shale, which, in its lower part, yields a few shells, such as *Nucula*, *Leda*, and *Lingula*—species which are rarely found in the lower fossiliferous shale-bed. A bed of sandstone overlies this shale, in which are occasionally found fragments of *Lepidodendron*, *Sigillaria*, and *Stigmaria*, but no marine forms. In making, therefore, a list of the fossils found at this quarry, it would be much more satisfactory to mention the stratum in which each species is found, its state of preservation, and to note those that are recurrent in any of the other beds, than merely to give a list in which these interesting details are wanting. It is only when stratigraphical lists of our fossils are prepared on some such exhaustive plan that we will ever be able to arrive at anything like a correct notion of the alternate changes of condition under which the flora and fauna of the carboniferous period existed, as indicated by its beds of terrestrial, fresh-water, and marine strata.

Having stated these views regarding the necessity of preparing catalogues of the fossils contained in each fossiliferous bed throughout this district, both for the sake of identifying thereby other tracts of strata in our Scottish coal fields, as well as of giving a more correct knowledge of their fossil contents, I will now mention the various groups found in our western coal fields. These may be included under the following sixteen classes, viz.:—

Plantæ.	Crustacea.	Pteropoda.
Foraminifera.	Insecta.	Gasteropoda.
Hydrozoa.	Polyzoa.	Cephalopoda.
Zoophyta.	Brachiopoda.	Pisces.
Echinodermata.	Lamellibranchiata.	Reptilia.
Annelida.		

Plantæ.—There is no class of our carboniferous fossils in which so little work has been done as in the plant-remains, either in the way of collecting or having them properly determined. This neglect in many cases may be owing to the bulky condition in which many of them are found in the strata, and which forbids their being secured as cabinet specimens. Not many collectors are tempted to shoulder a portion of the trunk of a *Sigillaria* or a *Lepidodendron*, say one or two feet in diameter and three or four feet in length, however well preserved the specimen may be. If secured at all, such specimens are generally found to be

fit only for museum display, and not for private collections. Neither would any one think of breaking up such stems into smaller portions, as the beauty and interest of fossil plants consist in a great measure (where the internal structure has not otherwise been preserved) in the entirety of the external form of the specimens. Large specimens of plants are therefore often allowed to go to decay in the shale-heaps at the pits or in the quarries where they have been exhumed, owing to the difficulty of carrying them away into places of security. The poor state of preservation in which plant-remains are met with in many strata does not tempt collectors to secure them for their cabinets or for future examination, even although new and rare forms may thereby be overlooked. There are, however, a few localities in the west of Scotland in which plants are found in good condition, or are at least moderately well preserved in the strata. But even from these localities the list is very meagre, and I think far from complete, if compared with lists of carboniferous species found elsewhere in similar British strata.

In Morris' catalogue of British fossils, about 300 species are recorded from various localities, only 90 of which I have yet been able to identify in our western coal field. This shows either that we have fewer carboniferous plants in our strata or that the beds have not yet been properly searched. If the latter supposition be correct, it opens up a large field of investigation to the members of this Society, and one which will require a great amount of patient research before we can ever hope to arrive at anything like a knowledge of the extent or the variety of the flora that may have been preserved in our strata. Year after year, however, in spite of tardy investigation, plant-remains are being found, some of which are new to science, while others are new to the district.

Remains of plants are found throughout the whole of our carboniferous beds, but are most abundant in the estuarine and fresh-water strata, and rarest in those of truly marine origin. The various coal seams testify to the great abundance of vegetation that flourished over the tracts where these coal beds now exist, and the cannel coals, bituminous and semi-bituminous shales, point also to the great amount of macerated vegetable matter swept from the land surfaces of the coal period, and mixed with these muddy sediments during their deposition in ever-varying quantity.

