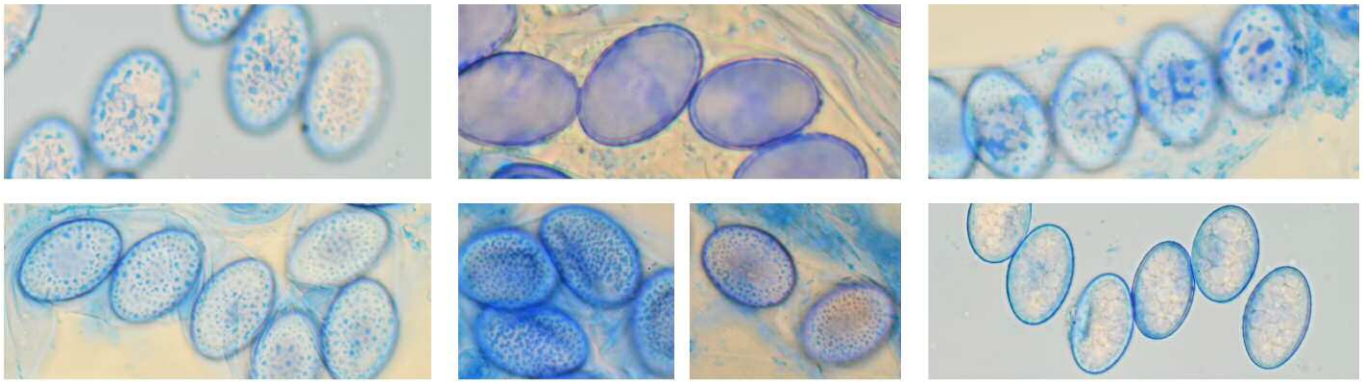

Fig. 27 – *Scutellinia nigrohirtula* complex (various collections BJ)

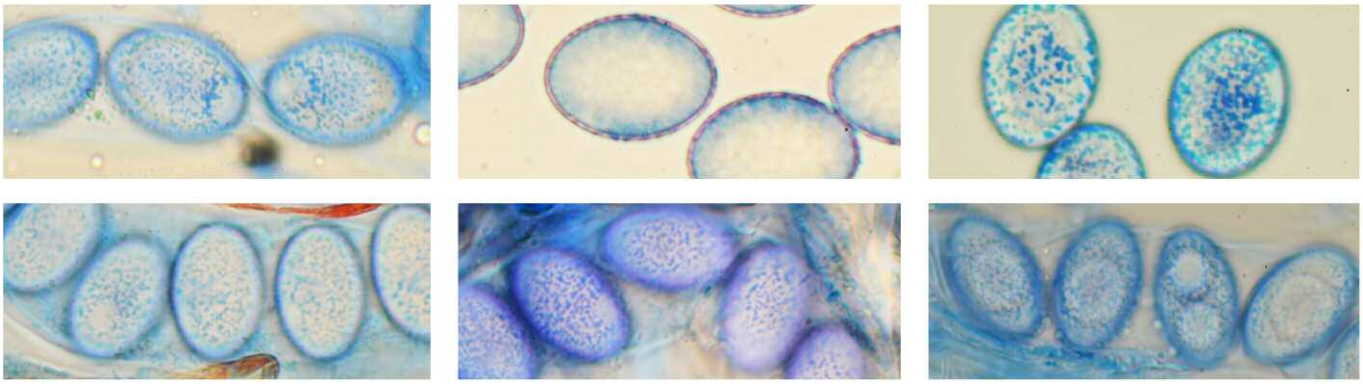

Fig. 28 – *Scutellinia kerguelensis* complex (various collections BJ)

