### APPENDIX

### List of Dinoflagellate cyst taxa.

##### *Achilleodinium biformoides* (Eisenack 1954) Eaton 1976

##### *Achomosphaera alcicornu* (Eisenack 1954) Davey & Williams 1966

##### *Achomosphaera crassipellis* (Deflandre & Cookson 1955) Stover & Evitt 1978

##### *Achomosphaera ramulifera* (Deflandre 1937) Evitt 1963

##### *Achomosphaera sagena* Davey & Williams 1966

##### *Adnatosphaeridium multispinosum* Williams & Downie 1996

##### *Adnatosphaeridium robustum* (Morgenroth 1966) De Conninck 1975, Pl. 1, fig. 1

##### *Adnatosphaeridium vittatum* Williams & Downie 1966, Pl. 1, fig.2

*Adnatosphaeridium*? sp., Pl. 1, fig. 3

*Alisocysta* sp.2 sensu Heilmann-Clausen (1985)

*Alicosysta* sp., Pl. 2, figs 1, 4

*Apectodinium homomorphum* (Deflandre & Cookson 1955) Lentin & Williams 1977

##### *Apectodinium quinquelatum* (Williams & Downie 1966) Costa & Downie 1979

##### *Areoligera coronata* (Wetzel 1933b) Lejeune-Carpentier 1938a, Pl. 2, figs 3, 6

##### *Areoligera medusettifromis* (Wetzel 1933b) Lejeune-Carpentier 1938a, Pl. 1, fig. 6

##### *Areoligera senonensis* Lejeune-Carpentier 1938a

*Areoligera sentosa-*group sensu Iakovleva & Heilmann-Clausen 2010, Pl. 1, figs 4, 5, 7, 8-12

*Areoligera tauloma* Eaton 1976

*Areoligera undulata*, Eaton 1976, Pl. 2, figs 2, 5

*Areosphaeridium diktyoplokum* (Klumpp 1953) Eaton 1971, Pl. 2, figs 7, 10, 11

*Areosphaeridium michoudii* Bujak 1994, Pl. 2, figs 8-9

*Biconidinium longissimum* Islam 1983, Pl. 2, fig. 12

##### *Caligodinium amiculum* Drugg 1970b, Pl. 3, fig. 1

##### *Cannosphaeropsis utinensis* Wetzel 1933, Pl. 3, figs 2, 3

##### *Cerebrocysta bartonensis* Bujak 1980

##### *Cerodinium depressum* (Morgenroth 1966) Lentin & Williams 1987

##### *Cerodinium diebelii* (Alberti 1959b) Lentin & Williams 1987

*Charlesdowniea* *columna* (Michoux 1988) Lentin & Vozzhennikova 1990, Pl. 3, figs 7, 8

*Charlesdowniea coleothrypta* (Williams & Downie 1966b) Lentin & Vozzhennikova 1989, Pl. 3, figs 4, 5

*Charlesdowniea coleothrypta* var.1 sensu Heilmann-Clausen & Costa 1989, Pl. 3, fig. 6

*Charlesdowniea* cf. *crassoramosa* (Williams & Downie 1966b) Williams et al. 2015

Remarks: A bad preservation of our single specimen did not permit to make a precise determination.

##### *Charlesdowniea tenuivirgula* (Williams & Downie 1966b) Williams et al. 2015, Pl. 3, figs 11, 12

##### *Cleistosphaeridium diversispinosum* Davey et al. 1966, Pl. 3, figs 9, 10

*Cleistosphaeridium polypetellum* (Davey et al. 1966) Islam 1993, Pl. 4, figs 1-3

*Cordosphaeridium biarmatum* Morgenroth 1966

*Cordosphaeridium*? *cracenospinosum* Davey & Williams 1966 sensu Heilmann-Clausen & Costa 1989

