CHAPTER 3    THE CHARACTERISTIC FAMILIES AND THEIR LIFEFORMS

1. **Proteaceae.** About 400 species. These are separated into several relatively distinct tribes.

   It is an exceedingly important family in the Southwest Province because it has such a large number of representatives. The family owes its premier position not only to the participation of several separate tribes, but also to the variation arising from the high degree of adaptation to the environment characteristic of most of the species in the different genera. The plasticity of the vegetative organs is extraordinary and is not approached by any other family in Australia. One cannot reasonably speak of a ‘proteaceous form’ as Grisebach has done, because of the difficulty of grouping such a variety of shapes under one type.

   In this family the generic complex often falls into a number of mutually exclusive local types whose vegetative characters appear to be an adaptation to the environment. For example, *Petrophila* (Fig. 11), and *Isopogon* are very characteristic of open heaths with gravelly sandy soil. Seen from a distance, the bright purple or yellow masses of flowers suggest that the plants are very gregarious and uniform. Closer inspection, however, shows that the species involved show some degree of variation in their vegetative characters, even over a short distance.

   In addition, almost every genus of the Proteaceae has its own physiognomically important species. *Xylomelum* provides the south-west landscapes with an imposing tree (*X. occidentale*), distinguished by its holly-like leaves. This character is also present in other genera of the family, e.g. *Hakea. Persoonia*. Sect. Amblyantha also includes some small trees of *Acacia*-like appearance. These grow only in the moister parts of the south-west, often under the protective shade of the taller *Eucalyptus* species.

   On conglomerate [lateritic] soils where, as already mentioned, well-developed *Eucalyptus* woodlands are present, the number of species in some genera of the family Proteaceae is quite high. *Petrophila* and *Isopogon* develop here in great variety. *Dryandra* also shows great diversity. The most commonly occurring species of this genus is *Dryandra nivea* which often covers a considerable area with its fern-like leaves. The most important genus, however, is *Hakea*. On ironstone gravels [laterite] “this genus shows a rich variety of species. This is all the more remarkable considering how few *Grevillea* species are represented in such areas. The vegetative structures show great diversity

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1. Fragn. Austr. occid. p. 426
and a whole series of gradations between entire and complicated divided leaves is encountered. On the Stirling Ranges the strange tall growing species of *Hakea Brownii* and *H. cucullata* overshadow the lower bushes. Again, in the moist woodland of the Karri country, *H. oleifolia* appears. This is present as a tree form which rivals *Banksia* in size. *H. ampexicaulis*, with its large and very spiny leaves, is found occurring throughout the entire Jarrah zone from King George Sound to the Swan River. *H. ruscifolia* is also present there. Its white flowers are abundant in the height of summer when the bush is otherwise more or less drab and colourless. Another species, *H. lissocarpha* is perhaps even more common in the hills. In contrast with *H. ruscifolia*, its leaves are finely divided and its delicate inflorescences open up in the winter rainy season."

Members of the Proteaceae occur much less commonly on water-retentive soils, i.e., clayey or loamy subsoils. Here, particularly on the banks of streams, one may find a few willow-like *grevilleas* with slender branches and somewhat delicate leaves, e.g. *G. diversifolia*.

Many members of the Proteaceae appear to thrive on sandy soils and particularly so where no trees are present in the plant associations. Gregarious types of shrub-like species are particularly common in such spots, e.g., the ericoid-leaved *Petrophila ericifolia*.
(Fig. 11), *Grevillea pilulifera* and the unusual and diverse types of Flannel flowers belonging to the genus *Conospermum*. These are most effective physiognomically because of their white woolly inflorescences (Plate XXI). Two other proteaceous species which are present towards the south-east, namely *Adenanthos cuneatus* and *Isopogon trilobus* with their peculiar broad fan-like leaves, must also be included here. Associated with them we find the impressive *Lambertia inermis* which can reach a height of 3 m. In the south-east this shrub is a typical indicator of sand-heath country. The hard-leaved *Dryandra* species may also be observed in similar places. Among the *Hakeas*, the terete-leaved species predominate (extremely rigid growths with well-developed sclerenchymatous tissue) (see Fig. 42).

Among these psammophytes a small group of morphologically variable, fine-leaved species of *Adenanthos* occur, e.g. *A. sericeus* and *A. cygnorum*. These are somewhat Cypress-like in appearance and in favourable habitats grow to a height of 4 - 5 metres. Their sombre forms are present on the coast, often extending out to the inner dune area. No other member of the Proteaceae is able to colonize such areas to the same extent.

The greatest number of species of Proteaceae found in the Southwest Province occurs in an area running from the coast inland to the 40 cm isohyet. As we go further inland, the number of species rapidly diminishes until they are no longer of any physiognomic importance.

2. **Myrtaceae**: About 370 species.