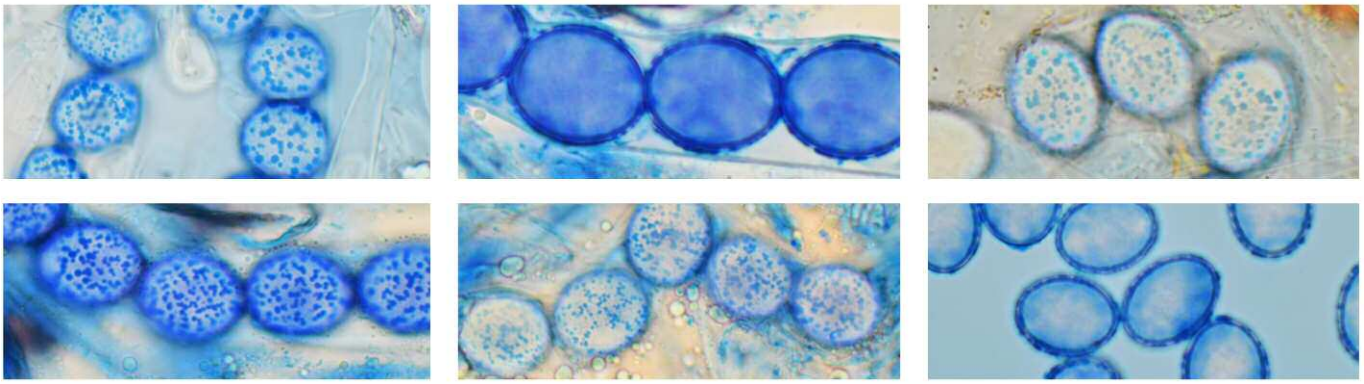

Fig. 29 – *Scutellinia patagonica* (holotype K(M)32153 and various collections BJ)

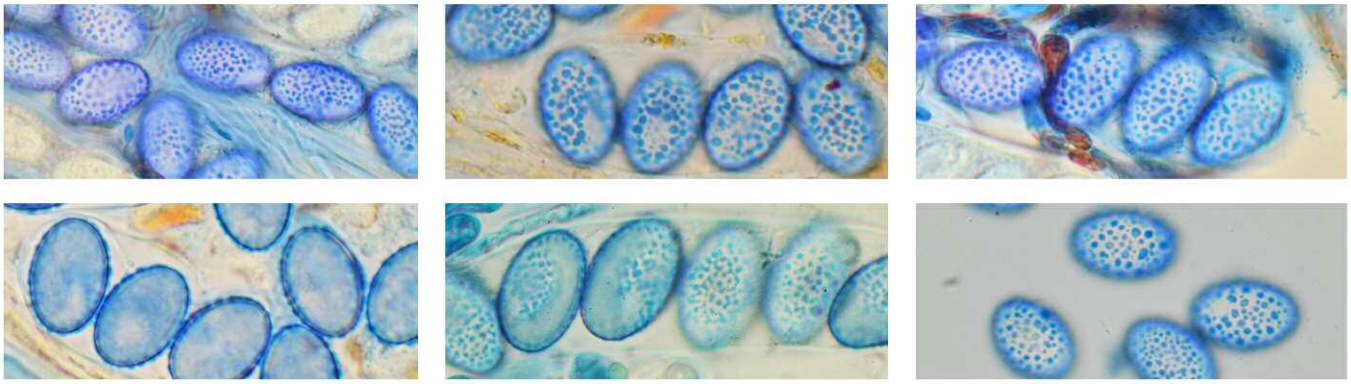

Fig. 30 – *Scutellinia subhirtella* (holotype PRM 616842 and various collections BJ)