The most abundant class of plants, and those which seem to

have entered most largely into the formation of our coal strata, besides having the greatest vertical range in the western coal field, belong to the genera *Lepidodendron*, *Sigillaria*, *Calamites*, and the family *Filicinæ*. Numbers of these are to be met with throughout all our plant-bearing strata. In this district, one well-marked species of *Lepidodendron* occurs in the Ballagan series along with some other obscure plants; and as this group of strata is believed to belong to the very lowest division of the carboniferous system, and is, moreover, stated to contain one or two thin seams of coal in the Fintry district, it may be looked upon as the repository of the earliest carboniferous flora with which we are yet acquainted in the west of Scotland.

When once our plants are better known, and are more correctly determined, I think it will be found that, while there are certain genera common to the whole coal measures, there are species belonging to some of them which are confined to special horizons of the strata. Amongst the ferns, there are one or two species found only in the lower carboniferous limestone series—viz., *Sphenopteris affinis*, *S. bifida*, etc., while other species of *Sphenopteris*, as well as *Alethopteris*, *Pecopteris*, etc., characterise the strata of the upper coal measures. It has also been noticed that plants belonging to the *Lepidodendron* group are more abundantly met with in the coal seams forming the lower beds of the upper coal measures, while *Sigillaria* and *Calamites* are more abundant in the higher beds.

The highest organised plants yet determined from our strata are certain stems and fruits which have been referred to the Coniferæ or pine family. They form the genera *Dadoxylon* and *Trigonocarpum*, and are believed to have grown upon more elevated stations than the members of the *Calamites*, *Sigillaria*, *Lepidodendron*, and Fern group, whose proper habitat seems to have been the low, level, swampy plains bordering either extensive fresh-water lakes or the sea-shore.

A portion of a finely-preserved stem of *Dadoxylon*, from the upper limestone series of the Dalry district, shows several rings of growth, which would seem to indicate seasonal changes of the climate during the growth of the plant.

PLANTÆ.

ALGÆ.

1. CAUDA-GALLI, *sp.*

Not uncommon. In sandstone, lower limestone series, Corrieburn, Campsie; and in sandstone, upper limestone series, Bowertrapping, near Dalry.

FILICES.

2. ALETHOPTERIS HETEROPHYLLIA, *Lindl.*

Not uncommon in the roof shales of one or two coal seams in the upper coal measures. Baillieston; Airdrie; Shotts; Kiltongue coal, Carluke; Kilmarnock; and various other localities.

3. A. LONCHITIDIS, *Sternb.*

Ure, Hist. Rutherglen and East Kilbride, pl. xi., *fig.* 5.

Common. In the roof shales along with the preceding species, in the same localities; also in sandstone, coal measures, Campbeltown; Kiltongue coal, Carluke; in slaty-band, and shale of Bellside ironstone, Shotts.

4. A. SERRA, *Lindl.*

Ure, pl. xi., *fig.* 3.

Rare. Roof shales, upper coal measures, Airdrie.

5. CYCLOPTERIS DILATATA, *Lindl.*

Ure, pl. xii., *fig.* 1.

Rather rare. In roof shales. Baillieston; Rutherglen; and in the Airdrie coal field.

6. C. ORBICULARIS, *Brong.*

Rather rare. Found along with the preceding species, in the same localities; also in clay-ironstone nodules, upper coal measures, Ayrshire; and in shale, Rae's Gill, Carluke.

7. NEUROPTERIS GIGANTEA, *Sternb.*

Ure, pl. xi., *fig.* 4.

Not uncommon in nodules of impure clay-ironstone, and in the roof shales of several of the coal seams. Carluke; Airdrie; Baillieston; Woodhill quarry, Kilmaurs.

8. N. HETEROPHYLLIA, *Brong.*

Occurs along with *N. gigantea*, in the same localities.

9. N. LOSHII, *Brong.*

The same observations apply to this species as to the two preceding. It is also common in the Stevenston coal field.

10. PECOPTERIS ABBREVIATA, *Brong. MS.*

Very rare. In clay-ironstone nodules, upper coal measures, Woodhill quarry, Kilmaurs, along with *Xylobius Sigillariæ.*

11. P. ADIANTOIDES, *Lindl.*

Rare. Coal measures, near Bathgate.

12. P. CHÆROPHYLLOIDES, *Brong.*

Rare. In shale, Carluke.

13. P. DENTATA, *Lindl.*

Ure, pl. xii., *fig.* 2.

