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whilst further

$$E_c = - L_f + W_1 ,$$

in which L_f represents the limiting heat of solution and W_1 the first heat of solution of $Tl_2 SO_4$, therefore:

$$- L_f + W_1 = 2\, \varepsilon_0 \left(E_e - T \frac{dE}{dT} \right)$$

or

$$L_f = W_1 - 2\, \varepsilon_0 \left(E_e - 1 \frac{dE}{dT} \right).$$

The right hand side of the equation contains again only known quantities if the E.M.F. of the cell and its temperature coefficient at $T°$ have been determined. W_1 may be borrowed from the table of Berthelot or Thomsen [1]).

The advantage of this method over the first lies in the fact that migration is excluded here and that we therefore, avoid the difficulty that the migration constants of concentrated solutions are not known.

I hope to describe the measurements in a future communication.

Amsterdam, Chem. University Lab., Aug. 1900.

Botanics. — "*Contributions to the knowledge of some undescribed or imperfectly known Fungi*" (3ᵈ Part) [2]). By Prof. C. A. J. A. Oudemans.

56. Ascochyta Rhei Ellis et Everhart, Proc. Acad. Sc. Philad. 1893, p. 160 (= Phyllosticta Rhei Ell. Ev. ante annum 1893); Sacc. Syll. XI, 525, forma *caulincola* Oud. — On the stem and branches of *Rheum Rhaponticum*. — Nunspeet, Oct. 2, 1899; Mr. Beins.

Maculae nunc nigrescentes, tunc vero pallescentes, irregulariter limitatae. Perithecia numerosissima, congesta, $1/10$—$1/8$ mill. in diam., epidermide velata, depressa, membranacea, vertice perforata. Sporulae hyalinae, cylindraceae, ad polos rotundatae, biloculares, non aut vix constrictae, 7—14×3.5—$4\ \mu$.

57. Ascochyta Psammae Oud. n. sp. — On the leaves of *Psamma littoralis* (= Calamagrostis arenaria = Ammophila arundinacea = Psamma arenaria). — Dunes of Scheveningen, Sept. 1891.

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[1]) See note on pag. 331. The same remarks also apply here.

[2]) For 2ⁿᵈ Part see these Proceedings p. 230.

Perithecia epiphylla, sparsa vel laxe-caespitosa, epidermide velata, non autem immersa, lenticulari-depressa, membranacea, mollia, nigra, in luce pervia autem pallide-fusca, $^1/_8$ mill. in diam., vertice perforata. Sporulae oblongae, dilute fuscescentes, biloculares, ad polos anguste-rotundatae, sine constrictionis vestigio, eguttulatae, $11^2/_3$— $14 \times 4^2/_3$ μ.

Our fungus must by no means be confounded with *Ascochyta perforans* Sacc. (Syll. III. 406) or, what according to this author would be the same, with *Sphaeria perforans* Roberge (Desm. Ann. Sc. nat. 2, XIX, 357 and Desm. Exs. 1st Series, 1st Ed., 1843, N°. 1288), because under this number, in the copy which I possess of this rare work, there are found Psamma-leaves, but no perithecia whose spores correspond with those of Ascochyta. They are indeed bilocular and uncoloured, but each extremity bears a sickle-shaped appendix, whose convex side is turned upward, and besides shows two inwardly curved ends and, in the middle, a short, thick stalk, by which it is joined to the summit of the spore. Perithecia with such spores can only belong to the genus *Darluca*, provided its character be somewhat expanded and, besides the presence of short-triangular or thread-shaped, there be also allowed comb-shaped, jelly-like appendices at the extremities of the spores. In this case the new form found by me might be denominated *Darluca cristigera*. These comb-bearing spores are, exclusive of the appendices, 25—26 μ long, and 14 μ wide, a measurement mentioned by Desmazières, not however taken over by Saccardo, but which is in any case much more considerable than was ever found in an *Ascochyta*. A slight deviation, in Saccardo's description, when compared to that of Desmazières, is found in so far as the former calls the spores at one and the same time "ellipticae" and "acutiusculae", notwithstanding these terms seem to exclude each other, and the second of the two is not found in the latter author.

In his diagnosis of *Ascochyta perforans* (Syll. III, 406) Saccardo also refers the reader to the article on *Sphaerella perforans* (Desm.) Sacc. in Vol I, p. 538 of the Sylloge, still, it cannot escape the attention of those who attend to this reference, that by this *Sphaerella* there is meant nothing else but the *Sphaeria perforans* already discussed by us, and the same number in Saccardo's herbarium venale. Desmazières' silence about the existence of asci induced Saccardo to doubt of the justness of the name of "Sphaeria", changed by himself, in accordance with the more recent ideas, into "Sphaerella". And herein the Italian Professor is right. Follows however that *Sphaerella perforans* has no right of existence any more and

can have no meaning but as a synonyme of *Darluca cristigera*.