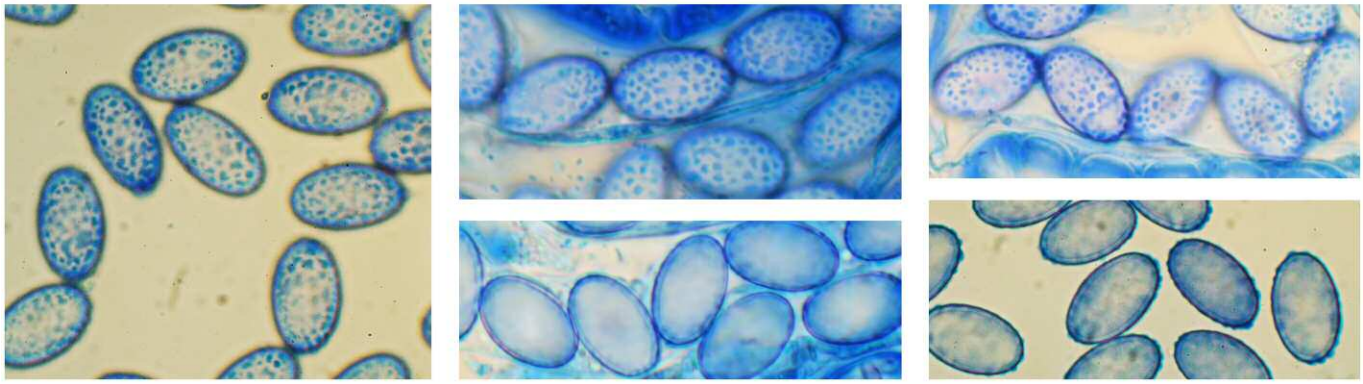

Fig. 31 – *Scutellinia vitreola* (various collections BJ)

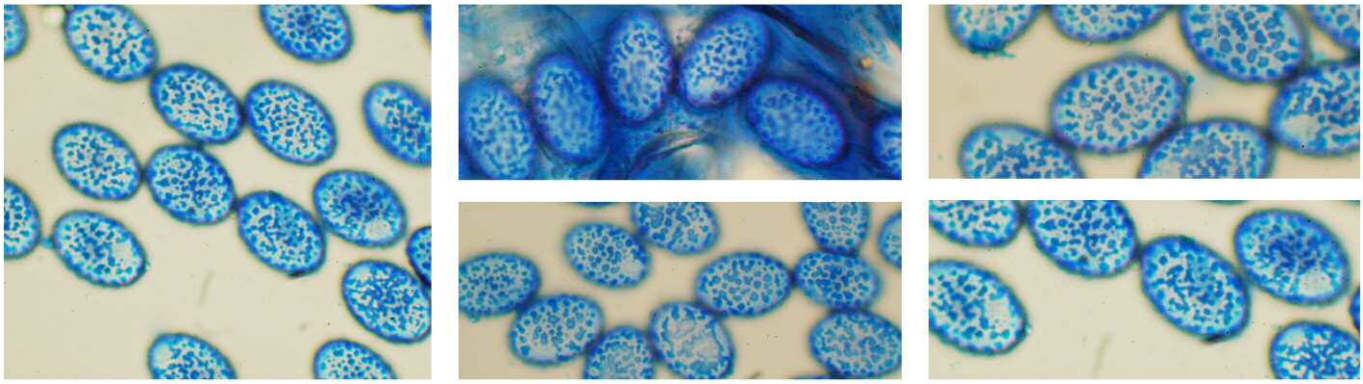

Fig. 32 – *Scutellinia pulchrornata* nom. prov. (various collections BJ)

