

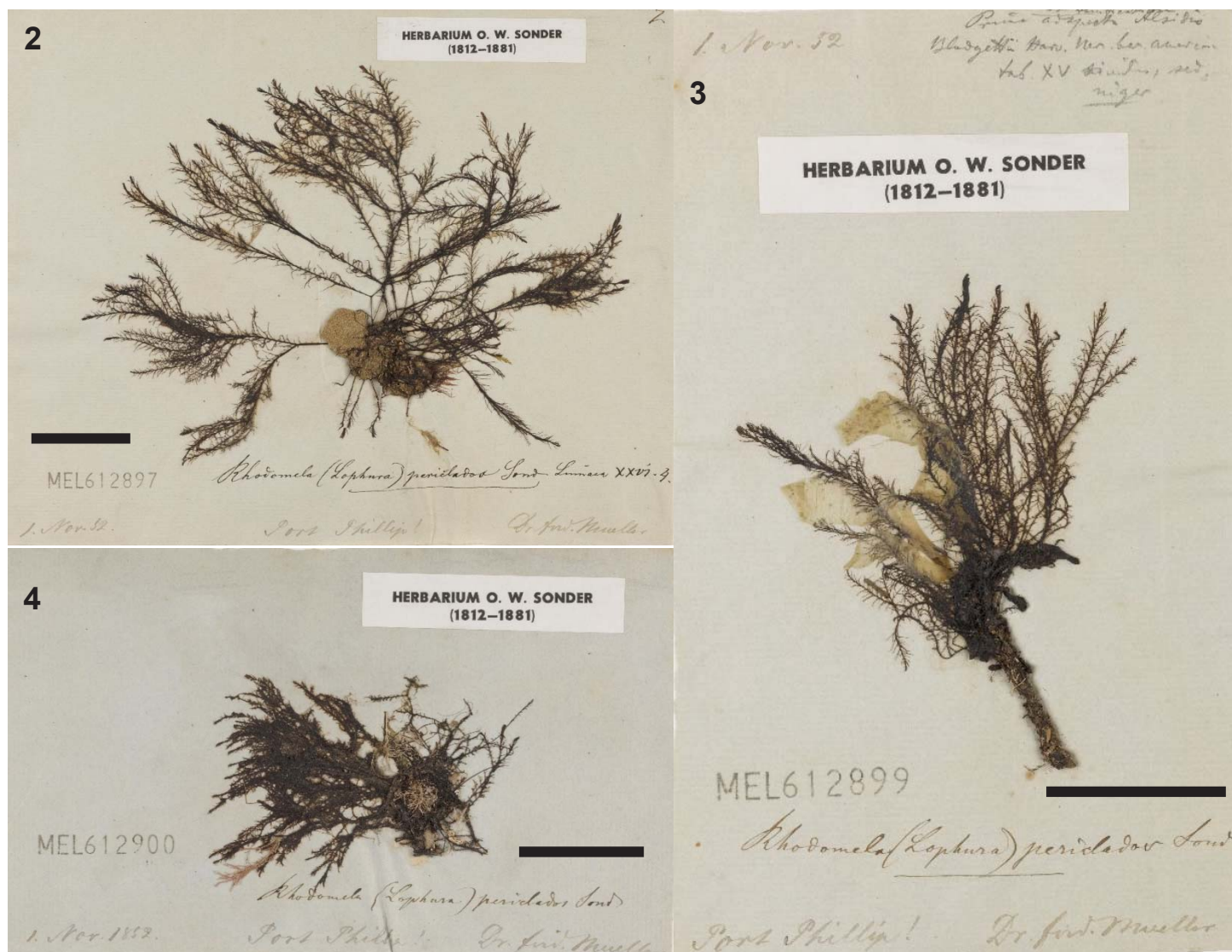
Reassessment of the genus *Lophurella* (Rhodomelaceae, Rhodophyta) from Australia and New Zealand reveals four cryptic species

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**Figs S1-32.** Habit of specimens of *Lophurella* spp. from Australasia.



**Fig. S1.** *Lophurella periclados*. Lectotype. Scale bar: 3 cm. Reproduced with permission from the Royal Botanic Gardens Victoria.

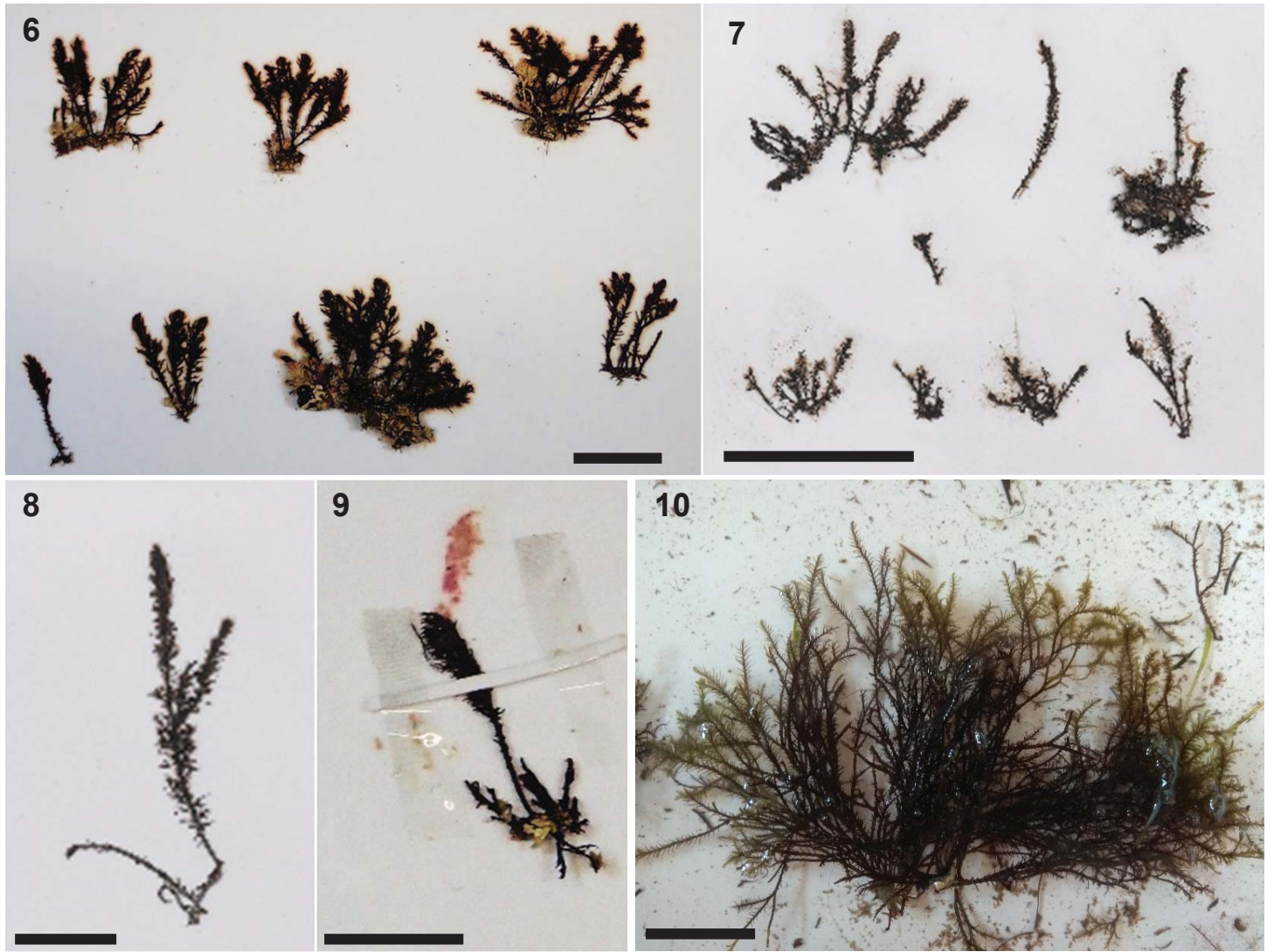


**Figs S2-4.** *Lophurella pericladus*. Isolectotypes. Scale bars: 3 cm. Reproduced with permission from the Royal Botanic Gardens Victoria.