Rare. In roof shales. Airdrie; Baillieston; first calmy limestone series, Carluke.

14. P. LACINIATA, *Lindl.*

Rare. Crossford, in sandy shale.

15. P. LOSHII, *Brong.*

Rare. In aluminous shale, splint and main coals, Carluke.

16. P. MURICATA, *Brong.*

Rare. Roof shales, Airdrie coal field.

17. P. NERVOSA, *Brong.*

Not common. In shale, Carluke and Airdrie.

18. SPHENOPTERIS AFFINIS, *Lindl.*

Rare. In shale at Auchengree, Dalry; in shale, Rae's Gill, Carluke.

19. S. ARTEMISIÆFOLIA, *Sternb.*

Rare. In roof shales, Airdrie.

20. S. BIFIDA, *Lindl.*

Very rare. In shale, marine limestone series, Campsie; Nitshill.

21. S. BRONGNIARTII, *Lindl.*

Very rare. In shale, Glasgow coal field.

22. S. CRENATA, *Lindl.*

Ure, pl. xii., *fig.* 5.

Rare. Watston, Stonehouse.

23. S. DILATATA, *Lindl.*

Upper coal measures. Baillieston.

24. S. EXCELSA, *Lindl.*

Rare. Coat Castle, Stonehouse, in clay-band ironstone.

25. S. HIBBERTII, *Lindl.*

Rare. Upper coal measures. In bituminous shale, banks of the Avon, near Hamilton.

26. S. HÖNINGHAUSI, *Brong.*

Upper coal measures. Baillieston.

27. S. LATIFOLIA, *Brong.*

Upper coal measures. Baillieston, in roof of Pyotshaw coal.

28. S. MACILENTA, *Lindl.*

Very rare. Coat Castle, Stonehouse.

29. S. POLYPHYLLA, *Lindl.*

Very rare. Crossford, in sandy shale.

EQUISETACEÆ.

30. [1]ASTEROPHYLLITES CHARÆFORMIS, *Sternb.*

Rare. Slaty-band ironstone, Shotts.

31. A. DUBIA, *Brong.*

Ure, pl. x., *fig.* 6.

Rare. In roof shales, and impure clay-ironstone nodules, upper coal measures. Baillieston; Airdrie.

32. A. FOLIOSUS, *Lindl.*

Ure, pl. xii., *fig.* 4.

Found with the preceding species in the same localities; also at Shotts.

33. A. GALIOIDES, *Lindl.*

Ure, pl. xii., *fig.* 3.

Rare. In roof shales and impure clay-ironstone nodules. Baillieston; Airdrie. This and the preceding species are frequently obtained in sinking pits to the slaty-band ironstone, Shotts.

34. A. GRANDIS, *Lindl.*

Very rare. Rutherglen, in light-coloured clay shale.

35. A. LONGIFOLIA, *Brong.*

Ure, pl. x., *figs.* 4, 5.

Rare. Occurs along with the preceding species in the same localities; also at Kilmarnock.

36. A. TUBERCULATA, *Sternb.*

Rare. Howlet Gill, Lesmahagow, in sandy shale; in shale 30 fathoms above the slaty-band ironstone, Shotts; Baillieston, in roof of Pyotshaw coal.

37. CALAMITES APPROXIMATUS, *Brong.*

Rare. Drumgray coal, Castlehill, Carluke; casts in sandstone strata, Glasgow; Stevenston, Ayrshire; in shale, Virtue Well coal, Shotts.

38. C. CANNÆFORMIS, *Schlot.*

Ure, pl. x., *figs.* 1, 2.

Not uncommon. Casts in sandstone, and crushed specimens in shale. Carluke; Airdrie; Cambuslang Glen; Bellside ironstone, Shotts. "In freestone at the east quarry of Rutherglen."—*Ure.*

[1] The species of this genus are the foliage of *Calamites*.

39. C. INÆQUALIS, *Lindl.*

Rare. Casts in sandstone, Lanarkshire coal field; and in the Kiltongue coal, Carluke.