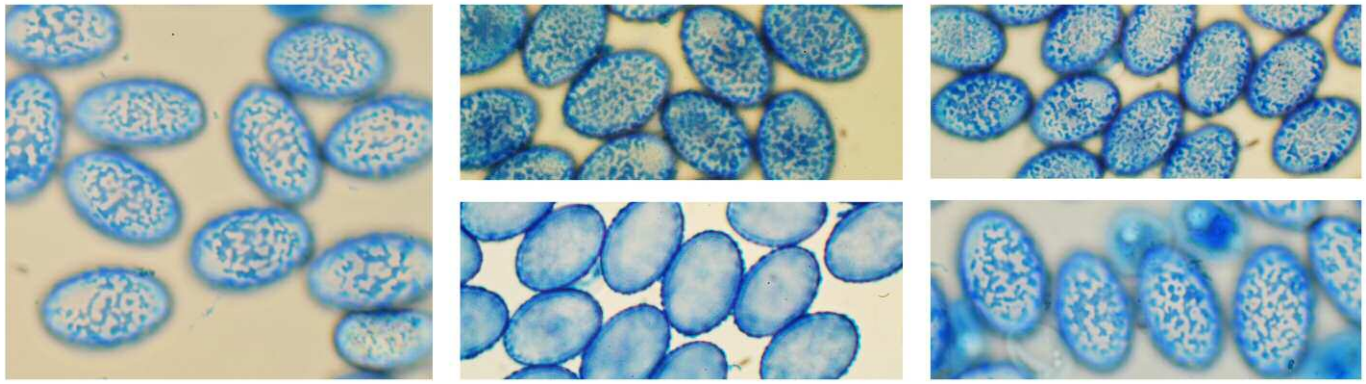

Fig. 33 – *Scutellinia olivascens* (various collections BJ)

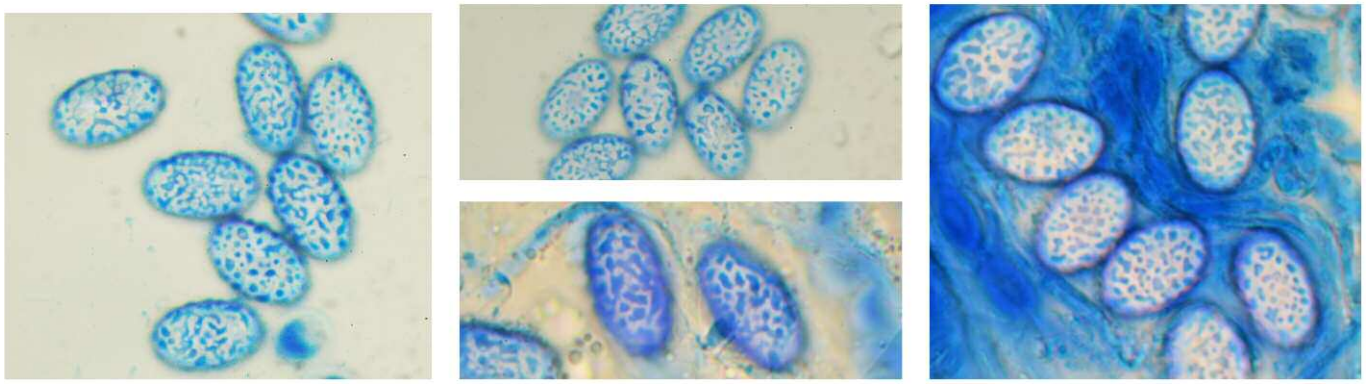

Fig. 34– *Scutellinia colensoi* (various collections BJ)

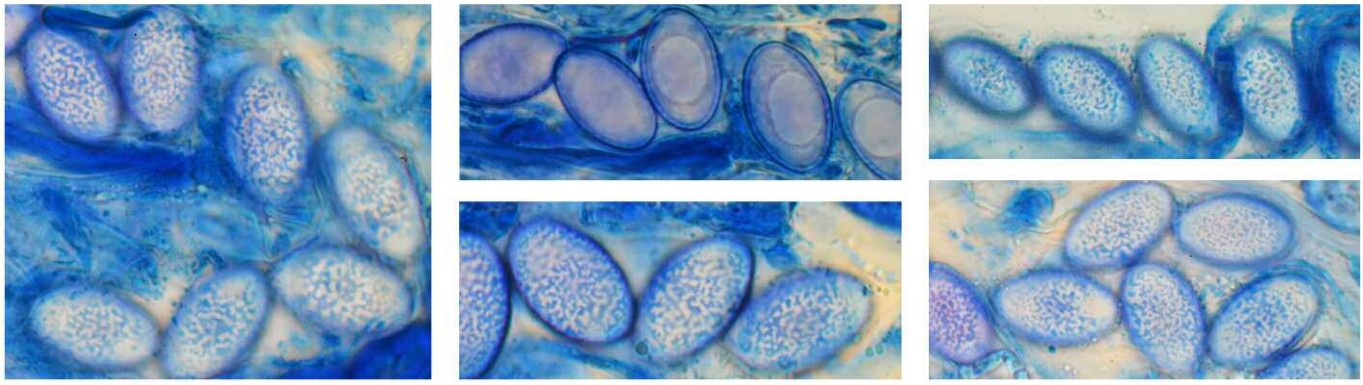

Fig. 35 – *Scutellinia pilatii* (various collections BJ)