Remains the question whether our fungus might perhaps belong to *Ascochyta graminicola* Sacc. (Mich. I, 127 and Syll. III, 407). The answer, however, we think, can be only negative, for though both species correspond in many respects with each other, still a nearer investigation proves that *Asc. graminicola* has ovoid-fusiform, bicellular spores, whilst in *Asc. Psammae* are found oblong spores without drops. — *Ascochyta graminicola* var. *Holci* and *Asc. graminicola* var. *ciliolata* Sacc. (both referred to on pag. 407 Vol. III of the Syll.) may remain out of consideration, the former having large four-dropped spores, the latter, on account of the gelatinous filaments at the summits of those organs, being obliged to withdraw to the genus *Darluca*-*Ascochyta graminicola* Sacc. var. *Brachypodii* Trail. (Sacc. Syll. X, 308) comes not into consideration, its spores being too large (15 — 17 × 5 μ) and somewhat crooked; *Asc. graminicola* var. *Caeruleae* not, as here again the spores bear appendices and accordingly belong to Darluca; lastly, neither *Asc. graminicola* var. *leptospora* (Sacc. Syll. XI, 308), as the spores are too narrow, as may be inferred from the name of the variety (λέπτος = slender).

So, we think ourself authorised to maintain the name of *Ascochyta Psammae*, and further, to withdraw the species *Ascochyta perforans* with their synonymes: *Sphaeria perforans* and *Sphaerella perforans*, together with *Ascochyta graminicola* var. *ciliolata* and *Ascochyta graminicola* var. *Caeruleae*, from the genera to which they hitherto belonged, bring them over to *Darluca*.

58. ASCOCHYTA SOLANICOLA Oud. n. sp. — On the leaves of *Solanum nigrum*. — Nunspeet, Oct. 11, 1898; Mr. BEINS

Maculae orbiculares (mill. 5 in diam.) sive ellipticae (18×15 mill), numerosae, fuscescentes, linea saturatius tincta in pagina superiore circumscriptae, pallide virescentes in pagina inferiore, vulgo steriles, denique aridae, fragillimae, foramen circulare vel ellipticum post destructionem relinquentes. Perithecia epiphylla, sparsa, $\frac{1}{5}$ mill. in diam., fusca, prominentia, primo epidermide velata, denique exposita, vertice perforata. Sporulae bacillares, ad polos rotundatae, hyalinae, biloculares, sine constrictionis vestigio, 10—12×2$\frac{1}{2}$ μ.

Ascochyta solanicola is distinguished from *Asc. Solani* Oud. (Ned. Kruidk. Arch. 2, VI, 44; Sacc. Syll. X, 304), on the stems of Solanum tuberosum, by the absence of black filaments at the base of the perithecia, and by the smaller spores (10—12×2$\frac{1}{2}$ μ to 14×7 μ); from *Asc. Lycopersici* Brunaud (Sacc. Syll. X, 304), on the leaves of Lycopersicum esculentum, by the brown, not black perithecia, by

the want of the slightest constriction on the height of the partition, and by longer spores ($10—12 \times 2^{1}/_3 \mu$ to $8—10 \times 2^{1}/_2 \mu$); from *Asc. socia* Pass. (Sacc. Syll. X, 304), on the leaves of Lycopersicum esculentum, by the somewhat longer and somewhat shorter spores ($10—12 \times 2^{1}/_3 \mu$ to $8—10 \times 2^{1}/_2 —3 \mu$): from *Asc. Atropae* Bresadola (Hedw. XXXII, 1893, p. 32 and Sacc. Syll. XI, 524), on the leaves of Atropa Belladonna, by the much larger perithecia ($(200 \mu$ to $70—80 \mu)$ and the narrower spores ($10—12 \times 2^{1}/_3 \mu$ to $8—12 \times 4 \mu$); from *Asc. Daturae* Sacc. (Mich. I, 163 and Syll. III, 402), on the leaves of Datura Stramonium and arboreum, by the larger perithecia (200μ to 100μ), otherwise coloured dots, and longer but narrower spores ($10—12 \times 2^{1}/_3 \mu$ to $7—8 \times 3 \mu$); from *Asc. Nicotianae* Pass. (Sacc. Syll. III, 401), on the leaves of Nicotiana Tabacum, by the absence of the slightest constriction on the height of the partition and of fine granules in the protoplasm; lastly, from *Asc. physalina* Sacc. (Mich. I, 93 and Syll. II, 401), on the leaves of Physalis Alkekengi, by the much smaller spores ($10—12 \times 2^{1}/_3 \mu$ to $25—28 \times 8 \mu$) and the absence of vacuoles in the protoplasm.

*ASCOCHYTA TUSSILAGINIS Oud. n. sp. — On the leaves of *Tussilago Farfara*. Apeldoorn, Oct. 6, 1897. — Cf. Ned. Kr. Arch. 3, I, 498, et Hedw. XXXVII, 178.

59. ASCOCHYTA VIBURNICOLA Oud. n. sp. — On the branches of *Viburnum Opulus*, together with *Phoma viburnicola*. — Nunspeet, April 14, 1899; Mr. BEINS.

Maculae nullae. Perithecia numerosa, parva, depressa, sub peridermate occultata, vertice perforata. Sporulae cylindraceae vel cylindraceofusiformes, ad polos rotundatae, rectae, solitariae hyalinae, in massam condensatae dilute-olivaceae, biloculares, $9^{1}/_3 \times 2^{1}/_2 \mu$.

Differt ab *A. Viburni*, *A. Lantanae* et *A. Tini* sporularum dimensionibus, quippe quae exprimuntur numeris

$$10—12 \times 3.5—4 \mu \quad \text{pro } A. \; Viburni.$$
$$11 \times 2 \mu \qquad \text{pro } A. \; Lantanae.$$
$$6—10 \times 3 \mu \qquad \text{pro } A. \; Tini.$$

CYTODIPLOSPORA Oudemans.

