77. Syracosphaera hirsuta Kleijne & Cros (2009)
Pl. 5. Syracosphaera hirsuta Kleijne & Cros sp. nov. Scale bars = 1μm. Figure 2 was published previously in Cros (2002), as Syracosphaera sp. 3 ‘rods on the laths’, and in Cros and Fortuño (2002), as Syracosphaera sp. ‘laths with rod protrusions’, and fig. 5 in Kleijne (1993), as Syracosphaera sp. I cf. S. epigrosa.

Fig. 1 Collapsed ‘irregular type’ coccosphere showing body coccoliths with relatively wide and obliquely raised distal flange and irregularly arranged rods on radial laths; FRONT5-95/18P/5m.

Fig. 2. Body coccoliths of ‘regular type’ in distal, proximal and lateral view, showing radial laths with regularly arranged rods, variation in width of distal flange, and one eoothecal coccolith in distal view (upper right); Station FANS-1/123/60m.
Fig. 3. Holotype; partly collapsed coccospHERE of ‘regular type’ showing monomorphic body coccoliths and detached exothecal coccoliths (arrows); HIVERN-99/30/0-5m.

Fig. 4. Saddle-shaped exothecal coccoliths in proximal view (left) and in distal and side view (right) with two parenthesis-shaped openings; HIVERN-99/19/0-5m.

Fig. 5. Body coccoliths of ‘small type’ showing radial cycle laths with small nodes, and central structure that is merely formed by interlocking laths; Snellius-II/Gx-196/0-5m (eastern North Atlantic).

Fig. 6. CoccospHERE consisting of body coccoliths of the ‘regular type’ with large spinous protrusions on the radial laths; HIVERN-99/19/0-5m.


*Syracosphaera* sp. I cf. *S. epigrosa*, KLEIJNE 1993, p. 237, pl. 4, fig. 2.

*Syracosphaera epigrosa* auct. non Okada et McIntyre 1977 var. 1, GIRAUDEAU and BAILEY 1995, pl. IV, fig. 1.


*Syracosphaera* sp. 3, CROS 2002, p. 57, pl. 30, figs. 3-6.

*Syracosphaera* sp. ‘laths with rod protrusions’, CROS and FORTUÑO 2002, pp. 31-32, fig. 33C, D.

*Syracosphaera borealis* auct. non Okada et McIntyre 1977 type 2. – YOUNG et al. 2003, p. 48, pl. 21, figs. 10-12.

**Diagnosis:** Cocosphaera subglobosa, dithecata, cum coccolithis endothealibus monomorphis et exothecalibus simplicibus undatis, ambo fere aequales magnitudine. Coccolithi exothecales sunt structurae longae ephippioideae cum duabus rimis parenthesiformibus, una in quoque extremo ellipticalis centri. Coccolithi comunes sunt murolithi ellipsoidales cum ambitu irregulari quorum parvus murus flectit et pergit in angustum clipeum. Area centralis constat ex elementis lamellaribus radialiter tendentibus quae ferunt nodos magnitudine et specimine varios.

Cocosphere subspherical, dithecate, with monomorphic endothecal coccoliths and simple undulating exothecal coccoliths. Both coccolith types are of approximate equal size. Exothecal coccoliths are saddle-shaped elongate structures, with two parenthesis-shaped slits, one at each end of the elliptical centre. Body coccoliths are elliptical muroliths with an irregular outline. Their low wall bends and continues into a narrow flange. The central area consists of radial laths that bear nodes of variable height and in a variable pattern.

**Holotype:** Negative 152001/EPI2 (pl. 5, fig. 3), deposited at ICM (CSIC), Barcelona, Spain.
**Type locality:** western Mediterranean Sea (41°33’N 2°25’E), depth 0-5m, 26 Feb. 1999 (Cruise HIVERN, Station 99-30).

**Etymology:** Latin *hirsutus*-a*-um* (adjective) bristly, prickly; referring to the bristly central area of the body coccoliths.

**Number of specimens studied:** 13.

**Distribution:** western Mediterranean Sea, 0-60; North Atlantic, 0-5m; South Atlantic, off Namibia, 5m.

**Description:** The coccosphere consists of ±38-70 monomorphic endothecal muroliths and up to 10 saddle-shaped exothecal planoliths (pl. 5, fig. 3). The planoliths usually occur in a low number, on one side of the coccosphere. They are very lightly attached to the coccosphere and, therefore, easily lost. Circum-flagellar coccoliths have not been found.