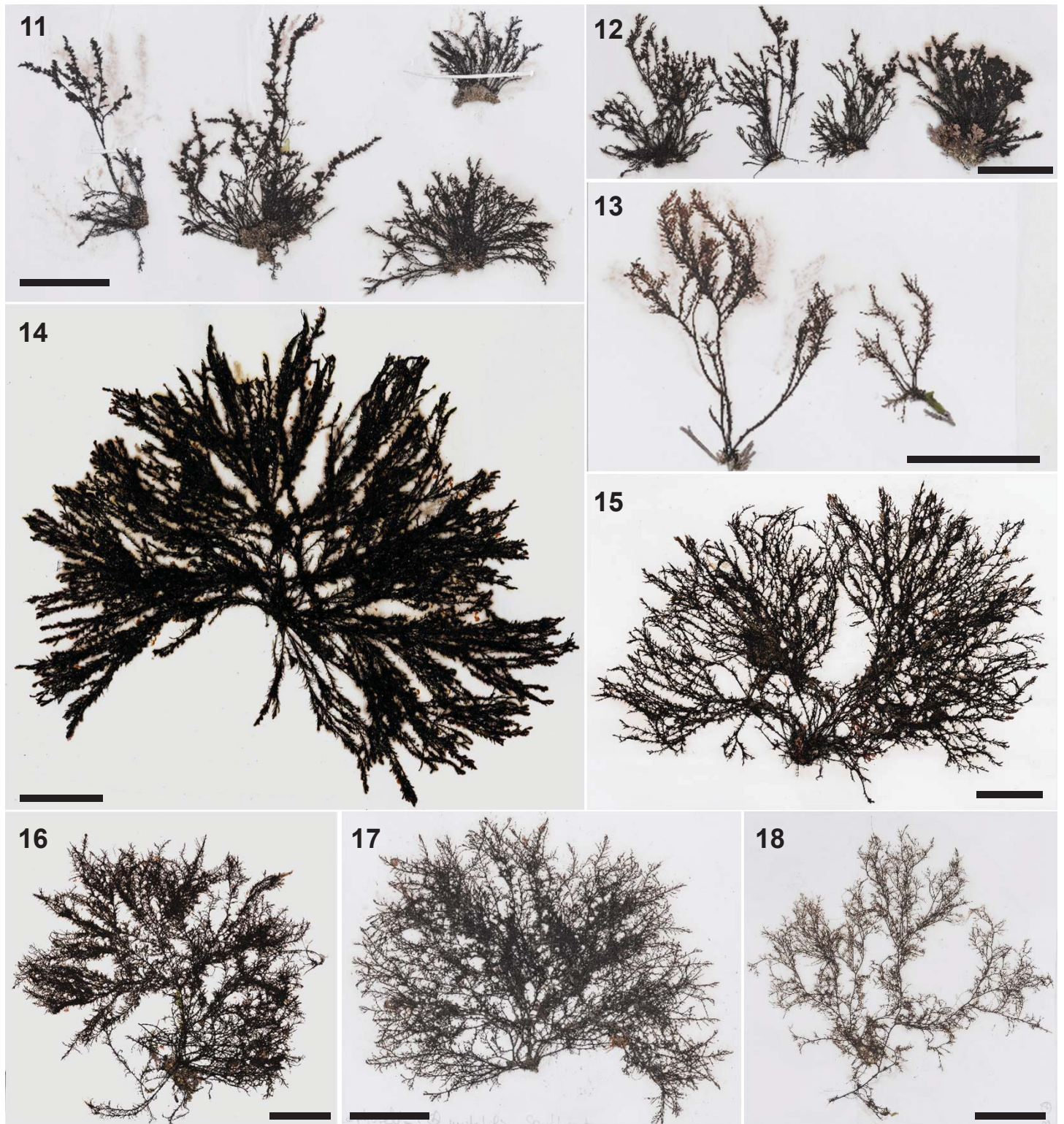


**Fig. S5.** *Lophurella caespitosa*. Specimen ASR202 (WELT A033734). Scale bar: 3 cm.



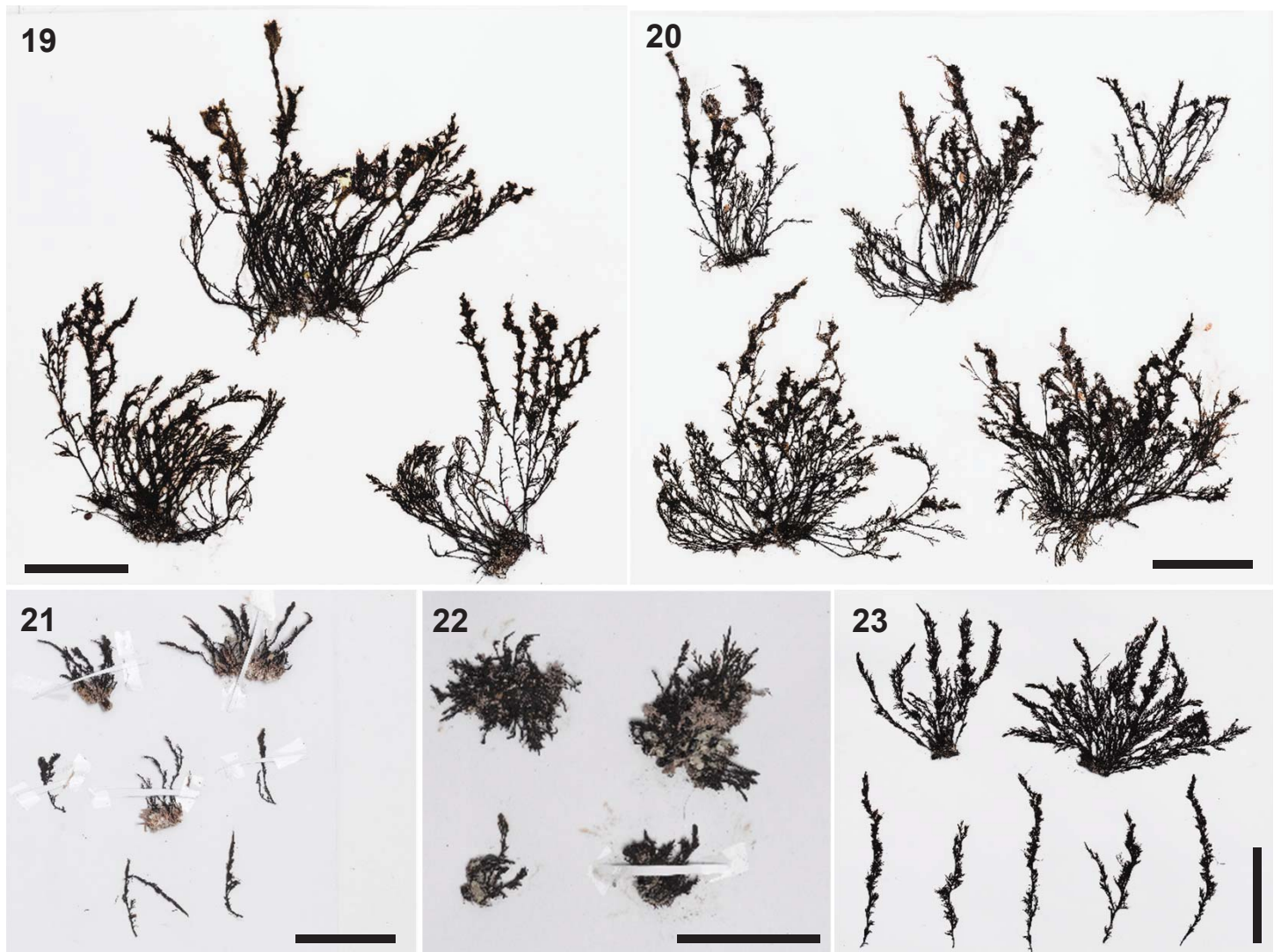
**Figs S6-10.** *Lophurella pericladus*. **Fig S6.** Specimen PD2866. **Fig S7.** Specimen PD772. **Fig S8.** Specimen PD2915. **Fig S9.** Specimen PD2746. **Fig S10.** Specimen PD4790. Scale bars: Fig S6, 1.5 cm; Figs S7 and S10, 3 cm; Figs S8 and 9, 1 cm.