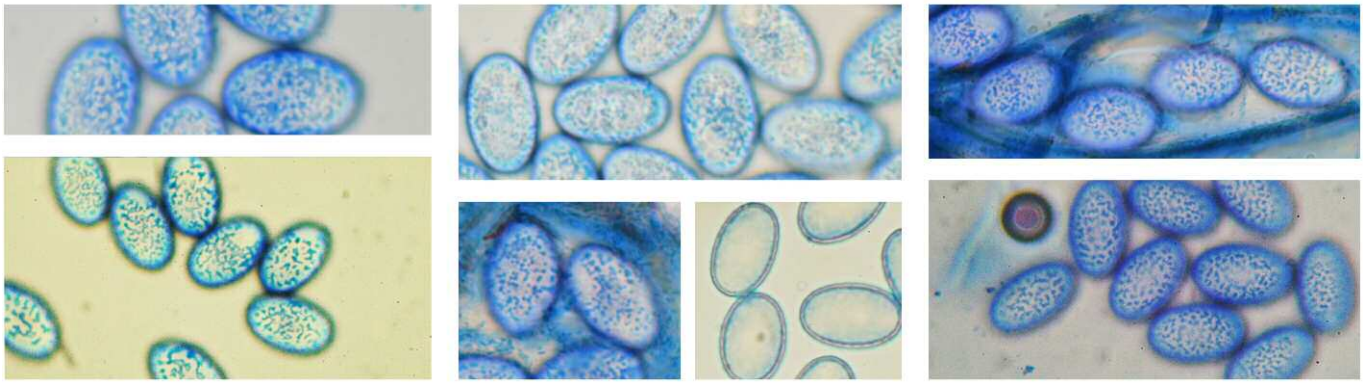

Fig. 36 – *Scutellinia crinita* (various collections BJ)

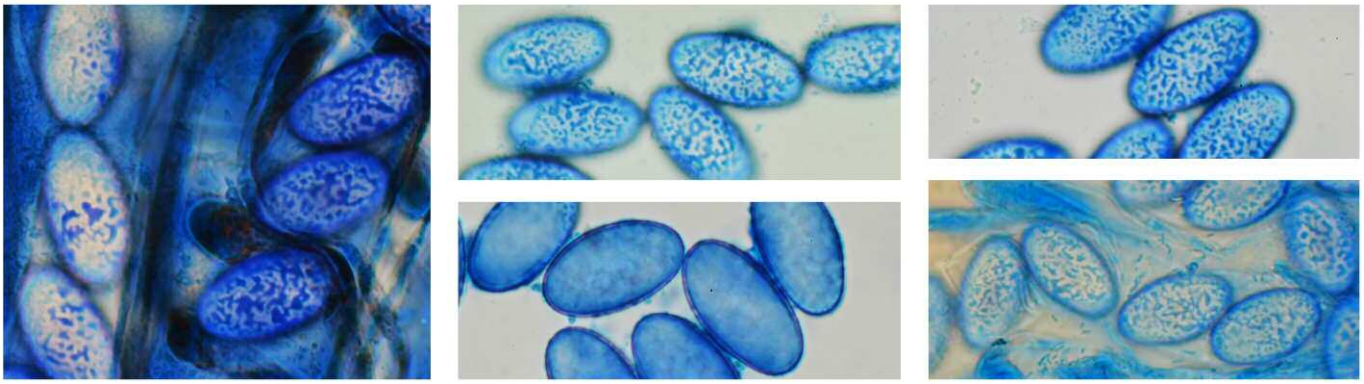

Fig. 37 – *Scutellinia scutellata* complex (various collections BJ)

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