A rough estimate of the number of Myrtaceous species in south-west Australia indicates that the family Myrtaceae ranks close behind the Proteaceae in the hierarchy of important families. The only other family whose variety of form approaches that of these
two families is the Leguminosae. A comparison of the nature of these three undisputed leading families of the region shows, however, that there are many differences, particularly between the Proteaceae and the Myrtaceae. In the Myrtaceae, the variability of the flowers is an important factor in producing diversity of form. There are also some adaptational vegetative modifications but the leaves of genera in the Myrtaceae do not show anything like the degree of variation shown by *Grevillea* and *Hakea*. The fundamental character of the adaptation to the environment is different in the two groups. In the Myrtaceae the leaves are much more delicate and there is much less sclerenchyma present than in the rigid leaves characteristic of most members of the western Proteaceae.

If the types of adaptation in the 370 species of Myrtaceae investigated, it will be found that the simple leaf with entire margins is the most common. It is also usually longer than broad. Only a few species of *Verticordia*, *Scholtzia* and *Hypocalymma* possess leaves which show a tendency towards the terete form. Reduction in leaf size is often noted and may be considerable. Quite a large number of species of the gregarious genera of the Myrtaceae possess such reduced structures, e.g. *Astartea*, together with some species of *Melaleuca* and *Leptospermum*. Much-branched shrubs, thickly covered with erect, quite small leaves, may also be observed. Further reduction results in the 'rolled' or ericoid form of leaf found in a still greater number of members of the family. Almost all the genera in the family would have to be mentioned if one wished to include all those containing ericoid-leaved species in Western Australia. It will suffice to mention *Verticordia*, *Darwinia*, *Calythrix*, *Lhotzkya* and *Beaufortia*. These are particularly rich in shrubs possessing a heath-like habit.

Generally speaking, members of the family Myrtaceae, such as the genus *Eucalyptus*, show a striking variability in height and stem thickness. In several other groups we have species which, under favourable conditions, attain tree-like dimensions while retaining their shrub-like habit elsewhere. Good examples include the coastal species *Chamaelaucium uncinatum* and *Agonis juniperina* (this latter species is usually seen only in the bushy condition and grows 5 - 8 m high in swampy low-lying areas along the south coast.) The related species, *A. flexuosa*, usually appears in tree form, or perhaps more correctly, as a giant arborescent shrub. With its unusual weeping willow-like habit, it is an important constituent of communities along stretches of the south-west coast. Perhaps of more importance because of the frequency of their occurrence are the tree-like species of *Melaleuca*. Among these *M. cardiophylla* and *M. Huegelii* are coastal plants.
and consequently their range is more restricted. Much more widespread and of greater importance physiognomically are the species growing in the wet alluvial areas. Here *M. viminea*, *M. rhaphiophylla* and *M. Preissiana* influence the scenery by virtue of their large number, close association and striking appearance. “*Melaleuca Preissiana* (Fig. 13, 56), in particular, because of its whitish papery bark and unusual knotty branches, catches the eye. it is all the more important because it is the characteristic plant of the *Melaleuca* swamps of the south-west, being the dominant tree in the communities there”.

The presence of the more important species of *Melaleuca* and *Eucalyptus* in the flora of the moist alluvial country indicates an ecological difference between the Myrtaceae and the Proteaceae. Closer inspection of the communities (see later) reveals a big difference between the two families in this respect. The Myrtaceae are nowhere so important and those of the family Proteaceae nowhere so unimportant as on such marshy country. In addition, however, the dryest and most barren sand areas have their own characteristic Myrtaceous flora. This indicates that the ecological adaptability of this family is greater than that of the Proteaceae. This ecological adaptability offsets to some extent the apparent disadvantages the Myrtaceae suffers because of the lack of variability in its leaves.

The number of species of the Western Australian Myrtaceae that may be regarded as being more or less hydrophytic in nature is not very large. They are, however, extraordinarily gregarious in occurrence. Species such as *Astartea fascicularis* (Fig. 56) and *Agonis parviceps*, which cover the low swamp lands of the south-west, represent typical community-forming species of the flora.

On gravel and conglomerate [lateritic] soils, hydrophytes are much less abundant. The shrubby members of the Myrtaceae play a much less important part here than either the Proteaceae or the Leguminosae. Some species of *Darwinia, Baeckea camphorosmae, Agonis, Beaufortia* and *Calothamnus* are the main types which represent the family.

On sandy soil a new development takes place. Here the dense, usually bright-red or yellow flower-heads of *Melaleuca* (Fig. 14, Plate XVII), *Beaufortia, Eremaea* and *Petrophila*-like species of the Proteaceae dominate the undergrowth. Members of the tribe Chamaelaucieae, which include *Darwinia, Calytrix* and *Verticordia*, are, however, much more important. With their small ericoid leaves, they occur scattered in the heath. However, when their flowers open they become most conspicuous, surpassing all other plants, with their bright colours. There is practically no ‘sand plain’ in the whole of the

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1 Diels and Pritzel, Fragm. Austr. occid. p. 426
south-west where one cannot see the snow-white or golden-yellow patches or rose-red crests of *Verticordia* (Fig. 15). Species of *Calythrix* (Fig. 14) with their startling yellow or bright-violet flowers also attract attention from a distance.

