FIG S1 Convex (A) and concave (B) eisosome faces of *Penicillium* sp. isolate K17. Stereo images (use red/green glasses)
FIG S2  *Candelaria concolor* mycobiont: (A) and (B) convex faces, (C) concave face
FIG S3  *Cladonia grayi* mycobiont: convex face
FIG S4 *Cladonia grayi* on agar:
(A) convex face
(B) concave face
FIG S5 (A) Cyanidioschyzon merolae
(B) Cyanidioschyzon YNP 1A
FIG S6 Cyanidioschyzon YNP 1A: Eisosomes in mature and daughter cells

The eisosomes are generally circumferential, but exceptions occur (asterisk). MW, discarded mother walls.
FIG S7 *Cyanidioschyzon* YNP 1A: Eiososomes in mature and daughter cells

A

B

chloroplast
FIG S8 *Cyanidioschyzon* YNP 1A: (A) convex face, (B) concave face

(A) convex face, (B) concave face
G. sulphuraria cell with several chloroplast profiles, several mitochondria, and no cytoplasmic starch. Eisosomes at white dots.
(A) Circular IMP “islands” and parallel rectangular arrays (arrow).
(B) Parallel rectangular arrays (arrows) and eisosome with cell-wall inclusion (asterisk). (C and D) Rectangular arrays of angled IMPs.
FIG S11 Galdieria sulphuraria
Non-etched concave eisosomes

Asterisks: P-faces of circular IMP “islands” (c.f. Fig. S10)
FIG S12 *Galdieria sulphuraria*: non-etched convex faces. Stereo image (use red/green glasses)
FIG S13 Galdieria sulphuraria: non-etched concave faces (arrows)
Stereo image (use red/green glasses)
FIG S14 *Auxenochlorella protothecoides*: eisosomes and walls

The inner granular layer 1 penetrates the eisosome furrow; the outer denser layer 2 does not.
FIG S15 *Auxenochlorella protothecoides* eisosomes: Concave faces (most elongated)

Arrows, wall entering eisosomes; cpst, chloroplast
FIG S16 Auxenochlorella protothecoides eisosomes: Convex faces (punctate)

lipid body

500 nm
FIG S17 *Auxenochlorella protothecoides* eisosomes: Periodicity of angled striations
FIG S18 *Chlamydomonas monoica*: Convex faces with irregularly shaped and distributed particles
FIG S19 *Chlamydomonas monoica* concave faces. Stereo image (use red/green glasses)
FIG S20 Chlamydomonas monoica convex faces
Stereo image (use red/green glasses)
FIG S21 *Chlamydomonas monoica* concave faces. Stereo image (use red/green glasses) (see Fig. S22 for labels)
FIG S22 *Chlamydomonas monoica*: Wall/eisosome relationships

A

wall cpst

nucleus

1 µm

B

wall W6 W2 W1

mito ER cpst envelope

White dots, eisosomes; cpst, chloroplast
FIG S23 Chlamydomonas reinhardtii zygote

White dots, eisosomes
FIG S24  *Chlamydomonas reinhardtii* zygotes: (A) concave faces (B) convex faces
FIG S25  *Polytomella parva* cysts

White dots, eisosomes; L1, granular wall layer; L2 denser wall layer.
FIG S26 *Borodinellopsis texensis* cyst

White dots, eisosomes; L1, granular wall layer; L2 denser wall layer.
FIG S27 *Euplotes* sp. cysts
(A) Freeze-substituted thin section (B) convex faces
White dots: eisosomes
FIG S28 Alignment of Green-BAR proteins.
Red, predicted α-helix; purple, predicted amphipathic α-helix.

Cre, Chlamydomonas reinhardtii; Astpho2, Asterochloris sp.; Klefl, Klebsormidium flaccidum; Cproto, Chlorella protothecoides; NC64A, Chlorella sp.; C169, Coccomyxa subellipsioidea.
FIG S29 Alignment of Prasino-BAR proteins.
Red, predicted α-helix; purple, predicted amphipathic α-helix

Bathy, Bathycoccus prasinos; RCC299, Micromonas pusilla; Ostta, Ostreococcus tauri
FIG S30 Alignment of Red-BAR proteins.
Purple, predicted amphipathic α-helix

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FIG S31 Alignment of yeast Lsp1/Pil1 eisosome proteins
Red, predicted α-helix; purple, predicted amphipathic α-helix
FIG S32 Alignment of animal amphypysin proteins
Red, predicted α-helix; purple, predicted amphipathic α-helix
FIG S33 3D structure of the two faces of BAR-domain monomers of yeast Lsp1p (3plt), *Drosophila* amphiphasin (1uru), *Chlamydomonas* Green-Bar (Gbar) and *Galdiera* Red-BAR (3caz).

Surface charge potential: Blue, positive; Red, negative; Yellow, polar; White, hydrophobic

Arrows, N-terminal amphipathic α-helices
### Table S1 Microalgae that do not produce eisosomes during vegetative growth.

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**Table S3** Genomes of algae and protists lacking Green-BAR and Red-BAR homologues.

*Aureococcus anophagefferens* (Pelagophyte)

*Fragilariopsis cylindrus* (Bacillariophyte)

*Phaeodactylum tricornutum* (Bacillariophyte)

*Thallasiosira pseudonana* (Bacillariophyte)

*Emiliania huxlei* (Bacillariophyte)

*Pytophthora sojae* (Oomycete)

*Oxytricha trifallax* (Ciliate)

*Ichthyophthirius multifiliis* (Ciliate)

*Styloynchia lemnae* (Ciliate)

*Paramecium tetraurelia* (Ciliate)

*Tetrahymena thermophila* (Ciliate)