(Ned. Kruidk. Archief 2ᵉ Serie, VI, 292).

The genus *Cytodiplospora* may be considered as to differ from *Cytospora* by bicellular spores.

Though SACCARDO p. 528, Vol. XI of his Sylloge, rightly assigned

a place to this genus among the Hyalodidymae, it was in Vol. XII of the said work (p. 162), elaborated by SYDOW, erroneously mentioned as belonging to the Phaeophragmeae, and in the "Index generalis Generum", in the back part of volume XIV, much to the detriment of the reader, an *s* is added to Cytodiplospora which is thereby changed into *Cystodiplospora*.

The first *Cytodiplospora* found by me, lived on branches of *Castanea vesca*, and was described by me under the name of *Cytodiplospora Castaneae* in Nederl. Kruidk. Archief, 2, VI, 528. A second species, found on Birch-branches, I mentioned under the title of *Cytodiplospora Betulae*, in Hedwigia XXXVII (1898) p. 317. A third species, found of late on branches of *Acer Pseudoplatanus* and *dasycarpum*, I here mention by the name of:

60. CYTODIPLOSPORA ACERUM Oud. n. sp. — On branches of *Acer Pseudoplatanus* and *Acer dasycarpum*. — Bussum, April, 1900. C. J. KONING.

Pustulae numerosae, irregulariter distributae, peridermate tectae, parum prominentes, sed praesentiam suam saepe jam ab initio tradentes macula subcutanea orbiculari vel annulari, nigra, opaca, 1 ad $1\frac{1}{2}$ mill. in diam. Peridermate rupto, stroma conspicuum fit depressum, fuliginosum, structura parenchymatica tenerrima insigne, intus lacunosum, i.e. septis pluribus flexuosis incompletis in loculamenta plurima variae dimensionis divisum. Sporulae numerosissimae, biloculares, fusiformes, rectae, hyalinae, ad polos anguste rotundatae, $12—14\times2\frac{1}{3}—3\,\mu$, non constrictae, basidiis brevibus suffultae.

DIPLODINA Westendorp.

61. DIPLODINA DASYCARPI Oud. n. sp. — On branches of *Acer dasycarpum*. — Scheveningen, May 1894.

Perithecia in caespites densos appropinquata, subcutanea, denique exposita, globuloso-papillata, nigra. Sporulae fusiformes, hyalinae, ad polos anguste rotundatae, biloculares, non constrictae, eguttulatae, $12\times2\frac{1}{2}\,\mu$. — Differt a *D. Acerum* sporulis minus largis ($12\times2\frac{1}{2}\,\mu$ contra $12—16\times4—4.5\,\mu$) et sporulis ne minime quidem constrictis.

62. DIPLODINA NEGUNDINIS Oud. n. sp. — On branches of *Negundo fraxinifolia*. — Naarden, Febr. 1900; C. J. KONING.

Perithecia numerosissima, dense congesta, in parenchymate corticali leviter immersa, orbiculari-depressa, vertice tandem periderma laxe adhaerens perforantia, $100\,\mu$ in diam. Sporulae bacillares, ad polos

rotundatae, continuae, hyalinae, biloculares, leviter in medio constrictae, nonnumquam imo panduriformes, 11—14×3—5 μ, eguttulatae, sporulis plurimis continuis, brevibus, phomiformibus (nondum penitus evolutis?) commixtae (Pl. IV, fig. 7).

THORACELLA n. g. Oudemans.

Stroma piceum, micans, infracuticulare, primo laeve, postea rugosum et foveolatum, e stratis duobus aequialtis composito: superiore pseudoparenchymatoso, fuliginoso, inferioıe e hyphis intertextis pachydermatosis, hyalinis composito; conceptaculis sporularum in strato superiore effossis, primo absconditis, postremo ostiolo hiantibus. Sporulae fusiformes, ad polos acutiusculae, hyalinae, in medio 1- septatae, basidiis filiformibus suffultae.

63. THORACELLA LEDI Oud. n. sp. On the leaves of *Ledum palustre;* Nunspeet, Sept. 9, 1898; Mr. BEINS.

Stroma amphigenum, nunc partem tantum folii, tunc vere totum folium occupans, piceum, micans, primo laeve, postea rugosum et foveolatum, ex ostiolis conceptaculorum perforatis paululum prominentibus p. m. inaequali. Conceptacula p. m. numerosa. Sporulae fusiformes, hyalinae, 7—11 × 2 μ, ad polos acutiusculae, in medio 1-septatae, basidiis filiformibus longiusculis suffultae — Saepe *Ascochyta Ledi* Oud. concomitata.

δ. Phragmosporae.

HENDERSONIA Berkeley.

*HENDERSONIA AGROPYRI REPENTIS Oud. n. sp. On the leaves of *Agropyrum repens.* Nunspeet, March 13, 1898; Mr. BEINS. Cf. Ned. Kr. Arch. 3, I, 500.

64. HENDERSONIA GROSSULARIAE Oud. n. sp. On the leaves of the young branches of *Ribes Grossularia.* — Apeldoorn, May 19, 1897, O. — Nunspeet, July 12, 1899; Mr. BEINS.

Perithecia membrana subtilissima praedita, subcutanea, parva, pallida, denique vertice perforata. Sporulae cylindricae vel fusiformes, subcurvatae, stramineae, quadriloculares, ad polos rotundatae, eguttulatae, 14—23 × 4—4$^2/_3$ μ (Pl. IV, fig, 8).