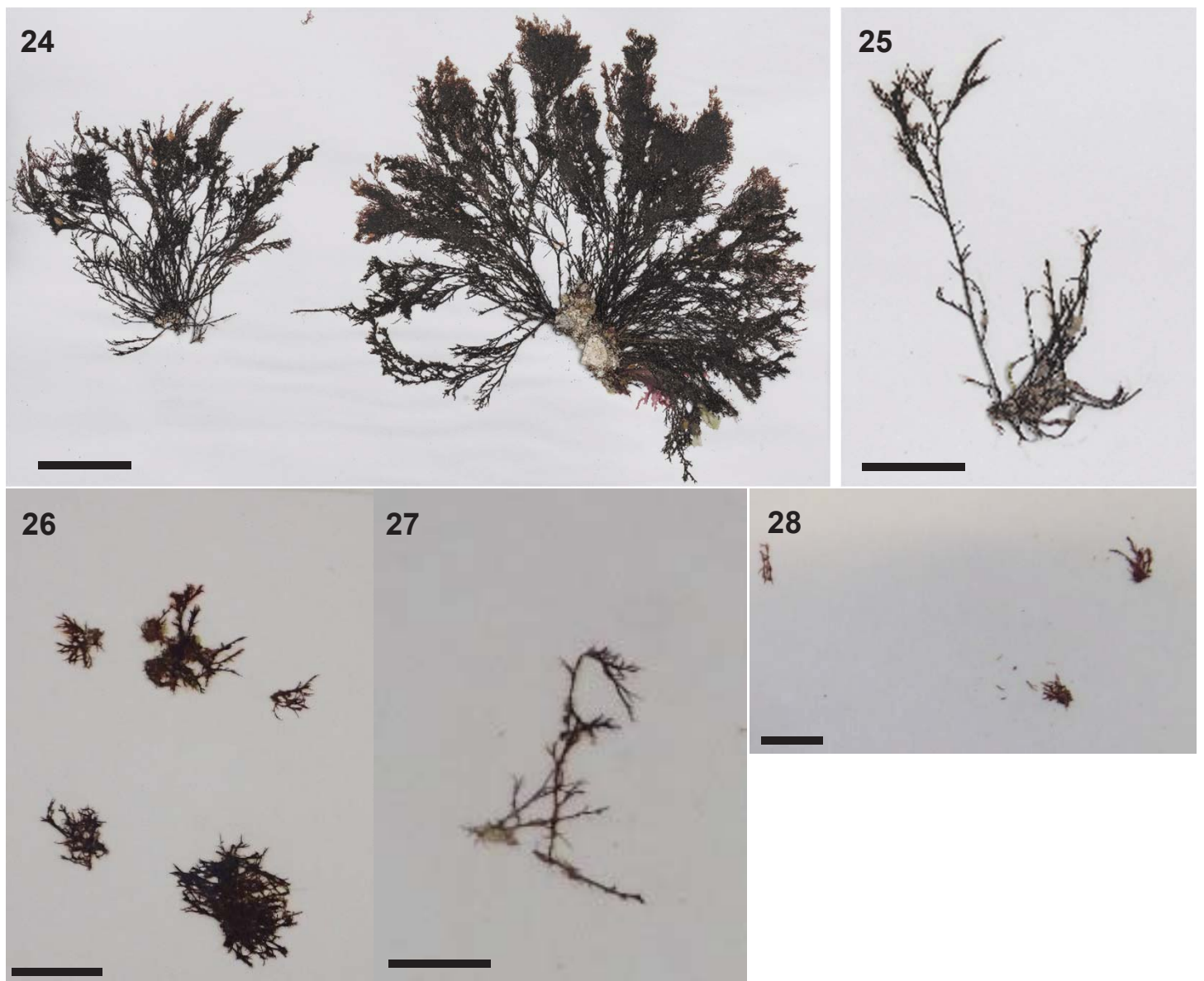
**Figs S11-18.** *Lophurella mutabilis*. **Fig. S11.** Specimen PD3075 (Holotype, MELUA118884a). **Fig. S12.** Specimen PD3079. **Fig. S13.** Specimen PD3093. **Fig. S14.** Specimen ASR85. **Fig. S15.** Specimen PD3106. **Fig. S16.** Specimen PD3139. **Fig. S17.** Specimen PD3164. **Fig. S18.** Specimen PD3172. Scale bars: 3 cm.



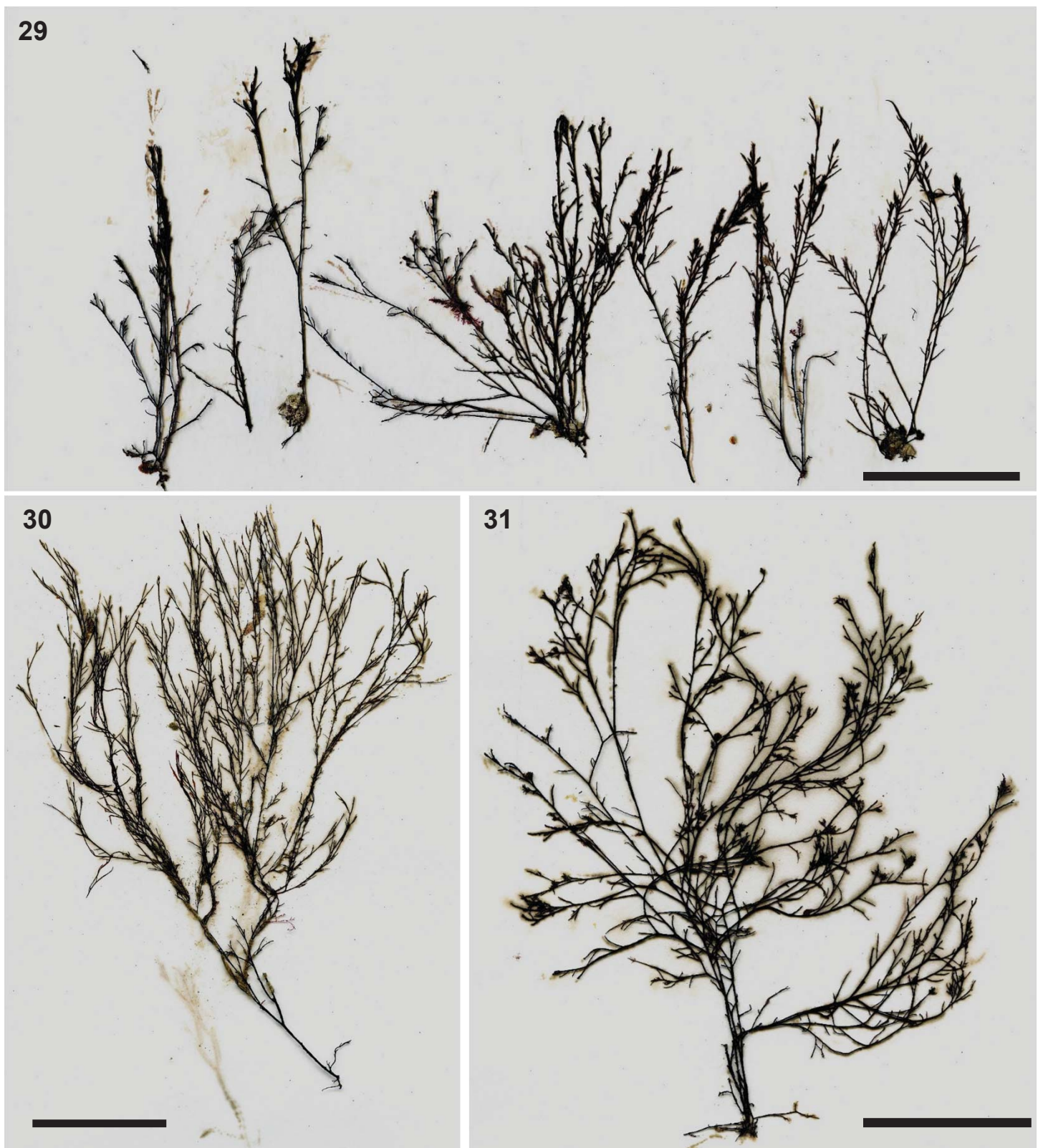


**Figs S19-23.** *Lophurella mutabilis*. **Fig. S19.** Specimen PD3483. **Fig. S20.** Specimen PD3478. **Fig. S21.** Specimen PD3376. **Fig. S22.** Specimen PD3411. **Fig. S23.** Specimen PD3457. Scale bars: 3 cm.





**Figs S24-28.** *Lophurella nigra*. **Fig. S24.** Specimen PD3475. **Fig. S25.** Specimen PD3401. **Fig. S26.** Specimen PD2736 (Holotype, MEL2457114). **Fig. S27.** Specimen PD2741. **Fig. S28.** Specimen PD2730. Scale bars: Fig. S24, 3 cm; Fig. S25, 1.5 cm; Fig. S26, 1 cm; Figs S27 and S28, 5 mm.

