

On the Algal Settlement in Craters on Surtsey during Summer 1968

By

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Pioneering photoautotrophic cryptogams have so far only been able to become established at postvolcanic steam exhalations, near which also the largest patches of the present moss flora of the island can be found. The most extensive patches may cover about 30 sq.cms. The steam wells are located at or in the younger craters (especially in Surtur I) or occur near contraction fissures in the lava at the foot of slopes build up by volcanic ash (Surtur II). The steam binds together drifting fine ash material and keeps it in place in such a way, that a compact permanently humid substrate is formed. More details on the general conditions there may be found in G. H. Schwabe: Umschau No. 2, p. 51–52, Frankfurt 1969; K. Behre und G. H. Schwabe, Algenbefunde in den Kraterräumen auf Surtsey/Island, Sommer 1968 (Vorläufige Mitteilung aus dem MPI. für Limnologie, Plön), 1969. Further reports are in preparation.

Starting from 212 raw cultures with Surtsey substrate samples (collected at the end of July 1968), the following living species listed below have been found to be present in the respective biotopes (Su I = craters of Surtur I; Su II = craters of Surtur II; local names according to Sigurdur Thórarinnsson, Surtsey Res. Progress Rep. IV, 143–148, Reykjavík 1968). The first figure indicates the number of samples in which the respective species was found: the figure in parenthesis refers to the number of raw cultures in which the species occurs; + = species is already known for Iceland; § = species has been found in cultures made at Plön, from soils of Austurkot/Sandvíkurhreppur.

TABLE 1

Blue-green algae (det. G. H. Schwabe)

	Su I	Su II
+ <i>Aphanocapsa grevillei</i> (Hass.) Rabenh.	4 (5)	1 (1)
+ § <i>Anabaena variabilis</i> Kütz (2 forms)	2 (4)	1 (2)
<i>Plectonema</i> c.f. <i>gracillimum</i> (Zopf) Hansg.	—	1 (3)
<i>Pseudanabaena</i> c.f. <i>catenata</i> Lauterb.	2 (2)	—
+ <i>Oscillatoria amphibia</i> Ag.	1 (2)	2 (4)
<i>Phormidium mucicola</i> Hub.-Pestal. Naumann	1 (1)	1 (1)
+ § <i>Phormidium autumnale</i> (Ag.) Gom. s. ampl. (2 forms)	2 (3)	—
+ § <i>Schizothrix lardacea</i> (Ces.) Gom.	—	7 (19)

TABLE 2

Flagellatae and algae (except for cyanophytes and diatoms) (det. K. Behre)

	Su I	Su II
<i>Bodo</i> sp.	2 (2)	—
<i>Gymnodinium</i> sp.	1	1
<i>Pleurochloris</i> sp.	—	1 (1)
<i>Euglena mutabilis</i> Schmitz	1 (1)	—
<i>Petalomonas</i> cf. <i>ventrित्राcta</i> Skuja	1 (1)	—
<i>Pet.</i> sp.	2 (2)	—
<i>Chlamydomonas asymmetrica</i> v. <i>gallica</i> Bourr.	1 (2)	1 (1)
<i>Chl. Augustae</i> Skuja	2 (6)	—
<i>Chl. gloeopara</i> Rodhe et Skuja	5 (11)	1 (1)
<i>Chl. intermedia</i> Chod.	2 (4)	—
<i>Chl.</i> n. sp. a („ <i>perforata</i> “)	3 (12)	—
<i>Chl.</i> n. sp. b („ <i>pseudintermedia</i> “)	1 (2)	—
<i>Chl.</i> sp. c	2 (4)	—
<i>Chl.</i> sp. d	1 (1)	—
<i>Chlorella vulgaris</i> Beyer s. ampl.	3 (6)	4 (7)
§ <i>Muriella decolor</i> Vischer	—	3 (4)
§ <i>Muriella terrestris</i> Boye Pet.	2 (3)	4 (6)
<i>Coccomyxa</i> sp.?	1 (1)	—
+ cf. <i>Δpatococcus lobatus</i> (Chod.) Boye Pet.	—	1 (1)
+ <i>Gloetila protogenita</i> Kütz.	4 (12)	—
+ <i>Stichococcus bacillaris</i> Naeg. s. ampl.	1 (1)	1 (1)
<i>St. minor</i> Naeg. sec. Chod.	1 (2)	—
Total number of samples studied	5 (24)	5 (15)