65. HENDERSONIA TYPHICOLA Oud. n. sp. On the stems of *Typha latifolia.* — Nunspeet, May 21, 1899; Mr. BEINS.

Perithecia primo epidermide velata, denique exposita, tenera, membranacea, parva, subfuliginea, denique vertice perforata. Sporulae oblongae, ad polos rotundatae, rectae vel curvatae, pallide-olivaceae, quadriloculares, $11^2/_3$—14 × $4^2/_3$—5 μ (Pl. IV, fig. 9).

*HENDERSONIA WEIGELIAE Oud. n. sp. On branches of *Weigelia amabilis*. Nunspeet, March 3, 1898. O. Ned. Kr. Arch. 3, I, 500.

STAGANOSPORA Saccardo.

*STAGONOSPORA DASYCARPI Oud. n. sp. (St. Aceris dasycarpi Ned. Kruidk. Arch. 3, I, 500). — On branches of *Acer dasycarpum*. — Scheveningen, May 1895.

ε. Dictyosporae.

CAMAROSPORIUM Schultz.

*CAMAROSPORIUM DASYCARPI Oud. n. sp. — This name should replace that of *Camarosporium Aceris dasycarpi*, used in the Ned. Kr. Arch. 3, I, 501 and in Hedwigia XXXVII (1898) p. 179. On the branches of *Acer dasycarpum*. — Scheveningen, May 1894.

*CAMAROSPORIUM ILICIS Oud. n. sp. N. K. A. 3, I, 502 and Hedw. XXXVII, 1898, p. 179). — On the branches of *Ilex Aquifolium*. — the Hague 1894.

*CAMAROSPORIUM PERICLYMENI. Oud. n. sp. N. K. A. 3, I, 502 and Hedw. XXXVII, 1898, p. 179. — On branches of *Lonicera Periclymenum*. — Scheveningen, Aug. 1894.

66. CAMAROSPORIUM TANACETI Oud. n. sp. — On the stems of *Tanacetum vulgare*. — Nunspeet, Febr. 15, 1899; Mr. BEINS.

Perithecia numerosa, epidermide velata, nunc inordinate sparsa, tunc vero in series lineares digesta, inter peridermatis lacinias ruptas prominentia, semiorbicularia vel anguste-elliptica, glabra, nigra, $^1/_2$ mill. in diam. Sporulae suborbiculares, ellipticae vel late ovatae, vulgo 14 × 9 μ, quadriloculares, loculo alterutro intermedio septo longitudinali, perpendiculari vel declivi, diviso.

η. Scolecosporae.

SEPTORIA Fries (emend.)

67. SEPTORIA CAPSELLAE Oud. n. sp. — On the dry and nearly decayed leaves of *Capsella Bursa pastoris*. — Apeldoorn,

July 26, 1899; Oud. — Perithecia minima, dense congesta, nigra. Sporulae cylindricae, rectae, curvatae vel flexuosae, hyalinae, ad polos rotundatae, quadriloculares, maturae 50—$60 \times 2^{1}/_{2}$—$3^{1}/_{2} \mu$.

68. SEPTORIA CONORUM (Sacc.) Oud.; Phoma Conorum Sacc. Mich II, 615; id. Syll. III, 150. — On the cone-scales of *Abies excelsa.* — Forest of Bloemendaal, Maart 12, 1900; C. J. J. VAN HALL. — Perithecia innato-erumpentia, globoso-depressa, astoma, jure crassiora, carbonacea, nigra, nucleo griseo. Sporulae fusoideae, rectae, 10—14×2—$2^{1}/_{3} \mu$, primitus 1-guttulatae, postremo septo transverso in partes 2 aequales divisae, basidiis sporis duplo longioribus, post lapsum sporularum uncinatis (Pl. IV, fig. 10).

69. SEPTORIA JAPONICAE Oud. n. sp. — On the leaves of *Evonymus japonica.* — Naaldwijk, 1867; the late Dr. J. E. VAN DER TRAPPEN.

Maculae pallescentes. Perithecia amphigena, inordinate distributa, dense congesta, primo epidermide velata, postea prominentia et epermidis ruptae laciniis dentiformibus erectis circumcincta, nigra, p. m. micantia. Sporulae breve-fusiformes, 15×4—5μ, hyalinae, continuae, rectae, eguttalatae, anguste ad polos rotundatae. — Differt a *Sept. Evonymi japonicae* Pass. (Sacc. Syll. III, 482) sporulis latioribus (15×4—5 contra 12—$13 \times 2.5 \mu$) et linea alba orbiculari ad verticem peritheciorum absentia (Pl. IV, fig. 11).

70. SEPTORIA OBESISPORA Oud. n. sp. — On the leaves of *Calystegia sepium.* — Nunspeet, Aug. 15, 1898; Mr. BEINS.

Maculae quoad formam et dimensiones admodum variabiles, solitariae vel confluentes, rufescentes. Perithecia epiphylla, minima, inordinate distributa, nigra. Sporulae bacillares, rectae vel curvatae, imo nonnumquam geniculatae, hyalinae, ad polos rotundatae, pluriseptatae, loculamentis omnibus uniguttulatis, 23—28×4—5μ. — Differt a *S. Convolvuli* Desm. sporulis multo crassioribus (23—28×4—5μ contra 35—$50 \times 1.5 \mu$); a *S. Calystegiae* West., sporulis brevioribus (23—28×4—5 contra 36—45×4—5μ), tandem a *S. flagellari* Ellis et Everhart sporulis brevioribus et crassioribus (23—28×4—5μ contra 35—$44 \times 1.5 \mu$). (Pl. IV, fig. 12).