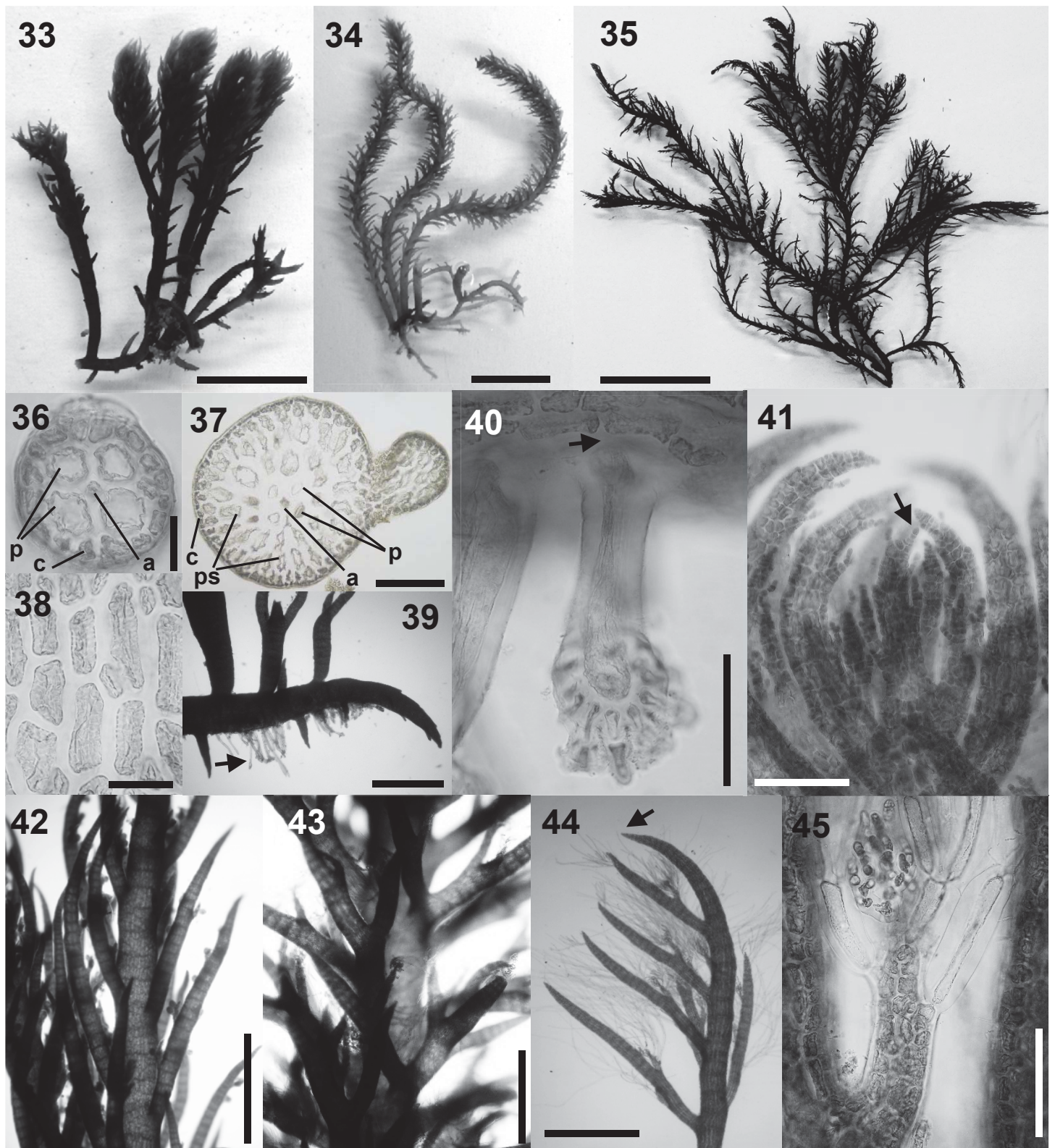


**Figs S29-31.** *Lophurella pauciramulosa*. **Fig. S29.** Specimen ASR175. **Fig. S30.** Specimen ASR 102. **Fig. S31.** Specimen ASR 166 (Holotype, WELT A033737). Scale bars: Figs S29 and S30, 4 cm; Fig. S31, 3.5 c m .



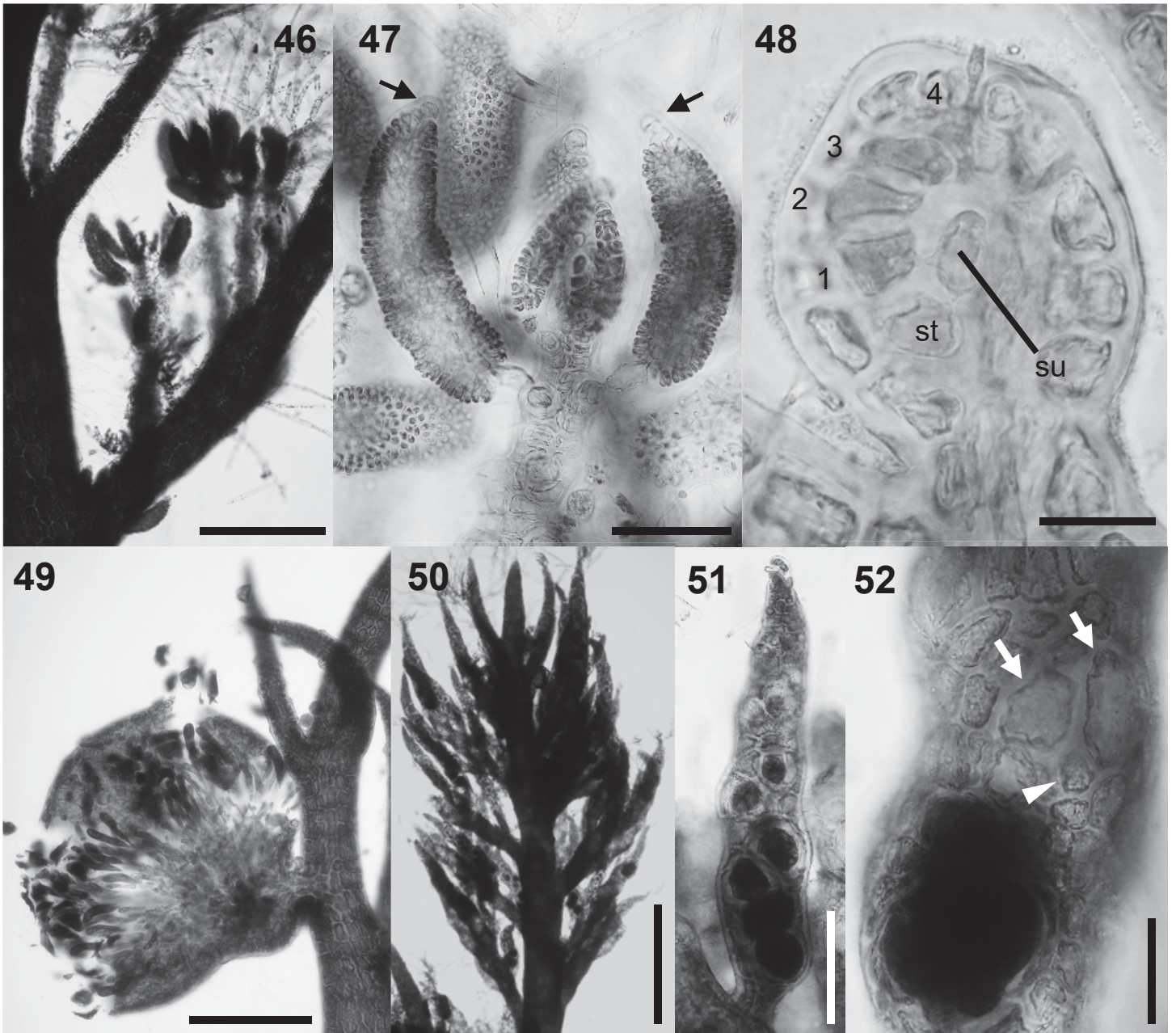


**Fig. S32.** *Lophurella tasmanica*. Specimen PD3584 (Holotype, MELUA118885a). Scale bar: 3 cm.



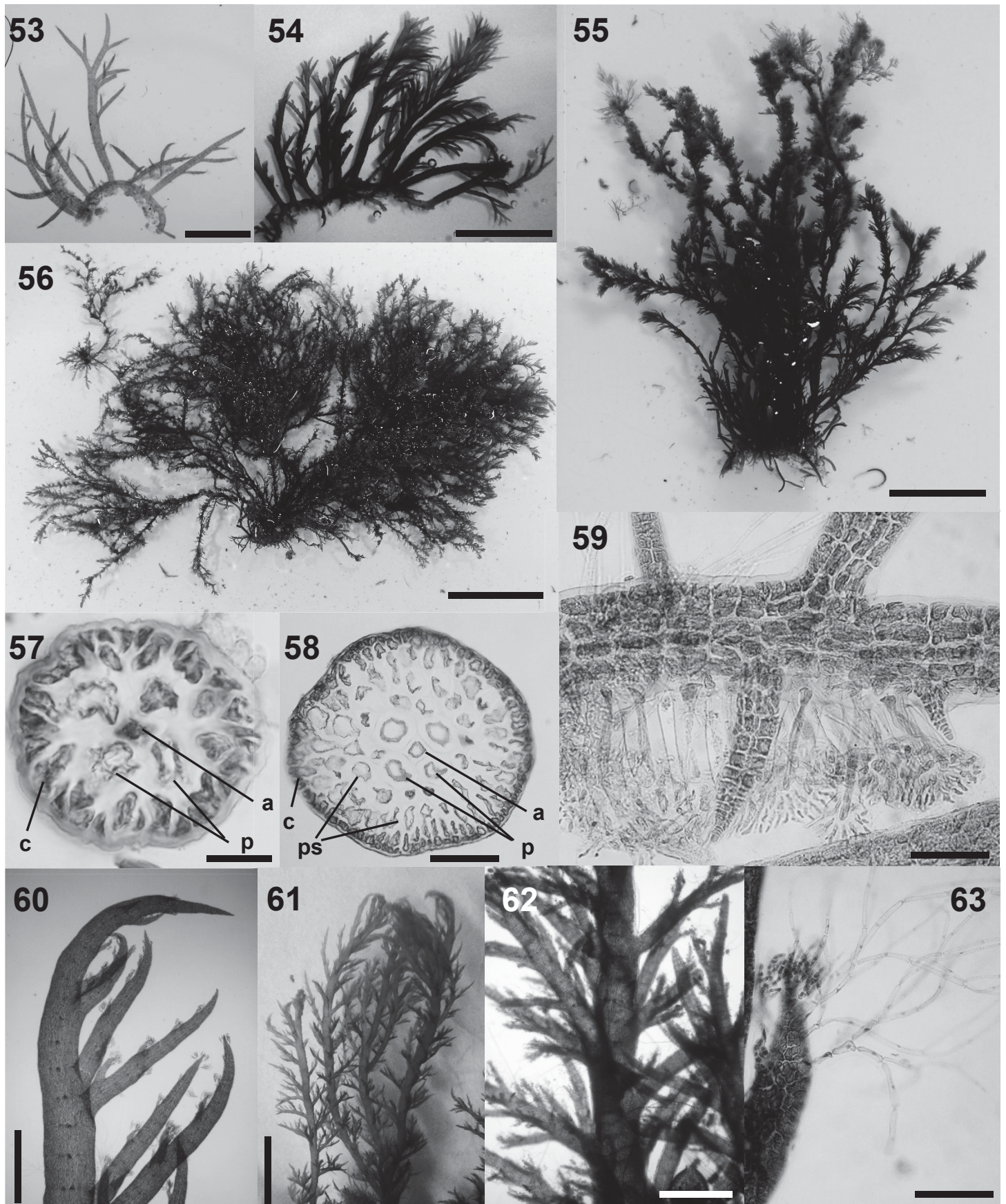
**Figs S33-45.** *Lophurella pericladus*: vegetative morphology. **Figs 33-35.** Habit of specimens PD2746, PD772, PD4787, respectively. **Figs 36-37.** Cross-section of a thallus in the apical part (Fig. 36) and the mid part (Fig. 37), with an axial cell (a), four pericentral cells (p), cortical cells (c) and, only in Fig. 37, pseudoparenchymatous cells (ps). **Fig. 38.** Cortical cells in surface view. **Fig. 39.** Prostrate axes with rhizoids (arrow). **Fig. 40.** Rhizoid cut off (arrow) from cortical cells and with multicellular haptera. **Fig. 41.** Apex of the thallus, the arrow showing the apical cell. **Figs 42-43.** Axes with determinate branches that are simple in the apical parts (Fig. 42) and branched in mid parts (Fig. 43). **Fig. 44.** First-order determinate branch lacking trichoblasts (arrow) and bearing second and third-order branches with trichoblasts. **Fig. 45.** Apex of a third-order determinate branch bearing spirally arranged trichoblasts. Scale bars: Figs 33 and 34, 8 mm; Fig. 35, 15 mm; Fig. 36, 50  $\mu$ m; Fig. 37, 300  $\mu$ m; Fig. 38, 35  $\mu$ m; Figs 39 and 42-44, 850  $\mu$ m; Figs 40 and 45, 100  $\mu$ m; Fig. 41, 150  $\mu$ m.