40. C. NODOSUS, *Schlot.*

Rare. Casts in sandstone and impressions in shale. Drumgray coal, Shotts and Carluke; Airdrie; Baillieston.

41. C. PACHYDERMA, *Brong.*

Rare. Casts in sandstone, Wishaw; Drumgray coal, Carluke.

42. C. UNDULATUS, *Brong.*

Rare. Drumgray coal, Carluke; casts in sandstone, coal measures, Airdrie.

43. PINNULARIA CAPILLACEA, *Lindl.* (Roots of *Calamites.*)
Ure, pl. X., *figs.* 7, 8.

Rare. Coal measures, Lanarkshire. "Stonelaw."—*Ure.*

44. SPHENOPHYLLUM EROSUM, *Lindl.*

Rather rare. In roof shales. Carluke; Baillieston; Rutherglen.

45. S. SCHLOTHEIMII, *Brong.*

Very rare. Crossford, in sandy shale; Baillieston, in roof of Pyotshaw coal.

46. VOLKMANNIA MORRISII, *Hooker.* (Fruit of a species of *Calamites.*)

Very rare. In shale, Rae's Gill, Carluke. A specimen of what seems to be the stem of this plant was found in the marine limestone shales of High Blantyre.

LYCOPODIACEÆ.

47. FLEMINGITES GRACILIS, *Carruthers*, Geol. Mag. Vol. II. pl. 12.

Rather rare. Slaty-band ironstone, Lanarkshire coal field.

48. FAVULARIA TESSELLATA, *Brong.*

Rare. Coal-shale, Airdrie; Kiltongue coal, Castlehill, Carluke; in shale, main coal, Shotts.

49. HALONIA TORTUOSA, *Lindl.*

Rare. Drumgray coal, Carluke; casts in blackband ironstone, Lanarkshire coal field.

50. H. TUBERCULOSA, *Lindl.*

Rather rare. Casts in sandstone and blackband ironstone. Stevenston; Carluke; Airdrie. Specimens from the volcanic ash-beds, Laggan Bay, Arran, show the internal structure.

51. KNORRIA TAXINA, *Lindl.* (Internal cast of Lepidodendroid trunks.)

Not common. Casts in sandstone. Giffnock; Nethanfoot; Stockbriggs, Lesmahagow; in sandstone, Partick gas-work.

A species of *Knorria* occurs at Brock's Hole and Braidwood Gill, Carluke, below the Tower coal and above the Maggy ironstones.

52. LEPIDODENDRON DILATATUM, *Lindl.*

Rare. Drumgray coal, Carluke ; Shotts.

53. L. ELEGANS, *Brong.*

Ure, pl. xiii., *fig.* 3.

Not uncommon. This species has a wide vertical range in our coal measures, and occurs as casts in sandstone and ironstone, and crushed examples in shale. Drumgray coal, Carluke ; Shotts ; Airdrie ; Rae's Gill ironstone, Carluke; Campbeltown; Brockley, in blackband ironstone shale. "On inflammable till, found above coal, at Stonelaw."—*Ure.*

54. L. GRACILE, *Lindl.*

Rather rare. Found as casts and crushed impressions in blackband ironstone and sandy shales. Rae's Gill beds, Carluke ; Brockley, along with the preceding species; in shale, Virtue Well coal, Shotts.

55. L. HARCOURTII, *Lindl.*

Rare. Casts in sandstone and ironstone. Drumgray coal, Carluke; Pit Cone, Dalry, in shales above blackband ironstone.

56. L. OBOVATUM, *Sternb.*

Ure, pl. xiii., *fig.* 4.

Not uncommon. Blackband ironstone, Possil; Govan; Bishopbriggs and Cadder ; Banton, Kilsyth ; Pit Cone, Dalry ; Campbeltown. "In an argillaceous freestone, in the bed of the Calder, near Torrance."—*Ure.*

57. L. SELAGINOIDES, *Sternb.*

Rather rare. Occurs as impressions in sandy shales and ironstones. Drumgray coal, Castlehill, Carluke ; Banton ; Possil.

58. L. STERNBERGII, *Brong.*

Ure, pl. xiii., *fig.* 6.