RHABDOSPORA Montagne.

71. RHABDOSPORA ERYNGICOLA Oud. et Sydow n. sp. — Septoria eryngicola Oud. et Sacc. Syll. Addit. ad. vol. I—IV, p. 345, sub.

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no. 298; Sacc. (Syll. X, 367, sub 108). — On the stems of *Eryngium maritimum*. — Scheveningen, Oct. 1892.

Internodia albido-pallescentia perithecicrum numero notabili obducta, quorum maxima $1/4$ mill. in diam. habent. Perithecia nigra, primitus epidermide velata, postea vero exposita, vertice perforata. Sporulae curvatae, continuae, eguttulatae, 28—30 × $1^1/2 \mu$.

Though *Septoria Eryngii* Pass. (Fghi. Parm. Septoria no. 57 and Sacc. Syll. III, 532), by Professor SACCARDO and myself had formerly been declared identic with *Septoria eryngicola* Oud. and Sacc., it will now appear to me that this view was contrary to the nature of the facts, as *Septoria Eryngii* not only attacks the *leaves* of *Eryngium campestre*, but as moreover its spores get no longer than 20—25 μ.

Everything well considered, it seems to me that *Septoria Eryngii* West. (Not. V, 31) with its straight spores of 50 × $2^1/2 \mu$ belongs to *Eryngium maritimum*, and that *Septoria eryngicola* Oud. (= S. Eryngii Pass. l. c. = S. eryngicola Oud. et Sacc.), with its straight or curved spores of 25 × 1—$1^1/2 \mu$, is exclusively found on the leaves of *Er. campestre*. — *Rhabdospora Eryngicola* Oud. et Syd. then represents a third species proper to *Er. maritimum*, whose curved spores of 28 – 30 × $2^1/2 \mu$, keep the middle between those of the two other species mentioned just now.

72. RHABDOSPORA MILLEFOLII Oud. n. sp. — On the stems of *Achillea Millefolium*. — Nunspeet, May 21, 1899; Mr. BEINS.

Perithecia numerosa, densissime congesta, solitaria vel confluentia, in series longitudinales, caulium sulcos implentes, coalescentia, semiglobosa vel a latere compressa et hinc cristiformia, glabra, nigra, primitus epidermide velata, denique exposita et centro perforata, mill. $1/3$—$1/2$ in diam. Sporulae bacillares, rectae vel curvulae, ad polos rotundatae, primo 3-, postea 2 guttulatae, continuae, hyalinae, $9^1/3$—$11^2/3$ × $2^1/3 \mu$, basidiis aequilongis vel longioribus suffultae (Pl. IV, fig. 13).

Differt a *Rh. Achilleae* Bresadola (Roum. Revue Myc. XIII, 1891, p. 30 et tab. CXIV, fig. IX; Sacc. Syll. X, 394) peritheciis multo majoribus et sporulis bis minoribus.

73. RHABDOSPORA TANACETI Oud. n. sp. — On the stems of *Tanacetum vulgare*. — Nunspeet, April 7, 1899; Mr. BEINS.

Perithecia gregaria, punctiformia, epidermide velata, nigra, solidiuscula, 90—120 μ in diam. Sporulae filiformes, hyalinae, rectae,

curvulae vel p. m. flexuosae, 3-septatae, sub lente multum augente neque guttiferae, neque protoplasmate granuloso farctae, 50—60 × 2 μ.

CYTOSPORINA Saccardo.

*CYTOSPORINA ABIETIS Oud. n. sp. — On the foremost portion of the under surface of fruit-scales of *Abies excelsa*. — Nunspeet, April 8, 1898; Mr. BEINS. Cf. Hedw. XXXVII (1898), p. 317.

74. CYTOSPORINA SYRINGAE Oud. n. sp. — On the branches of *Syringa vulgaris*. — Nunspeet 1898; Mr. BEINS.

Stromata corticola, immersa, nigra, oblonga, rima longitudinali sinuosa exarata, intus in loculamenta plura p. m. completa sporulasque foventia divisa. Sporulae filiformes, uncinato-curvatae, continuae, hyalinae, eguttulatae, 32×2 μ, basidiis filiformibus aequilongis fultae.

b. Nectroideae.

SPHAERONEMELLA Karsten.

75. SPHAERONEMELLA WENTII Oud. n. sp. (Dedicated to Dr. F. A. F. C. WENT, Piofessor in Botanics at the University of Utrecht). — On the putrefying stems of *Faba vulgaris*. — Utrecht, 1900; Mr. PULLE, candidate of Pharmacy.

Perithecia subglobosa, membranacea, mollia, primo alba, deinde ochracea, cava, 300 μ in diam., sparsa, in telis putrescentibus immersa, rostro concolore subulato circa 900 μ longo coronata. Rostrum e filis tenerrimis, primo per totam longitudinem unitis, postremo versus apicem rostri relaxatis, solutis, retrorsum arcuatis, compositum. Sporulae, basidiis brevissimis e mycelio, conceptaculi fundum obtegente, sursum tendentibus fultae, maturae decidunt et deinde, in guttulam mucilaginis ope conglobatae, ad orificium rostri apparent. Guttula viscosa, in corpora quibusum in contactum venit statim diffluens, diam. habet 250 μ, et colore albo, nec minus nitore suo oculos allicit. Sporulae hyalinae, ellipticae, continuae, longae 7 μ, laiae 4 μ.

c. Leptostromaceae.