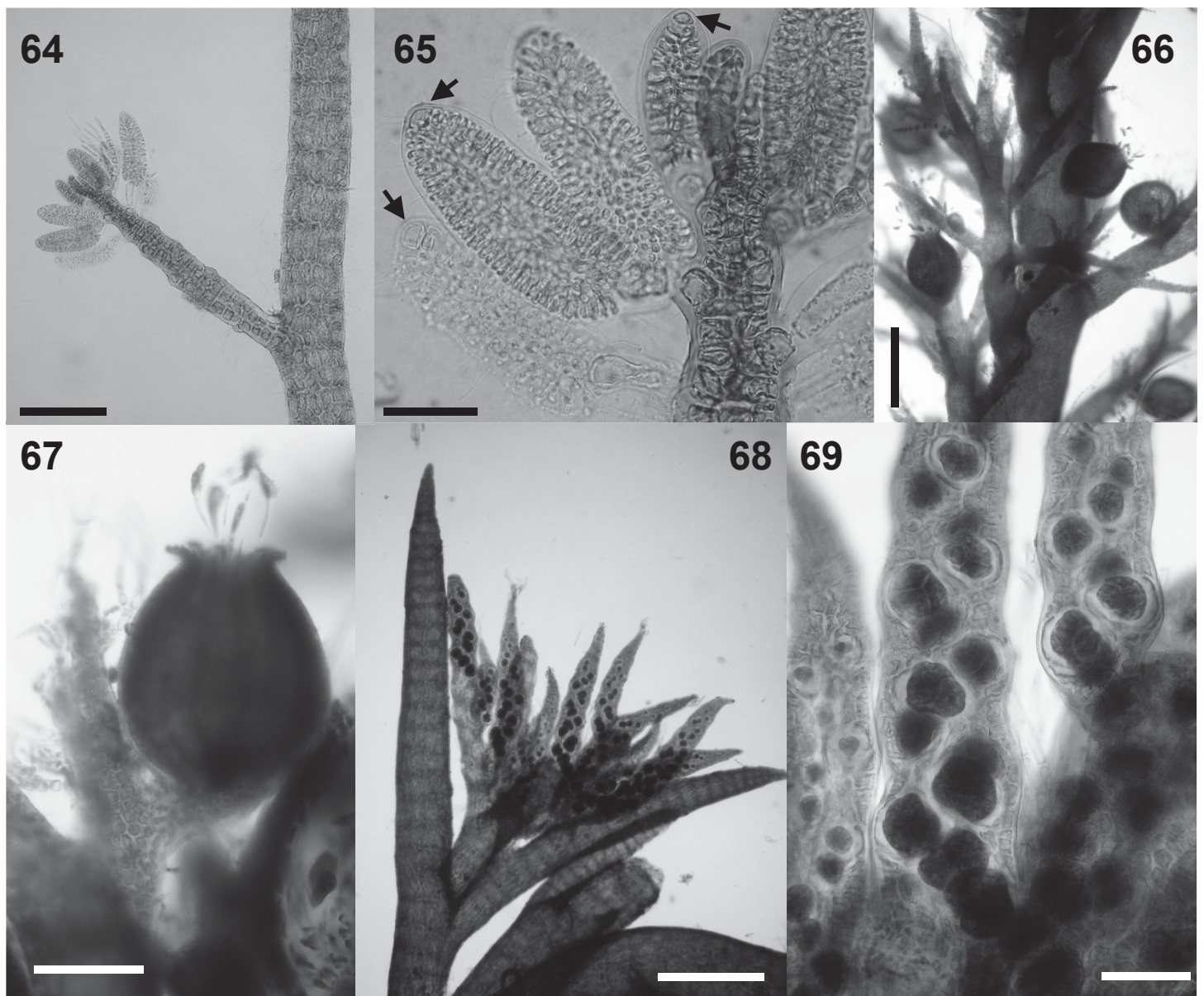
**Figs S46-52.** *Lophurella pericladus*: reproductive morphology. **Fig. 46.** Spermatangial branches densely clustered on second-order determinate branches. **Fig. 47.** Spermatangial branches with one or two sterile apical cells (arrows). **Fig. 48.** Procarp showing the supporting cell (su), a four-celled carpogonial branch (1-4) and a basal sterile cell (st). **Fig. 49.** Cystocarp. **Fig. 50.** Determinate branches bearing tetrasporangia. **Fig. 51.** Determinate branch with spirally arranged tetrasporangia. **Fig. 52.** Tetrasporangia with two presporangial (arrows) and a postsporangial (arrowhead) cover cells. Scale bars: Figs 46 and 49, 300  $\mu\text{m}$ ; Fig. 47, 70  $\mu\text{m}$ ; Fig. 48, 20  $\mu\text{m}$ ; Fig. 50, 800  $\mu\text{m}$ ; Fig. 51, 150  $\mu\text{m}$ ; Fig. 52, 50  $\mu\text{m}$ .