Rare. Casts in sandstone, and impressions of crushed specimens in shale. Banton ; Campbeltown ; Rae's Gill beds, Carluke ; Shotts ; in sandstone, Byers' Road, Partick ; Rutherglen, in shale above the splint coal. "In the ironstone mines, in the lands of Basket."—*Ure.*

59. L. TRANSVERSUM, *Brong.*

Rare. Casts in sandstone, and impressions of crushed specimens in shale. Glasgow ; Banton.

60. LEPIDOPHLOIOS WÜNSCHIANA, *Carruthers.*

Specimens showing the internal structure occur in the volcanic ash-beds, Laggan Bay, Arran.

61. LEPIDOPHYLLUM LANCEOLATUM, *Brong.*

Rare. Upper coal measures, Shotts.

62. LEPIDOSTROBUS, (?) AMBIGUUS, *Binney*, Carboniferous Flora, *pl.* xi., *figs.* 1, 1*a*, 1*b*.

Trappean ash, Laggan Bay, Arran.

63. L. COMOSUS, *Lindl.*

Rare. Coal measures, Carluke.

64. L. (?) DUBIUS, *Binney*, Carb. Flora, *pl.* ix., *figs.* 3, 3*a*.
Blackband ironstone, Airdrie.

65. L. LATUS, *Binney*, Carb. Flora, *pl.* xi., *figs.* 3*a*, 3*b*, 3*c*.
Trappean ash; Laggan Bay, Arran.

66. L. LEVIDENSIS, *Binney*, Carb. Flora, *pl.* x., *figs.* 1, 1*a*, 1*b*.
Blackband ironstone, Airdrie.

67. L. ORNATUS, *Brong*.
Ure, pl. xiii., *fig.* 1.
Rather rare. Slaty-band ironstone, Shotts; Drumgray coal, Carluke; blackband ironstone, Dalmellington.

68. L. PINASTER, *Lindl.*
Rare. Coal measures, Carluke.

69. L. TENUIS, *Binney*, Carb. Flora, *pl.* ix., *figs.* 4, 4*a*.
Blackband ironstone, Airdrie.

70. L. RUSSELLIANUS, *Binney*, Carb. Flora, *pl.* ix., *figs.* 1, 1*a*, 2, 2*a*.
Blackband ironstone, Airdrie.

71. L. VARIABILIS, *Lindl.*
Not rare. Drumgray coal, Carluke; Airdrie, in shale above blackband ironstone; in sandstone, in the region of the Bowhousebog ironstone, Shotts; Possil ironstone.

72. L. WÜNSCHIANUS, *Binney*, Carb. Flora, *pl.* xi., *figs.* 2, 2*a*, 2*b*, 2*c*.
Trappean ash, Laggan Bay, Arran.

73. LYGINODENDRON LANDSBURGII, *Gourlie.*
Rare. Casts in sandstone. Shotts; Stevenston quarries; in sandstone below Tower coal, Carluke.

74. SIGILLARIA ELEGANS, *Brong.*
Rare. Coal shale, Airdrie; Wishaw, in main coal; Brockley, in shale above blackband ironstone.

75. S. NODOSA, *Lindl.*
Very rare. Upper coal measures. Wishaw, in roof of the main coal.

76. S. OCULATA, *Lindl.*
Moderately common. Coal and shale. Carluke; Airdrie; main coal, Shotts and Wishaw.

77. S. ORGANUM, *Sternb.*
Ure, pl. xi., *fig.* 1.
Moderately common in coal and shale. Shotts; Carluke; ironstone pits, Dalry; Nitshill. "Found on coal, Rutherglen."—*Ure.*

78. S. RENIFORMIS, *Brong.*
Not rare. Kiltongue coal, Carluke; main coal, Shotts; Airdrie; main coal, Newmains.

79. S. SERLII, *Brong.*

Rare. Coal shale, Airdrie; Kiltongue coal, Carluke.

80. S. SAULII, *Brong.*

Rare. Coal shale, Airdrie; Kiltongue coal, Carluke; Baillieston.