LEPTOTHYRIUM Kunze et Schmidt.

76. LEPTOTHYRIUM BETULI Oud. n. sp. — On the leaves of *Carpinus Betulus*. — Nunspeet, Nov. 5, 1899; Mr. BEINS.

Maculae nullae. Perithecia scutiformia hypogena, numerosa, aequaliter distributa, puncta nigra, convexa, rugulosa, $^1/_{12}$—$^1/_{10}$ mill. in diam. simulantia. Scutula, ex cuticula mutata et atrata formata, itaque

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omnis structurae expertia, cavernulas obtegunt minimas, sporulis minutissimis $(7 \times 1^{1}/_{6} \mu)$, bacillaribus, vulgo curvatis, continuis, eguttulatis, utrimque rotundatis, basidiis aegre distinguendis fultis, repletas.

77. LEPTOTHYRIUM FUNCKIAE Oud. n. sp. — On the leaves of *Funckia ovata.* — Nunspeet, Oct. 11, 1898; Mr. BEINS.

Maculae nullae. Perithecia in facie foliorum inferiore p. m. regulariter distributa, $^{1}/_{6}$—$^{1}/_{4}$ mill. in diam., nigra, perfecte circumscissosoluta, ad marginem subtilissime fimbriata, orificio nullo. Sporulae cylindraceae, rectae, ad polos rotundatae, hyalinae, eguttulatae, $2 \times ^{1}/_{2} \mu$.

LEPTOSTROMA Fries.

78. LEPTOSTROMA ABROTANI Oud. n. sp. — On the stems and branchlets of *Artemisia Abrotanum.* — Nunspeet, 1899; Mr. BEINS.

Perithecia dimidiata, aequaliter distributa, $^{1}/_{2}$—$1^{1}/_{2}$ mill. longa, primo epidermide vel peridermate nigrefacto velata, postea exposita, $^{1}/_{3}$—$^{1}/_{2}$ mill. lata, astoma, saturate-fusca, opaca. Sporulae numerosissimae, hyalinae, continuae, vulgo oblongae vel fusiformes, 7—$10 \times 2^{1}/_{3}$—3μ, nonnumquam reniformes, $7 \times 3 \mu$, semper biocellatae, ad polos rotundatae.

79. LEPTOSTROMA LONICERICOLUM Rabh. Bot. Zeit. 1846, p. 46 (nomen tantum); Rab. H. M. I, N°. 865; Sacc. Syll. III, 647 (nomen tantum). On the branches of *Lonicera Caprifolium* var. *coccinea.* — Nunspeet 1899; Mr. BEINS.

Perithecia inordinate sparsa, cuticula tenuissima velata, planoconvexa, atra, nitida, oblonga, centro prominentia, ad polos declivia et acutata, 1 mill. longa, $^{1}/_{2}$ mill. lata, tandem poro pertusa. Sporae oblongae vel fusiformes, hyalinae, continuae, biocellatae, $7 \times 2^{1}/_{3} \mu$, ad polos rotundatae vel acutatae, singulae basidio filiformi tenuissimo, sporulis bis ad quater longioribus suffultae. — Internodia peritheciigera pallescentia, albida vel straminei coloris.

80. LEPTOSTROMA STELLARIAE Kirchner, Lotos 1856, p. 204; Sacc. Syll. III, 647. — On the leaves of *Stellaria Holostea*, in company with *Septoria Holosteae* Oud. — Nunspeet, April 17, 1899; Mr. BEINS.

Species adhuc indescripta.

Perithecia epiphylla, dimidiata, in maculis pallidioribus foliorum exsiccatorum inordinate-destributa, late-elliptica, convexa, rufo-nigra, opaca, $^{1}/_{2}$—$^{3}/_{4} \times ^{1}/_{3}$—$^{1}/_{2} \mu$, epidermide velata, tandem fissura longitu-

dinali hiascentia. Sporulae cylindraceo-fusiformes, $9^1/_3$—$11^2/_3 \times 2^1/_3$—$2^1/_2$ μ, ad polos anguste-rotundatae, continuae, hyalinae, biocellatae.

The above description, the first given of this fungus, qualifies us to remove it from the list of the "Species vix notae" (Sacc. Syll. III, 647).

SACIDIUM Nees.

81. SACIDIUM ABIETIS Oud. n. sp. — In sulco longitudinali mediano faciei superioris, et juxta nervum medianum prominentem faciei inferioris acuum *Abietis grandis* cultae, puncta nigra numerosa approximata offenduntur, quae, oculo armato examinata, vesiculas simulant minimas, omnis structurae expertes, 60—100 μ in diam. habentes, colore dilute fuligineo affectas, basin versus in pedicellum brevissimum, quamvis amplum, contractas, sporulis singulis basidio filiformi fultis, repletas. Ipsae sporulae numerosissimae, ellipticae, hyalinae, continuae, guttula mediana ampla, valde micante, praeditae, 9—13 μ longae, 7—9.5 μ latae. — Nunspeet, Sept. 1899; Mr. BEINS. On the leaves of *Abies grandis*.