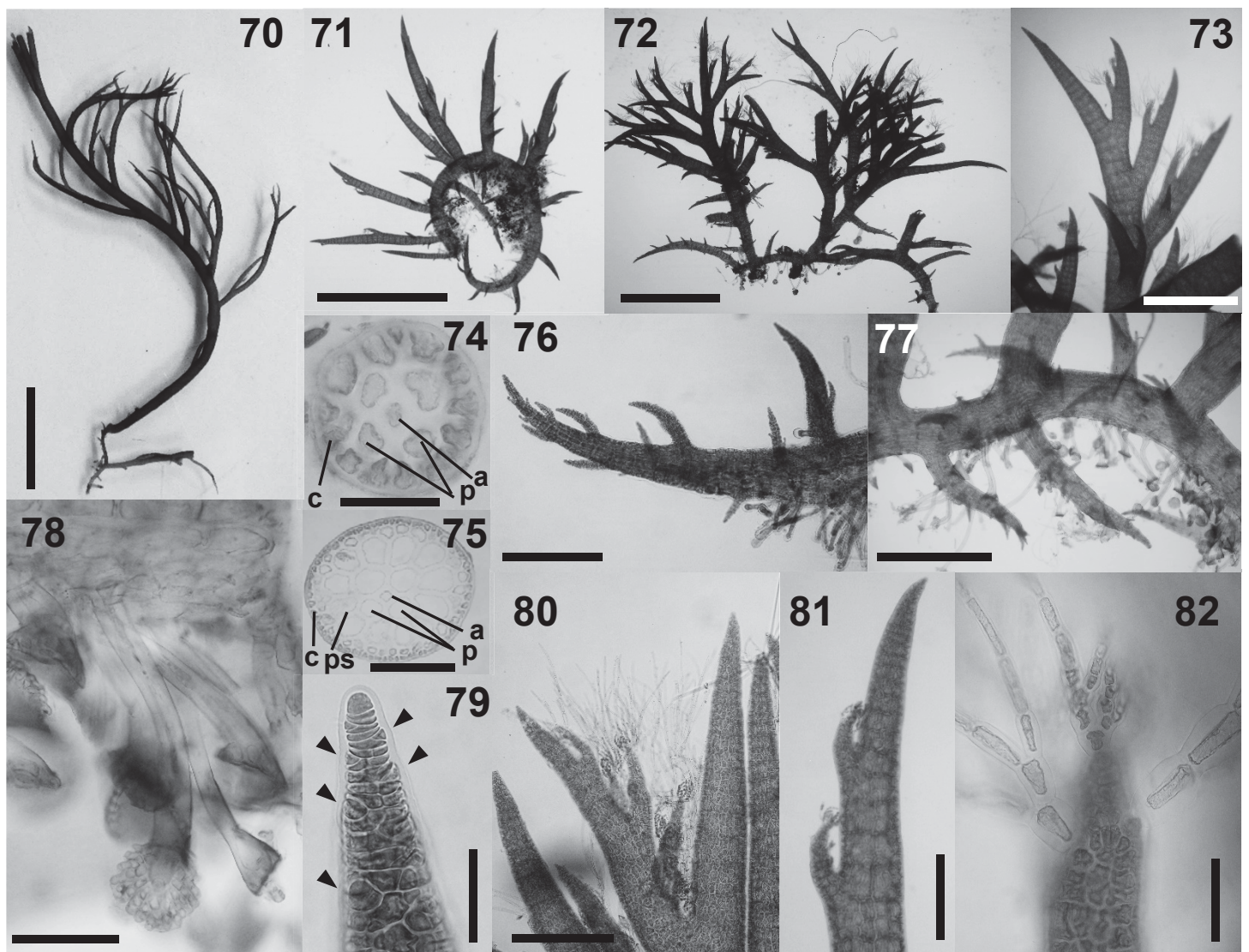
**Figs S53-63.** *Lophurella mutabilis*: vegetative morphology. **Figs 53-56.** Habit of specimens PD1111, PD3411, PD3483 and PD3106, respectively. **Figs 57-58.** Cross-section of axes in the apical part (Fig. 57) and the mid part (Fig. 58) of thallus, showing an axial cell (a), four pericentral cells (p), cortical cells (c) and, only in Fig. 28, pseudoparenchymatous cells (ps). **Fig. 59.** Prostrate axes with rhizoids cut off from cortical cells and with multicellular haptera **Fig. 60.** Apical part of an erect axis, forming determinate branches several segments below the apex. **Figs 61-62.** Thallus clothed with determinate branches. **Fig. 63.** Apex of a third-order determinate branch bearing spirally arranged trichoblasts. Scale bars: Fig. 53, 450  $\mu$ m; Fig. 54, 7 mm; Fig. 55, 2 cm; Fig. 56, 4 cm; Fig. 57, 30  $\mu$ m; Fig. 58, 200  $\mu$ m; Fig. 59, 100  $\mu$ m; Figs 60 and 62, 700  $\mu$ m; Fig. 61, 4 mm; Fig. 63, 150  $\mu$ m.





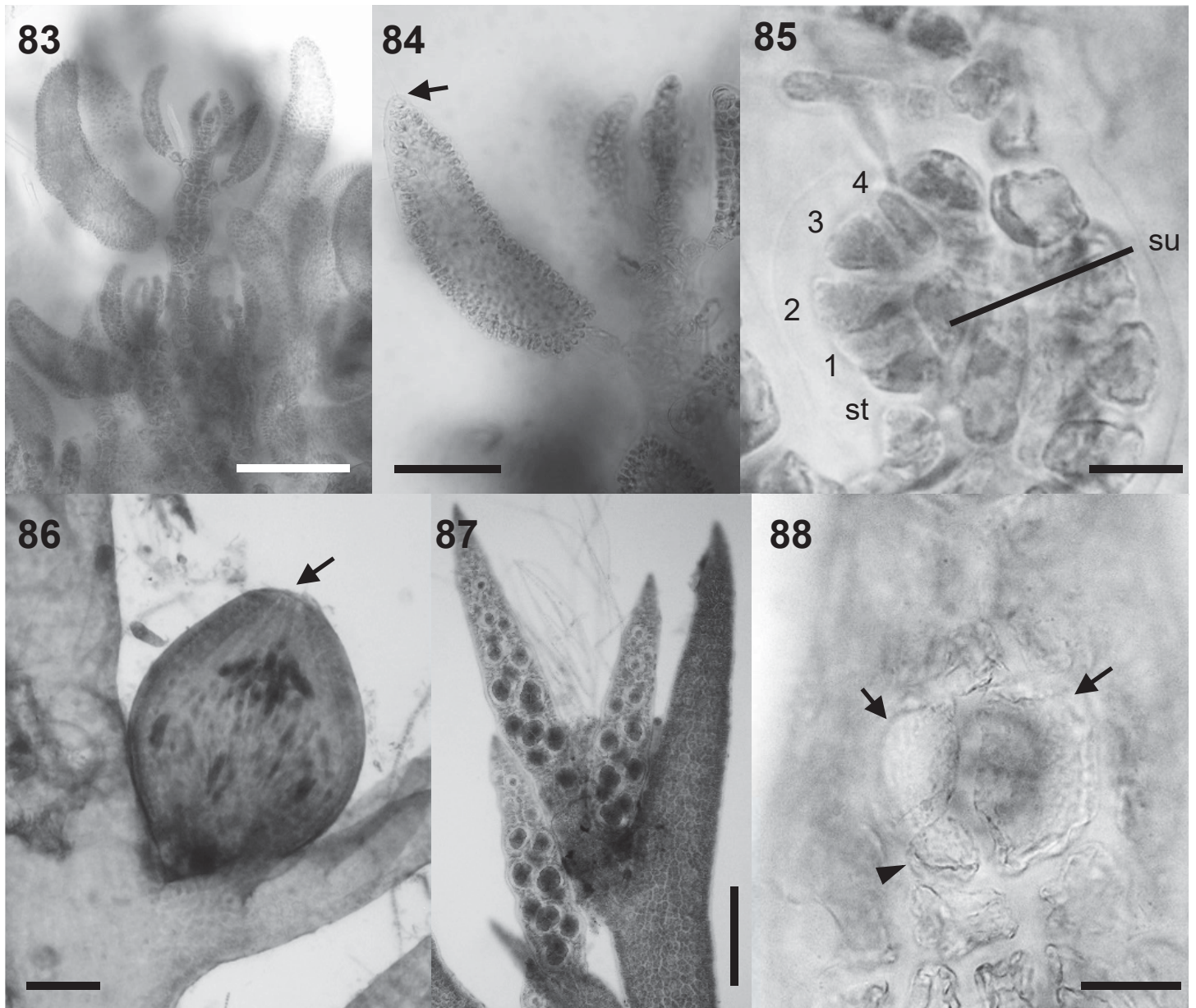
**Figs S64-69.** *Lophurella mutabilis*: reproductive morphology. **Fig. 64.** Spermatangial branches densely clustered on determinate branches. **Fig. 65.** Spermatangial branches with apical sterile cells (arrows). **Figs 66-67.** Cystocarps. **Figs 68-69.** Determinate branches bearing spirally arranged tetrasporangia. Scale bars: Figs 64 and 67, 200 μm; Figs 65 and 69, 100 μm; Figs 66 and 68, 600 μm.