TABLE 3
Diatoms (det. K. Behre)

	Su I	Su II
+ § <i>Melosira italica</i> (Ehrb.) Kütz.	3 (4)	1 (1)
+ § <i>Cyclotella Meneghiniana</i> Kütz.	4 (4)	1 (1)
<i>C. striata</i> (Kütz.) Grun.	3 (3)	2 (2)
+ § <i>Stephanodiscus astraea</i> (Ehrb.) Grun. and <i>v. minutela</i> (Kütz.) Grun.	5 (8)	2 (3)
§ <i>Coscinodiscus cf. lineatus</i> Ehrb.	2 (2)	—
+ <i>Diatoma elongatum v. tenue</i> Van Heurck	2 (2)	2 (2)
+ § <i>Fragilaria consturens</i> (Ehrb.) Grun. and <i>v. venter</i> (Ehrb.) Grun.	3 (3)	2 (3)
+ <i>Fr. pinnata</i> Ehrb.	5 (7)	2 (2)
+ § <i>Synedra ulna</i> (Nitzsch) Ehrb.	3 (5)	3 (3)
+ § <i>Eunotia exigua</i> (Bréb.) Rabh.	1 (1)	—
+ § <i>Eu. lunaris v. subaricata</i> (Naeg.) Grun. . .	1 (1)	—
+ § <i>Eu. pectinalis v. minor</i> (Kütz.) Rabh. . .	—	2 (2)
<i>Cocconeis pediculus</i> Ehrb.	3 (4)	—
+ § <i>C. placentula</i> Ehrb. and <i>v. euglypta</i> (Ehrb.) Cleve	4 (7)	2 (3)
+ <i>Achnanthes affinis</i> Grun.	2 (2)	1 (1)
+ <i>A. hungarica</i> Grun.	2 (2)	1 (1)
+ § <i>A. lanceolata</i> (Bréb.) Grun.	5 (9)	2 (3)
+ § <i>A. minutissima</i> Kütz. and <i>v. cryptocephala</i> Grun.	4 (5)	2 (3)
+ § <i>Stauroneis anceps</i> Ehrb.	1 (1)	—
+ § <i>St. Borrichii fa. sabcapitata</i> Boye Pet. . .	4 (10)	2 (3)
+ <i>St. thermicola</i> (Boye Pet.) Lund	1 (1)	—
+ <i>Navicula atomus</i> (Kütz.) Grun.	5 (9)	3 (4)
§ <i>N. avenacea</i> Bréb.	—	1 (1)
+ <i>N. bacillum</i> Ehrb.	—	1 (1)
+ <i>N. Clementis</i> Grun.	—	1 (1)
+ § <i>N. cocconeiformis</i> Gregory	1 (1)	—
+ § <i>N. cryptocephala</i> Kütz.	2 (2)	2 (2)
+ <i>N. — v. veneta</i> (Kütz.) Grun.	3 (3)	1 (1)
<i>N. cf. dismutica</i> Hust.	2 (4)	—
+ <i>N. gracilis</i> Ehr.	1 (1)	1 (1)
+ <i>N. gregaria</i> Donkin	1 (1)	—
+ § <i>N. hungarica</i> Grun.	3 (3)	2 (2)
+ <i>N. integra</i> (W. Smith) Ralfs	1 (1)	—
+ § <i>N. minima</i> Grun.	2 (2)	1 (1)
+ § <i>N. mutica</i> Kütz. and <i>v. Cohnii</i>	4 (9)	2 (3)
<i>N. oppugnata</i> Hust.	—	1 (1)
+ <i>N. pelliculosa</i> (Bréb.) Hilse	3 (5)	—
+ § <i>N. pupula fa. rectangularis</i> (Greg.) Grun.	1 (1)	—
+ <i>N. salinarum</i> Grun.	1 (1)	1 (1)
+ § <i>N. seminulum</i> Grun.	4 (4)	2 (2)
<i>N. vitabunda</i> Hust.	1 (2)	—
§ <i>N. sp. a</i>	—	1 (1)
<i>N. sp. b</i>	1 (1)	2 (2)
+ § <i>Pinnularia borealis</i> Ehrb.	1 (2)	—
+ <i>P. intermedia</i> Lagerst.	4 (9)	—
<i>P. sp. a</i> (Bruchstücke)	3 (3)	1 (1)
+ § <i>Caloneis fasciata</i> (Lagerst.) Cleve	5 (10)	3 (4)
+ <i>Amphora ovalis var. pediculus</i> Kütz. . . .	3 (3)	2 (2)
+ <i>A. cf. coffeaeformis</i> Agardh	1 (1)	2 (3)
+ <i>Cymbella cistula</i> (Hemprich) Grun. . . .	1 (1)	—
+ <i>C. sinuata v. antiqua</i> Grun.	1 (1)	—
+ § <i>C. ventricosa</i> Kütz.	5 (9)	1 (1)