##### *Cordosphaeridium exilimurum* Davey & Williams 1966

##### *Cordosphaeridium fibrospinosum* Davey & Williams 1966

##### *Cordosphaeridium funiculatum* Morgenroth 1966

##### *Cordosphaeridium gracile* (Eisenack 1954) Davey & Williams 1966

##### *Cordosphaeridium inodes* (Klumpp 1953) Eisenack 1963

*Corrudinium incompositum* (Drugg 1970) Stover & Evitt 1978, Pl. 4, figs 7-8

##### *Cribroperidinium giuseppei* (Morgenroth 1966a) Helenes 1984, Pl. 4, fig. 6

*Cribroperidinium* *cavagnettiae* sp. nov., Pl. 4, figs 4, 5, 9-17

*Dapsilidinium simplex* (White 1842) Bujak et al. 1980

*Deflandrea andromiensis* Vozzhennikova 1967, Pl. 5, fig. 1

*Deflandrea denticulata* Alberti 1959

*Deflandrea eocenica* (Baltes 1969) Lentin & Williams 1973, Pl. 5, fig. 3

*Deflandrea granulata* Menendez 1965

*Deflandrea leptodermata* Cookson and Eisenack, 1965a

*Deflandrea oebisfeldensis* Alberti 1959, Pl. 5, fig. 2

*Deflandrea phosphoritica* Eisenack 1938

*Deflandrea truncata* Stover 1974

*Diphyes brevispinum* Bujak 1994, Pl. 5, fig. 7

*Diphyes colligerum* (Deflandre & Cookson 1955) Cookson 1965

*Diphyes ficusoides* Islam 1983, Pl. 5, figs 4, 5, 6

*Diphyes pseudoficusoides* Bujak 1994

*Dracodinium condylos* Williams & Downie 1966b), Pl. 5, figs 11, 12

*Dracodinium politum* Bujak et al. 1980, Pl. 5, figs 15, 16

*Dracodinium* *robertknoxii* sp. nov., Pl. 6, figs 1-4

*Dracodinium simile* (Eisenack 1954) Costa & Downie 1979, Pl. 6, fig. 7

*Dracodinium* aff. *simile* (Eisenack 1954) Costa & Downie 1979, Pl. 6, fig. 5

##### Remarks: *Dracodinium* aff. *simile* represents a transitional form between *Dr. simile* and *Wetzeliella lunaris*. It differs from typical *Dr. simile* by a distinct apical horn.

##### *Dracodinium varielongitudum* (Williams & Downie 1966) Costa & Downie 1979, Pl. 6, figs 6, 9, 10

*Dracodinium* cf. *varielongitudum* sensu Heilmann-Clausen & Costa 1989

*Dracodinium* sp.1, Pl. 6, figs 8, 12

Remarks: *Dracodinium* sp.1 is relatively close to *Wetzeliella samlandica*, but differs by the less sharply defined horns and by the less developed intratabular processes. The endophragm of *Dracodinium* sp.1 is thicker than the periphragm. *Dracodinium* sp. 1 is characterized by the presence of two equal antapical horns.

##### *Duosphaeridium nudum* (Cookson 1965) Loeblich & Loeblich 1968, Pl. 5, fig. 10

*Duosphaeridium* sp.1, Pl. 5, figs 8, 9

Remarks: *Duosphaeridium* sp. 1 represents a transitional form between *Duosphaeridium nudum* (Cookson) Loeblich & Loeblich and *Diphyes brevispinum* Bujak. *D. nudum* does not possess processes except for the large antapical one, whereas *D. brevispinum* has numerous narrow nontabular processes. Specimens assignable to *Duosphaeridium* sp. 1 bear 5 processes at the archaeopyle margin in addition to the large antapical one.

##### *Eatonicysta ursulae* (Morgenroth 1966a) Stover & Evitt 1978, Pl. 7, figs 2, 3

##### *Eisenackia* *scrobiculata* Morgenroth 1966a, Pl. 7, fig. 4

##### *Enneadocysta arcuata* (Eaton 1971) Stover & Williams 1995, Pl. 7, figs 5, 6

*Enneadocysta*?sp.1, Pl. 7, fig. 7

Remarks: This specimen is tentatively attributed to the genus *Enneadocysta* for the subspherical central body bearing solid processes with irregularly branched tips and for the apical archaeopyle.