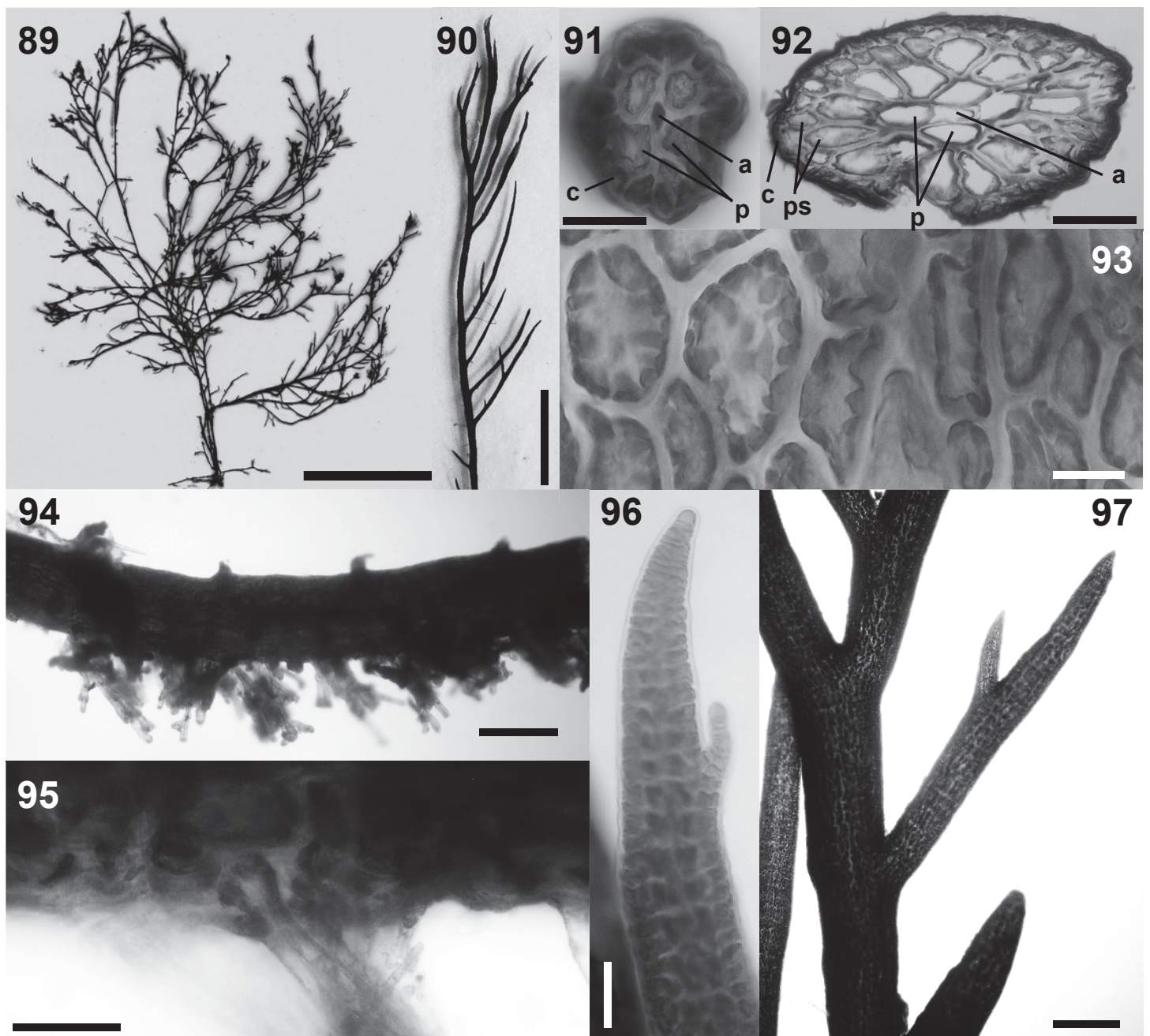


**Figs S70-82. *Lophurella nigra*: vegetative morphology.** **Figs 70-72.** Habit of specimens PD3555, PD2736, and PD2741, respectively. **Fig 73.** Apical part of an erect axis with determinate branches. **Figs 74-75.** Cross-section of axes in the apical part (Fig. 74) and the mid part (Fig. 75) of thallus, showing an axial cell (a), four pericentral cells (p), cortical cells (c) and pseudoparenchymatous cells (ps). **Figs 76-78.** Prostrate axes with rhizoids cut off from cortical cells and with multicellular haptera. **Fig 79.** Apex of an erect axis with initials on every segment (arrowheads). **Fig. 80.** Apex of an erect axis bearing two orders of determinate branches, the second-order bearing trichoblasts. **Fig. 81.** Determinate branch, lacking trichoblasts, bearing an order of determinate branches with young trichoblasts. **Fig. 82.** Apex of a second-order determinate branch bearing spirally arranged trichoblasts. Scale bars: Fig. 70, 5 mm; Figs 71 and 72, 2.5 mm; Figs 73 and 77, 1 mm; Figs 74 and 82, 70  $\mu$ m; Figs 75 and 81, 250  $\mu$ m; Figs 76 and 80, 350  $\mu$ m; Fig. 78, 150  $\mu$ m; Fig. 79, 40  $\mu$ m.



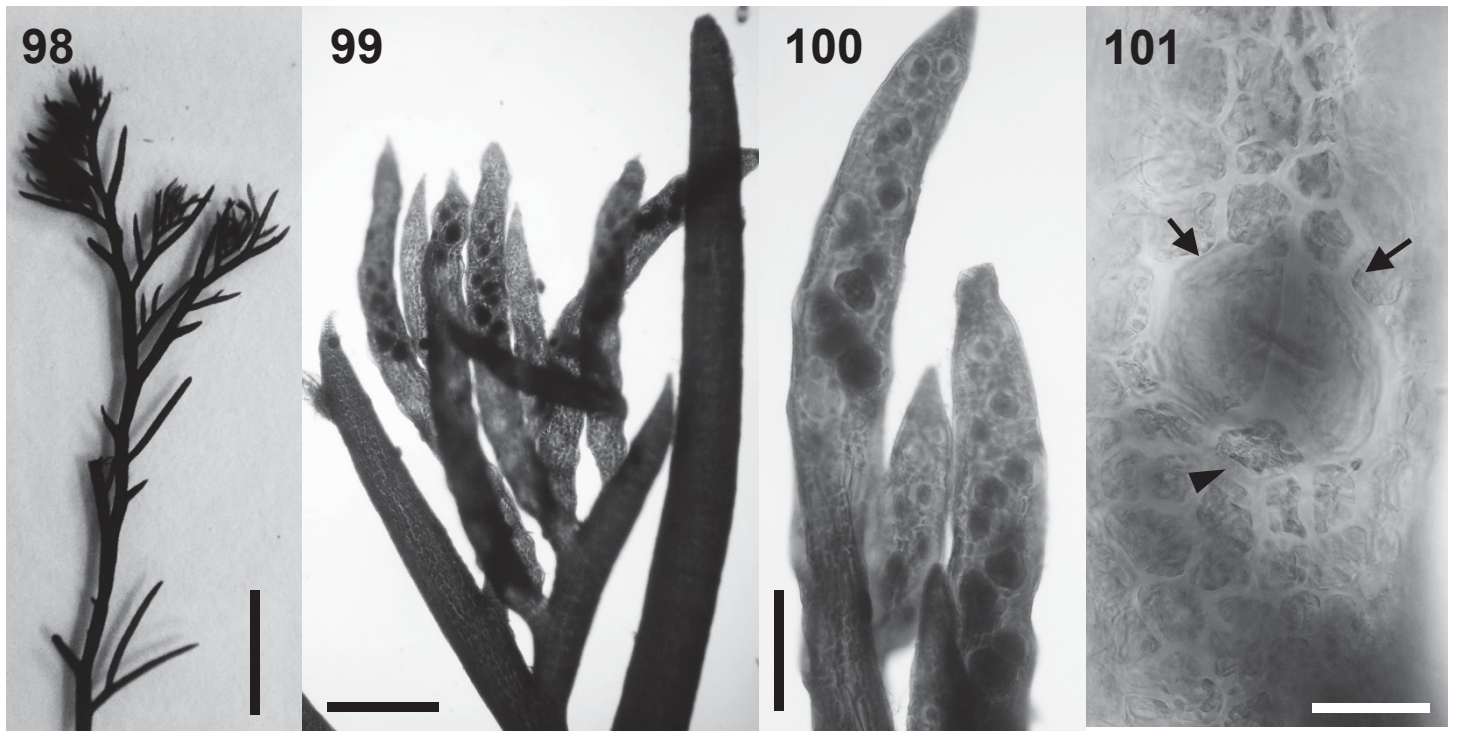


**Figs S83-88.** *Lophurella nigra*: reproductive morphology. **Fig. 83.** Spermatangial branches densely clustered on determinate branches. **Fig. 84.** Spermatangial branch with an apical sterile cell (arrow). **Fig. 85.** Procarp showing the supporting cell (su), a four-celled carpogonial branch (1-4) and a basal sterile cell (st). **Fig. 86.** Cystocarp with an apical ostiole (arrow). **Fig. 87.** Determinate branches bearing tetrasporangia. **Fig. 88.** Tetrasporangia with two presporangial (arrows) and a postsporangial (arrowhead) cover cells. Scale bars: Fig. 83, 150  $\mu\text{m}$ ; Figs 84 and 86, 70  $\mu\text{m}$ ; Fig. 85, 10  $\mu\text{m}$ ; Fig. 87, 250  $\mu\text{m}$ ; Fig. 88, 25  $\mu\text{m}$ .