Sacidium Abietis Oud

82. SACIDIUM QUERCUS Oud. n. sp. On the leaves of an American species of *Quercus*. — Nunspeet, April 11, 1898; Mr. BEINS.

Perithecia hypogena, caespitosa, orbicularia vel elliptica, 160 ad 180 μ lata, inaequaliter inflata, postremo plana et rugosa, dimidiata, clypeata, atra, astoma, ad faciem internam basidiis numerosissimis, sporuliferis obsessa. Basidia dense congesta, filiformia, 14—$18^2/_3 \times 1^1/_6$ μ, recta, hyalina, continua. Sporulae bacillares, hyalinae, continuae, $6 \times 1^1/_6$ μ.

PIROSTOMA Fries.

83. PIROSTOMA CIRCINANS Fr. S. V. Sc. 395; Fuck Symb. 401; Sacc. Syll. III, 653. On the leaves and leaf-sheaths of *Phragmites communis*. — Nunspeet, 1899; Mr. BEINS.

Badly known species!

When consulting the different authors who have occupied themselves with *Pirostoma circinans*, it is difficult, if not impossible, to imagine that their communications regard the same fungus, though all, for starting point, applied themselves to objects which, although denominated differently, such as *Coniosporium circinans* Fr. S. M. III, 257; West. Herb. Cr. n⁰. 38; *Sphaeria circinans* Rab. Kr. Fl.
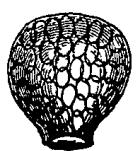
174; Kickx Crypt. des Flandres I, 349; Lambotte, Fl, Mycol. Belge II, 240; *Pirostoma circinans* Fr. S. V. S. 395; Sacc. Syll. III, 653; Fuck. Symb. 401, — were notwithstanding considered by all of them as no more but synonymes.

Indeed, while some (Fries S. M. III, 257; Rab. Kr. Fl. 174, Lambotte Fl. Mycol. Belge II, 240) make mention of a Sphaeriacee, possessing "globular perithecia perforated at their summit", nay even "asci and paraphyses" (Fr. S. V. S. 395; Kickx l. c.; Lamb. l. c.), others wish the fungus to be allowed but an inferior rank among the Sphaeropsideae, to which asci and paraphyses are wanting (Fuck. l. c.; Sacc. Syll. III, 653). WALLROTH, who endowed our fungus with the name of Sphaeria stigmatella (Flora Crypt. II, 786), ascribes it "very small, slightly-globose perithecia which are closely pressed against the plant", while FUCKEL, adopting the nomenclature of FRIES, declares notwithstanding: „Ich kann mir ueber den Bau dieses Pilzes noch kein klares Bild entwerfen." The characteristics of the genus he passes by, but admits that the species has globular, brown stylospores of 12 μ diameter, concealed under a lengthwise stretched peltate perithecium.

The supposition that the different authors have possibly devoted their investigations to two different species, may be represented as acceptable, still it ought to be rejected, when considering that as well FRIES, who introduced the name of *Coniosporium*, as RABENHORST KICKX and LAMBOTTE, who served themselves of the expression *Sphaeria* to elucidate their divergent opinions, refer all to N°. 330 of the "Plantes Cryptogames du Nord de la France 1e Ed. (A°. 1828)", which — as is proved by the words added to the name of „*Pirostoma circinans*": „FRIES, in litteris", sent to the renowned mycologue to be verified — shows neither perithecia, nor asci, nor paraphyses, and which, moreover, consists of nothing else but very small, flat, perfectly sterile shields, not unlike those which are characteristic of the genus *Leptothyrium*.

The specimens of *Pirostoma circinans*, published by FUCKEL in his Fungi Rhenani under N°. 791, not without the synonymes *Coniosporium circinans* and *Sphaeria circinans* being added to the chief name, differ in no single respect from those of DESMAZIÈRES, while these, in their turn, cannot be distinguished from those of the "Herbier des Cryptogames Belges" of WESTENDORP (N°. 38).

The specimens collected in Holland of *Pirostoma circinans*, for the greater part in excellent condition, deviate in no single respect from those of:

1. DESMAZIÈRE's Plantes Cryptogames du Nord de la France, 1e Ed., No. 330 (Coniosporium);

2. RABENHORST's Herbarium mycologicum, 2e Ed. No. 59 (Coniosporium);

3. RABENHORST's Fungi Europaei, Nos. 1031 en 2700 (Pirostoma);

4. WESTENDORP's Herbier Cryptogamique Belge, No. 38 (Sphaeria);

5. FUCKEL's Fungi Rhenani, No. 791 (Pirostoma);

6. ROUMEGUÈRE's Fungi gallici, No. 1082 (Pirostoma);

which means, that the microscopic investigation of all these collections may be considered as to be described in the following lines.

Pirostoma circinans, a fungus, hitherto found nowhere but on the stems and leaf-sheaths of *Phragmites communis*, appears at macrocospic examination in the shape of stripes, dots, or rings (whence the name of *circinans*), of more or less length, circumference, or diameter, which are first hidden under the cuticula, but later throw off that membrane and then show a brown tint, which in older objects inclines to black and, when struck by sunlight, displays more or less gloss.