*Eocladopyxis* cf. *peniculata* Morgenroth 1966a

Remarks: *Eocladopyxis* cf. *peniculata* differs from *E. peniculata* by having more numerous processes.

*Fibrocysta axialis* (Eisenack 1965) Stover & Evitt 1978

*Fibrocysta essentialis* (De Coninck 1969) Brinkhuis & Zachariasse 1988

*Fibrocysta vectensis* (Eaton 1976) Stover & Evitt 1978, Pl. 7 Fig.8

*Florentinia ferox* (Deflandre 1937) Duxbury 1980

*Fromea fragilis* (Cookson & Eisenack 1962) Stover & Evitt 1978

*Glaphyrocysta divaricata* (Williams & Downie 1966c) Stover & Evitt 1978

*Glaphyrocysta exuberans* (Deflandre & Cookson 1955) Stover & Evitt 1978

*Glaphyrocysta ordinata* (Williams & Downie 1966c) Stover & Evitt 1978

*Glaphyrocysta pastielsii* (Deflandre & Cookson 1955) Stover & Evitt 1978, Pl. 7, fig. 13

*Glaphyrocysta*? *vicina* (Eaton 1976) Stover & Evitt 1978, Pl. 7, figs 9, 11, 12

##### *Hafniasphaera septata* (Cookson & Eisenack 1967) Hansen 1977

aff. *Heslertonia heslertonensis* (Neal & Sarjeant 1962) Sarjeant 1966 sensu Heilmann-Clausen & Costa 1989, Pl. 8, figs 2-3

##### *Heteraulacacysta campanula* Drugg and Loeblich 1967

##### *Heteraulacacysta everriculata* Islam 1983, Pl. 8, fig. 1

##### *Heteraulacacysta leptalea* Eaton 1976

##### *Homotryblium abbreviatum* Eaton 1976

##### *Homotryblium tenuispinosum* Davey & Williams 1966, Pl. 8, fig. 4

##### *Hystrichokolpoma bulbosum* (Ehrenberg 1838) Morgenroth 1968, Pl. 8, figs. 5, 6

##### *Hystrichokolpoma cinctum* Klumpp 1953, Pl. 8, figs 7, 8, 11

*Hystrichokolpoma granulatum* Eaton 1976

*Hystrichokolpoma rigaudiae* Deflandre & Cookson 1955

*Hystrichokolpoma salacium* Eaton 1976

*Hystrichokolpoma spinosum* Wilson 1988, Pl. 8, figs 9-10

*Hystrichokolpoma unispinum* Williams & Downie 1966

*Hystrichosphaeridium cylindratum* Morgenroth 1966a

*Hystrichosphaeridium palmatum* Deflandre & Courteville 1939

*Hystrichosphaeridium salpingophorum* Davey & Williams 1966, Pl. 8, fig. 14

*Hystrichosphaeridium tubiferum* (Ehrenberg 1838) Deflandre 1937

*Hystrichosphaeropsis costae* Bujak 1994, Pl. 9, figs 3, 4, 7, 8

*Hystrichosphaeropsis* cf. *costae* Bujak 1994, Pl. 9, figs 1-2

Remarks: *Hystrichospaeropsis* cf. *costae* is a transitional form between *R. borussica* and *H. costae* (*Hystrichosphaeropsis* sp.B in Heilmann-Clausen 1993)

*Hystrichostrogylon holohymenium* Islam 1983a, Pl. 8, figs 12, 13

##### *Hystrichostrogylon membraniphorum* Agelopoulos 1964

*Hystrichostrogylon membraniphorum* subsp. *granulatum* Heilmann-Clausen & Costa 1989