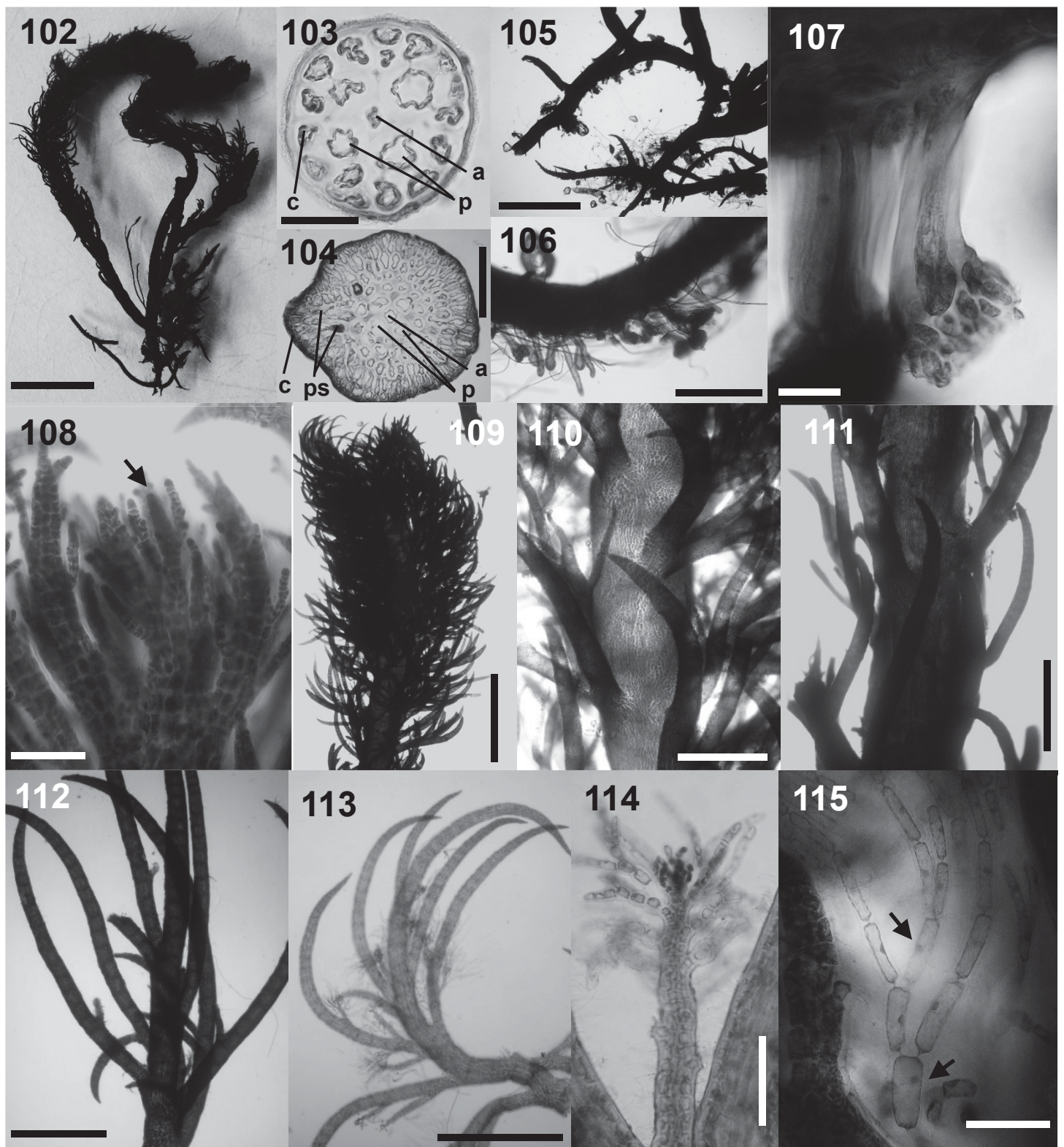


**Figs S89-97.** *Lophurella pauciramulosa*: vegetative morphology. **Fig. 89.** Habit of the holotype (specimen ASR166). **Fig. 90.** Apical part of an erect axis with determinate branches. **Figs 91-92.** Cross-section of axes in the apical part (Fig. 91) and the mid part (Fig. 92) of thallus, showing an axial cell (a), four pericentral cells (p), cortical cells (c) and, only in Fig. 92, pseudoparenchymatous cells (ps). **Fig. 93.** Cortical cells showing plastids. **Figs 94-95.** Prostrate axes with rhizoids. **Fig 96.** Apex of an erect axis. **Fig. 97.** Determinate branch lacking trichoblasts. Scale bars: Fig. 89, 35 mm; Fig. 90, 6 mm; Figs 91 and 95-96, 60  $\mu$ m; Fig. 92, 250  $\mu$ m; Fig. 93, 15  $\mu$ m; Figs 94 and 97, 400  $\mu$ m.



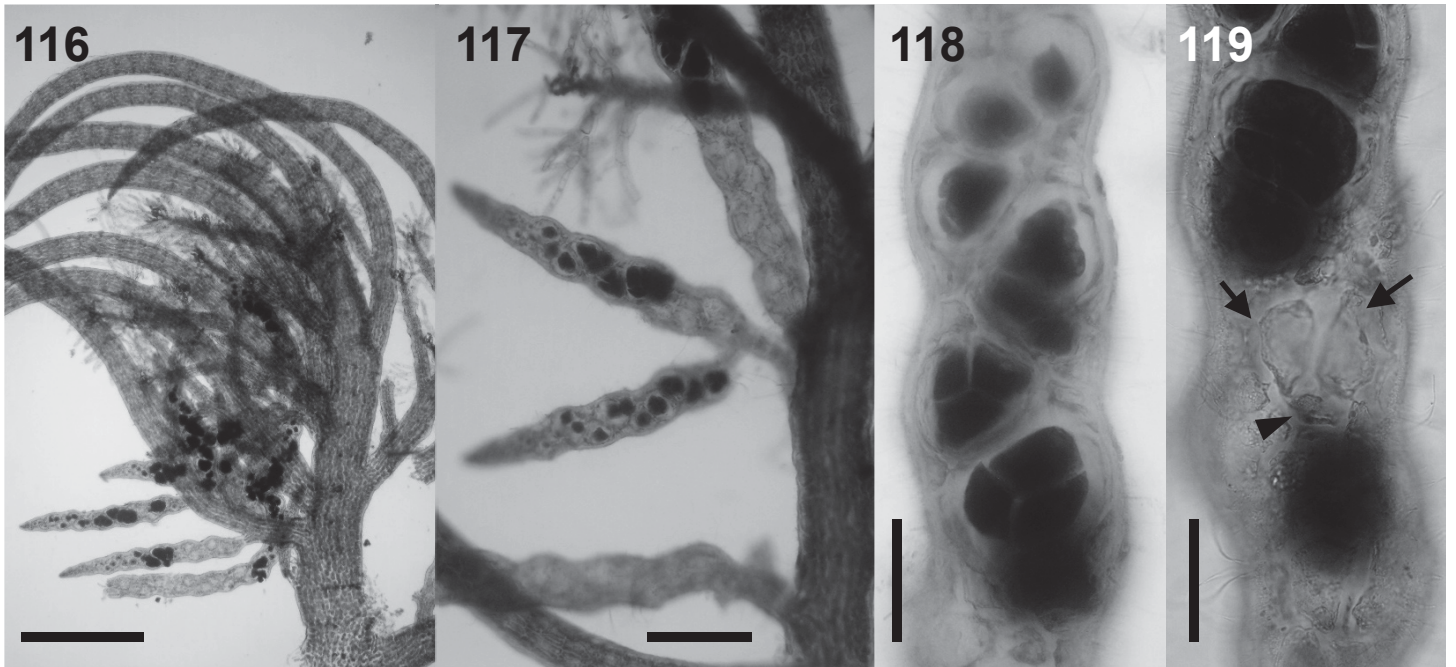


**Figs S98-101.** *Lophurella pauciramulosa*: reproductive morphology. **Fig. 98.** Apex of an axis with densely clustered tetrasporangial branches. **Figs 99-100.** Determinate branches bearing tetrasporangia. **Fig. 101.** Tetrasporangium with two presporangial (arrows) and a postsporangial (arrowhead) cover cells. Scale bars: Fig. 98, 5 mm; Fig. 99, 500  $\mu$ m; Fig. 100, 200  $\mu$ m; Fig. 101, 50  $\mu$ m.



**Figs S102-115.** *Lophurella tasmanica*: vegetative morphology. **Fig. 102.** Habit of specimen PD3584. **Figs 103-104.** Cross-section of axes in the apical part (Fig. 103) and the mid part (Fig. 104) of thallus showing axial cell (a), four pericentral cells (p), cortical cells (c) and, only in Fig. 104, pseudoparenchymatous cells (ps). **Figs 105-107.** Prostrate axes with rhizoids cut off from cortical cells and with multicellular haptera. **Fig. 108.** Apex of an erect axis with apical cell indicated (arrow). **Fig. 109.** Apical part of an erect axis densely clothed with determinate branches. **Figs 110-111.** Mid-part of an erect axis with unbranched or basally branched determinate laterals. **Figs 112-113.** Determinate branches bearing an order of determinate branches with (Fig. 113) or without (Figs 112) trichoblasts. **Fig. 114.** Apex of a second-order determinate branch bearing spirally arranged trichoblasts. **Fig. 115.** Trichoblast with uninucleate cells (arrows). Scale bars: Fig. 102, 8 mm; Figs 103 and 107, 40  $\mu$ m; Figs 104 and 106, 400  $\mu$ m; Fig. 105, 3 mm; Fig. 108, 100  $\mu$ m; Fig. 109, 2.5 mm; Figs 110-113, 800  $\mu$ m; Fig. 114, 150  $\mu$ m; Fig. 115, 70  $\mu$ m.





**Figs S116-119.** *Lophurella tasmanica*: reproductive morphology. **Figs 116-117.** Determinate lateral branches with densely clustered tetrasporangial branches. **Fig. 118.** Tetrasporangia spirally arranged. **Fig. 119.** Tetrasporangia with two presporangial (arrows) and a postsporangial (arrowhead) cover cells. Scale bars: Fig. 116, 600  $\mu\text{m}$ ; Fig. 117, 200  $\mu\text{m}$ ; Figs 118 and 119, 60  $\mu\text{m}$ .