81. STIGMARIA FICOIDES, *Brong.*[1]
Ure, pl. xiii., *fig.* 2.

Common in the coals, underclays, and sandstones, from the Ell coal to the lower beds of the lower limestones in the west of Scotland, often presenting several varieties.

82. STIGMARIA STELLATA, *Eichwald.*

Rare. Wildshaw quarry, east of Douglas; Meadowfoot, Drumclog.

83. ULODENDRON LINDLEYANUM, *Sternb.*

Rare. Casts in sandstone. Kilwinning; in slaty-band ironstone, Shotts.

84. U. MAJUS, *Lindl.*

Rather rare. Casts in sandstone. Barrhead; Carluke, in shale, Drumgray coal; in slaty-band ironstone, Shotts; in coal below lower limestone, Beith.

85. U. MINUS, *Lindl.*

Rather rare. Casts in sandstone, and impressions in coal shale and blackband ironstone. Carluke; in shale, Shotts gas coal; Wishaw, in roof of main coal. Banton; Pit Cone, and Riddence, Dalry.

CONIFERÆ.

86. DADOXYLON, *sp.*

Rare. Casts of pith in sandstone, Stevenston; Airdrie; in shale, Kiltongue mussel-band, and in sandstone, Drumgray coal, Carluke; Auchenskeoch. A specimen found in trappean ash above blackband ironstone, Dalry, shows the annual rings of growth.

87. [2]TRIGONOCARPUM GLOAGIANUM, *Young.*

This finely-preserved fossil fruit from the marine limestone shales of Calderside, High Blantyre, is at present unique. It is figured by Mr. John Young in the Proceedings of the Natural History Society of Glasgow, Vol I., pl. iv. figs. 9, 10, and referred to at p. 203. He names it in honour of its discoverer, the Rev. Dr. J. Paton Gloag, of Blantyre, one of the corresponding members of this Society.

88. T. OBLONGUM, *Lindl.*

Rather rare. Casts in sandstone, Stevenston quarry, Ayrshire. It occurs also in the first calmy limestone series, Carluke.

[1] Roots of arborescent *Lycopodiaceæ.*

[2] Fruits of taxineous Conifers.

89. T. OLIVÆFORME, *Lindl.*

Rare. Airdrie and Bathgate.

90. T. OVATUM, *Lindl.*

Moderately common as casts in sandstone, Stevenston quarry; and impressions in roof shales, Baillieston. It occurs also in the first calmy limestone series, Carluke.

NOTE.—The foregoing list of plant-remains is partly compiled from a MS. catalogue made by Mr. John Young, of the specimens exhibited at the meeting of the British Association in Glasgow, in 1855. It must be considered as very imperfect, for, in the various collections then exhibited, there were many specimens unnamed, and which we believe still remain undetermined, so little having been done, of recent years, in working out the plant-remains of the western coal fields of Scotland. We are glad, however, to state that Mr. Carruthers, of the British Museum, has now some of the rarer undetermined specimens in his hands, and from him we expect to learn something of their family and generic affinities.

Foraminifera.—Until the last few years no examples of this group were recorded from our strata, but in the recent washing of the limestone shales for Entomostraca some five or six species have been found.

Most of the forms have been determined by Dr. Henry B. Brady, of Newcastle-on-Tyne, and his provisional names are given in the subjoined list. All the species of Foraminifera in our beds are found in the lower marine limestones and shales, but one or two are recurrent in the the upper limestone series. Out of the five or six species there are only two which are moderately common; some of the others are very rare. As their discovery is of such recent date, I believe that many more species will yet be found when a more exhaustive search is made in other localities. The districts which have already yielded this interesting class are the lower limestone shales of Brockley, near Lesmahagow; main limestone of Braidwood, near Carluke; lower limestone shales of the Garple Water, near Muirkirk; Craigie, near Kilmarnock; Craigenglen, Campsie; and the upper limestone shales of Calderside, High Blantyre.

FORAMINIFERA.

1. TEXTULARIA ANTIQUA, *Brady, MS.*

Not common. Lower limestone. Brockley; main limestone, Braidwood. Mr. Brady refers several varieties of this *Textularia* to a single species.