*Impagidinium elegans* (Cookson & Eisenack 1965a) Stover & Evitt 1978

*Impagidinium* sp.1 sensu Heilmann-Clausen (1985), Pl. 9, figs 9-10

*Impagidinium* *wardii* sp. nov., Pl. 9, figs 5-6

##### *Kallosphaeridium brevibarbatum* De Conninck 1969

##### *Kallosphaeridium orchiesense* De Coninck 1975, Pl. 9, fig. 14

*Kenleyia* sp., Pl. 9, fig. 11

*Laternosphaeridium lanosum* Morgenroth 1966a

*Lejeunecysta hyalina* (Gerlach 1961) Sarjeant 1984b

*Lentinia wetzelii* (Morgenroth 1966a) Bujak in Bujak et al. 1980

*Lingulodinium machaerophorum* (Deflandre & Cookson 1955) Wall 1967

*Melitasphaeridium pseudorecurvatum* (Morgenroth 1966) Bujak et al. 1980, Pl. 9, fig. 12

*Membranilarnacia compressa* Bujak 1994, Pl. 9, fig. 13

*Membranilarnacia glabra* Agelopoulos 1967, Pl. 7, fig. 1

*Membranophoridium* cf. *aspinatum* Gerlach 1961 sensu Heilmann-Clausen & Costa 1989, Pl. 9, figs 15-17

*Microdinium ornatum* Vozzhennikova 1967

*Muratodinium fimbriatum* (Cookson & Eisenack 1967) Drugg 1970

*Nematosphaeropsis reticulensis* (Pastiels 1948) Sarjeant 1986

*Ochetodinium romanum* Damassa 1979a, Pl. 9, figs 18-19

*Oligosphaeridium complex* (White 1842) Davey & Williams 1966b, Pl. 9, fig.2 0

*Operculodinium centrocarpum* (Deflandre & Cookson 1955) Wall 1967

*Operculodinium nanaconulum* Islam 1983, Pl. 10, fig. 5

*Operculodinium microtrianum* (Klumpp 1953) Islam 1983

*Palaeocystodinium golzowense* Alberti 1961

*Pentadinium favatum* Edwards 1982, Pl. 10, figs 1-2

*Pentadinium goniferum* Edwards 1982

*Pentadinium laticinctum* Gerlach 1961

*Pentadinium polypodum* Edwards 1982

*Pentadinium* sp.1, Pl. 10, figs 3, 4, 6, 7, 9, 10

Remarks: *Pentadinium* sp.1, is characterized by a spherical endophragm with a moderately thick-walled smooth surface. The periphragm bears parasutural folds of variable height: from large, lace-like to narrow slightly jagged.

##### *Phthanoperidinium resistente* (Morgenroth 1966a) Eisenack & Kjellström 1971

# *Polysphaeridium zoharyi* (Rossignol 1962) Bujak et al. 1980

# *Pterodinium cingulatum* (Wetzel 1933b) Below 1981a

##### *Rhombodinium draco* Gocht 1955, Pl. 10, fig. 8

*Rhombodinium*? *glabrum* (Cookson 1956) Vozzhennikova 1967, Pl. 10, fig. 12

##### *Rhombodinium*? *pentagonum* Vozzhennikova 1967, Pl. 10, figs 11, 13

##### *Rottnestia borussica* subsp. *borussica* (Eisenack 1954) Cookson & Eisenack 1961

*Rottnestia borussica* subsp. *granulata* Heilmann-Clausen & Costa 1989

##### *Samlandia chlamydophora* Eisenack 1954, Pl. 11, figs 1-5

*Samlandia* cf. *chlamydophora* Eisenack 1954, Pl. 11, figs 6-7

Remarks: *Samlandia* cf. *chlamydophora* represents a transitional form between *S. chlamydophora* and *Samlandia chriskingii* sp. nov.

*Samlandia* *chriskingii* sp. nov., Pl. 11, figs 8-12

# *Selenopemphix nephoides* Benedek 1972, Pl. 11, fig. 14

*Senegalinium*? *dilwynense* (Cookson & Eisenack 1965c) Stover & Evitt 1978

##### *Senegalinium obscurum* (Drugg 1967) Stover & Evitt 1978

# *Soaniella granulata* Vozzhennikova 1967

##### *Spiniferella cornuta* subsp. *cornuta* (Gerlach 1961) Stover & Hardenbol 1994

*Spiniferella cornuta* subsp. *laevimura* (Davey & Willams 1966a) Willams et al. 1998, Pl. 11, fig. 13