When examined with the microscope, the black portions show a finely granulous surface, which has probably given cause to the mentioning of an "accumulation of very minute, densely crowded perithecia", which expression is still met with in some authors. We must directly add, however, that this conception reposes on an error, and that in *Pirostoma* there are found no perithecia at all, and accordingly neither asci and paraphyses.

A single granule, subjected to microscopic examination, presents itself as a low, dome-shaped body, or, in other words, as a plane-convex (hollow) lens, of which the convex side is turned toward the spectator, while the flat one reposes on the object which bears the fungus. The convex side is composed of extremely minute blown-up cells, which, seen in front, are $2\frac{1}{3}$ to $4\frac{2}{3}\mu$ wide, and angular, and have this peculiarity, that the black colour proper to them and on which depends the dark appearance of the stripes, dots, and rings, proves to be limited to that outerside, whilst the side-walls and the inner-wall are wholly devoid of it. Add to this that the coloured side in the middle, or close by, shows an extremely small hole at the bottom of a superficial impression, and that this hole has the appearance of a brilliant point because it allows the eye

to penetrate into the colourless back wall of the cell and into the colourless tissue behind it, — then it can hardly be denied, that this concurrence of facts can give rise to the conviction that no better name than that of *Pirostoma* (derived from the Greek words πείρω to pierce, and στόμα mouth or opening) could have been chosen to indicate the properties, which we have above drawn attention to. Still there is no doubt that FRIES, whose diagnoses sprung from researches with no other instrument but the magnifying-glass, cannot have been acquainted with the finer structure sketched by us just now, whence it follows that in giving the name of *Pirostoma* to objects quite like to those which we examined ourselves, he will have been led: not by examining the cells of the small granulous corpuscula. but by the black spots themselves, at which we, however, never observed anything like an opening. For the rest we repeat that the presence of "sporae ascis linearibus paraphysophoris receptae" has neither been found true by ourselves, nor by FUCKEL, nor by SACCARDO, so that the fungus, endowed by FRIES with the name of Pirostoma circinans, has remained a riddle to us. The information of KICKX and LAMBOTTE, of whom the latter did nothing but simply copying the formula produced by the former, and that imperfectly, too, cannot relieve our embarrassment, as they refer their readers to the dried objects of WESTENDORP, at which nothing can be discovered of what they describe; on the contrary, everything corresponds with what we have found in our own specimens.

After mature consideration, *Pirostoma circinans* appears to us a preliminary, sterile condition of a higher form, and allied to the genus *Leptothyrium*. SACCARDO gave the fungus a place among his „Leptostromaceae phaeosporae', no doubt because FUCKEL had attributed to it "globular, brownish stylospores", still we can attach no value to this view as it is completely contrary to the experience acquired in the investigation of FUCKEL's exsiccata.

All those who attribute to *Pirostoma circinans* an ostiolum, asci, spores, and paraphyses, seem to have examined some or other Pyrenomycete, accidentally got among the shields of Pirostoma or, without previous research, to have copied the mycologue of Upsala, or one another.

d. Excipulaceae.

DISCELLA Berkeley et Broome.

84. DISCELLA BERBERIDIS Oud. n. sp. (Discella Grossulariae Oud. Ned. Kruidk. Arch. 2, V, 506). After it had appeared to me that

the branchlet on which I had found the above mentioned *Discella*
had not belonged to *Ribes Grossularia*, but to *Berberis vulgaris*, the
first chosen name had of course to be changed. So I here redress
the error committed while calling to mind that the diagnosis of the
fungus ran as follows:

Maculae circulares nigrae numerosae, $^1/_{10}$—$^1/_5$ mill. in diam., mi-
cantes, primo neutiquam, postremo parum prominentes, e cellulis
peridermatis, pseudoparenchymate nigrescente repletis, formatae, foveas
minimas, in parenchymate corticali absconditas, operculi ad instar
occludunt. Foveae, sporulaium glebula coloris mellei repletae, peri-
theciorum locum tenent operculoque scutiformi perforato vel delapso
late patentes, contenta amittunt. Sporulae bacillares, rectae vel sub-
curvatae, ad polos rotundatae, biloculares, separatim visae fere hyalinae,
congestae vero manifeste mellae, 7—10 $\times$ 2—3 μ.

(To be continued).

Mathematics. — *" On the* MacMahon *generalization of the*
NEWTON-GIRARD *formulae"*. By Prof. L. GEGENBAUER of
Vienna (Communicated by Prof. JAN DE VRIES).

In his treatise contained in the 15th volume of the "Proceedings
of the London Mathematical Society" "On Symmetric Functions and
in particular on certain Inverse Operators in connection therewith"
MacMahon has deduced with the aid of differential operators the
relations

$$S^m_{m+r} - f_1 S^m_{m+r-1} + f_2 S^m_{m+r-2} - \ldots + (-1)^r f_r S^m_m = (-1)^r \frac{(r+m)!}{r!\, m!}\, f_{m+r}$$

where S^i_k denote those symmetric functions of dimension k in the
n quantities $x_1, x_2, \ldots, x_n$ in which every term contains i of these
quantities, so that in particular S^i_i is their elementary symmetric
function f_i and S^1_k the sum of their k^{th} powers.

These relations forming an interesting generalisation of the NEWTON-
GIRARD formulae, were proved anew somewhat later by LACHLAN
in his paper „On certain Operators in connection with Symmetric
Functions" published in the 18th vol. of the same „Proceedings". Other
deductions of these formulae have as yet not caught my eye; neither