The elongate, undulated exothecal coccoliths are saddle-shaped. Their solid and almost smooth centre bears parenthesis-shaped slits on both ends, while it is surrounded by a narrow, distally bent rim of squarish elements. This results in a distally concave structure with an irregular margin (pl. 5, figs. 2, 4).

The narrowly to broadly-elliptical body coccoliths are irregular in outline (pl. 5, figs. 2-3). The distal flange varies in width and in shape: from nearly horizontal to obliquely raised and even slightly convex (pl. 5, figs. 1, 2, 6). The central area consists of 15-26 radial laths, that interlock in the centre (pl. 5, fig. 5). A central structure may be present as nodes that form a low and incomplete elongate ridge (pl. 5, figs. 2-3, 6). The laths of the radial cycle bear nodes, usually placed in a ring halfway the laths; sometimes they are less ordered. The nodes vary from small nodes to vertical rods between cccosospheres as well as on individual coccoliths on a coccosphere (pl. 5, figs. 2-3, 6).

**Dimensions:** coccosphere, diameter ± 5.5-9.0 μm; exothecal coccoliths, length 1.7-2.4 μm; body coccoliths, length 1.2-2.6 μm, width 0.8-1.5 μm.

**Taxonomic notes:** Syracosphaera hirsuta sp. nov. belongs to the *S. molischii* group of Young et al. (2003): species bearing body muroliths with prominent proximal and distal flanges. It is placed in the *borealis-*subgroup: species with elliptical exothecal coccoliths and without circum-flagellar coccoliths.

Cros (2002) distinguished two forms in the taxon that is presently introduced as the new species *S. hirsuta*. She described ‘irregular type’ specimens that bear coccoliths with irregularly arranged rods (pl. 5, fig. 1; see also Heimdal and Gaarder 1981, pl. 8, fig. 39; Giraudeau et al. 1993, pl. 1, figs. 11-12; Cros 2002, pl. 30, figs. 3, 5;). The ‘regular type’ specimens, on the other hand, have coccoliths with regularly placed perpendicular rods (pl. 5, figs. 2-3, 6; see also Heimdal and Gaarder 1981, pl. 8, fig.
Coccoliths with a more regular rod distribution are typically smaller and more irregular in outline than the ones with irregularly arranged rods.

The coccolith morphology of *Syracosphaera hirsuta* sp. nov. appears to be highly variable, since a third form has also been found: coccospheres bearing coccoliths with very small central area nodes (pl. 5, fig. 5; see also Kleijne 1993, p. 237, pl. 4, fig. 2; Young et al. 2003, pl. 21, figs. 10-11).

Coccospheres of the ‘irregular type’ were included in *Syracosphaera borealis* by Young et al. (2003), as *S. borealis* type 2. However, although both *S. hirsuta* sp. nov. and *S. borealis* have saddle-shaped exothecal coccoliths and lack circum-flagellar coccoliths, we now think that these taxa are different enough to separate them as distinct species. The folded exothecal planoliths of *S. borealis* have a wider rim and stronger curvature than those of *S. hirsuta* sp. nov., see e.g. Winter and Siesser (1994, fig. 106, by C. Samtleben) and their body coccoliths are notably different. In *Syracosphaera borealis* muroliths the vertical wall bends sharply into the wide distal flange, that has prominent sutural ridges, and its central area bears an elongate mound of short nodes. In *S. hirsuta* sp. nov., on the other hand, the narrower flange bears small sutural ridges on the inner side of the wall and on the more gradual bending from wall to flange, while the central area bears an elliptical cycle of nodes, or even rods, on the radial laths. Moreover, the two species are biogeographically separated, with *S. borealis* occurring in subarctic and subantarctic regions (south of Iceland, Bergen Fjord and Antarctic; J. Young, pers. comm.), whilst *S. hirsuta* sp. nov. appears to be a temperate species.

Another species with nodes or rods on the central area is *Syracosphaera epigrosa*, but that species has a wider and flat distal flange, while no exothecal coccoliths have been described yet (see Okada and McIntyre 1977, pl. 7, figs. 5-6; Kleijne 1993, p. 237, pl. 4, fig. 1; Young et al. 2003, p. 48, pl. 21, fig. 6).