##### *Spiniferites buccinus* (Davey & Williams 1966) Sarjeant 1970

##### *Spiniferites compactus* Cookson & Eisenack 1974

##### *Spiniferites membranaceus* (Rossignol 1964) Sarjeant 1970

##### *Spiniferites monilis* (Davey & Willams 1966a) Sarjeant 1970

##### *Spiniferites pseudofurcatus* (Klumpp 1953) Sarjeant 1970

##### *Spiniferites ramosus* (Ehrenberg 1838) Loeblich & Loeblich 1966

*Spiniferites ramosus* subsp. *brevifurcatus* (Cookson & Eisenack 1974) Lentin & Willams 1977b

*Spiniferites ramosus* subsp. *granomembranaceus* (Davey & Williams 1966) Lentin & Williams 1973

*Spiniferites ramosus* subsp. *granosus* (Davey & Willams 1966a) Lentin & Willams 1973

*Spiniferites ramosus* subsp. *multibrevis* (Davey & Williams 1966) Below 1982

*Systematophora* sp.1 sensu Heilmann-Clausen & Costa (1989)

##### *Tectatodinium pellitum* Wall 1967, Pl. 11, fig. 17

##### *Thalassiphora delicata* Williams & Downie 1966, Pl. 11, fig. 16

##### *Thalassiphora pelagica* (Eisenack 1964) Eisenack & Gocht 1960, Pl. 12, fig. 1

*Thalassiphora* *dominiquei* Iakovleva & Heilmann-Clausen 2010, Pl. 12, fig. 5-7

##### *Trigonopyxidia ginella* (Cookson and Eisenack 1960a) Downie & Sarjeant, 1965

##### *Turbiosphaera* *galatea* Eaton 1976

##### *Wetzeliella articulata* Eisenack 1976

*Wetzeliella articulata* subsp. *brevicornuta* Heilmann-Clausen & Costa 1989, Pl. 13, fig. 7

*Wetzeliella* aff. *articulata*-group sensuIakovleva & Heilmann-Clausen 2010, Pl. 13, fig. 4

##### *Wetzeliella coronata* Vozzhennikova 1967, Pl. 13, fig. 3

*Wetzeliella eocaenica* Agelopoulos 1967, Pl. 5, figs 13-14

##### *Wetzeliella lunaris* Gocht 1969

*Wetzeliella* aff. *lunaris* Gocht 1969, Pl. 13, fig. 1

Remarks: *Wetzeliella* aff. *lunaris* differs from *Wetzeliella* *lunaris* by less distinct apical horn, thinner intratabular processes and thin and light-coloured endophragm.

# *Wetzeliella meckelfeldensis* Gocht 1969, Pl. 12, fig. 2

##### *Wetzeliella ovalis* Eisenack 1954, Pl. 13, fig. 5

##### *Wetzeliella samlandica* Eisenack 1954)

*Wetzeliella* cf. *samlandica* Eisenack 1954, Pl. 13, fig. 2

Remarks: *Wetzeliella* cf. *samlandica* differs from typical *Wetzeliella* *samlandica* by having slightly wider bases of horns and generally shorter processes.

##### *Wetzeliella* aff. *Wilsonidium* sp., Pl. 11, fig.18; Pl. 13, figs 9-10

##### Remarks: Specimens attributed to *Wetzeliella* aff. *Wilsonidium* sp. represent transitional forms between typical *Wetzeliella* and *Wilsonidium*: they have parasutural processes as in typical *Wilsonidium*, but possess intratabular processes as well. The archeopyle is not clearly detected, supposed to be soleiform or hyperepeliform.

##### *Wilsonidium echinosuturatum* (Wilson 1967) Lentin & Williams 1976, Pl. 11, fig. 15

##### *Wilsonidium* aff. *echinosuturatum* (Wilson 1967) Lentin & Williams 1976, Pl. 13, fig. 6

Remarks: *Wilsonidium* aff. *echinosuturatum* differs from *Wilsonidium echinosuturatum* by having a more rounded ambitus and more fragile periphragm and endophragm; its ridges of parasutural processes are less prominent.