	Su I	Su II
+ § <i>Gomphonema acuminatum v. coronatum</i> (Ehrb.) W. Smith	1 (1)	—
+ § <i>G. angustatum</i> (Kütz.) Rabh.	1 (1)	1 (1)
+ <i>G. constrictum</i> Ehrb.	1 (1)	—
<i>G. helveticum</i> Brun.	2 (3)	—
+ <i>G. parvulum</i> (Kütz.) Grun. and <i>v. micro-</i> <i>pus</i> (Kütz.) Cleve	2 (3)	1 (1)
+ <i>Epithemia sorex</i> Kütz.	3 (3)	1 (1)
+ § <i>Hantzschia amphioxys</i> (Ehrb.) Grun. and <i>f. capitata</i> O. Müller	5 (10)	2 (3)
+ § <i>Nitzschia amphibia</i> Grun.	4 (5)	2 (3)
<i>N. communis v. hyalina</i> Lund	2 (2)	2 (2)
+ § <i>N. fonticola</i> Grun.	1 (1)	1 (1)
+ <i>N. frustulum</i> (Kütz.) Grun.	1 (1)	—
+ § <i>N. — v. perpusilla</i> (Rabh.) Grun.	1 (1)	—
+ § <i>N. Hantzschiana</i> Rabh.	—	1 (1)
+ <i>N. microcephala</i> Grun.	1 (1)	—
+ § <i>N. palea</i> (Kütz.) W. Smith	—	2 (2)
+ § <i>N. perminuta</i> Grun.	1 (1)	—
§ <i>N. recta</i> Hantzsch	1 (1)	—
+ <i>N. subtilis</i> (Kütz.) Grun.	1 (1)	1 (1)
<i>N. sp. a</i>	2 (2)	—
<i>N. sp. b</i>	1 (1)	—
§ <i>N. sp. c</i>	1 (1)	—
+ <i>Surirella ovata</i> Kütz.	1 (2)	—
Total number of samples studied	5 (10)	3 (4)

There are definite differences between the two craters, with regard to the three groups of algae examined. Similar differences appear to exist between the craters with respect to other organisms (for instance, protozoa, especially amoebae, and mosses). Bacteria and moulds in a resting state are apparently so widely distributed over Surtsey, that definite differences between both craters in that respect are not striking. In the raw-cultures the following moulds have been found: *Penicillium citrinum* Thom., *Phoma putaminum* Speg. u. *Verticillium cf. psalliotae* Trechow (det. W. Gams, Baarn). — Only in Surtur I the ubiquitous rotifer *Habrotrocha constricta* Dujardin (det. P. J. Donner, Katzelsbach) is present, being the systematically highest organized animal. — From the results made hitherto the conclusion can be drawn that algae along with associated bacteria and mosses play a decisive role in ecogenesis and soil formation on Surtsey.

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