The further one penetrates inland from the boundaries of the south-west, the smaller the absolute number of members of the Myrtaceae present becomes. The reduction, however, is much less marked than is the case with the Proteaceae. At Mount Churchman, for instance, beautiful *Verticordia* spp. still occur and, even at Coolgardie, *Calythrix* is present. Less conspicuous genera, e.g. *Baeckea, Micromyrtus*, etc. also show no obvious reduction in their ability to colonize most parts of the Eremaea.

3. **Leguminosae - Podalyrieae**: About 270 species.

The degree of adaptation characteristic of the tribe Podalyrieae is in many respects intermediate between the mean for the Proteaceous and Myrtaceous types. The conditions needed for survival by this group suggest on the whole a better agreement with the Proteaceae. The plasticity of the vegetative organs, while not equal to that of the Proteaceae, does at least approach it. A detailed discussion of the relationships concerned has been given by E. Pritzel (in Diels and Pritzel Fragm. Austr. occid. p. 215 on.). The following extract is helpful in enabling one to form an opinion regarding the physiognomic importance of this group.

“Almost all members of the Podalyrieae are shrubby growths. As compared with *Acacia, Myrtaceae*, etc., however, only a few such as *Jacksonia Sternbergiana, J. furcellata* and *Oxylobium Callistachys* form tall shrubs or small trees. There are no annuals, although in
some species the above-ground parts are in effect practically annual, e.g. *Sphaerolobium* Sect., Roea, and some species of *Gompholobium* and *Isotropis*. All the members of the group show some degree of xeromorphism. This is expressed particularly by reduction in leaf area. The pinnate leaf, normally so characteristic of the Leguminosae, is present only in species of *Gompholobium* and *Burtonia*. The commonly occurring simple leaf (Fig. 16, 17) is in many cases, although not all, a reduced pinnate leaf. Evidence of this is provided by the small stalk which is frequently present between the leaf and the end of the petiole. On the other hand, where no reduction of the leaf area has taken place, the xeromorphic character is indicated by (a) the strong development of sclerenchyma, and (b) the very firm, almost woody, consistency of the leaf. The presence of sharp spines at its tip or on the margins is a further indication. Such large hard leaves are frequently present in the genera *Oxylobium* and *Gastrolobium*. At the same time, these relatively large leaves appear small by comparison with those of trees of tropical rain-forests or even of *Eucalyptus* species.

In other genera, reduction of the leaf surface is carried still further, resulting in the following types (Fig. 17):

1. Small firm broad leaves, e.g., many species of *Oxylobium* and *Gastrolobium*. *Gompholobium marginatum* and *Pultenaea obcordata*, provide further good examples.
2. Large needle-like leaves with incurved margins, e.g. *Eutaxia myrtifolus*, *Daviesia Croniniana*, and *Chorizema Henchmannii*.
3. Very small, narrow, thick leaves. This is the ericoid shape typical of the genera *Pultenaea*, *Dillwynia*, *Eutaxia* and *Aotus* and many species of *Gompholobium*
and *Burtonia*, among others.

4. Leaves with practically no lamina but often with the mid-rib expanded dorsiventrally. Examples are frequently present in the genus *Daviesia*.

5. Rounded, often somewhat long leaves, e.g. species of *Daviesia*.

6. Leaves absent (aphyllon); characteristic of the genera *Jacksonia* and *Sphaerolobium*. This condition is also found in species of *Daviesia*, *Brachysema* and *Isotropis*. From the nature of the stalk, one can also distinguish rush-like, round or flat-stalked species.”

This account leads one to expect many parallels with the Proteaceae. In fact, particularly in the case of vegetative organs, this is so. Surprisingly analogous forms occur between *Isopogon* and *Daviesia*, *Grevillea* and *Chorizema*, *Daviesia* and others.

As pointed out by Pritzel, the Leguminosae possess much the same ability, although to a more limited extent, to produce tall growths, as do the Proteaceae and Myrtaceae. In the genus *Jacksonia*, however, many large shrubs are present. These have a somewhat strange appearance because of their stiff, flattened branches. *Jacksonia sternberghiana* and *J. furcellata*, even develop a distinct trunk. Their crowns appear unusual since they consist of numerous pendent leafless branches covered with grey silky hair. On marshy or swampy ground we find the graceful “tall shrub” *Viminaria denudata* which is comparable with many species of *Cytisus*. Finally, in the genus *Oxylobium*, we may mention two somewhat willow-like species which also occur on moist or at times waterlogged
soil. These are _0. lineare_ and _0. Callistachys_ which form impressive communities at King George Sound.

These few above-named species comprise practically all the tall-growing forms. The rest of the vegetation is a chaotic mixture of low shrubs and bushes. Only a few of these are worthy of note because of their bright flowers or unusual leaf form. Amongst these plants hydrophytes are rare. They tend to crowd on gravelly soils with adequate moisture or on sandy soils. In some places they develop an extraordinary variety of forms which are concentrated in a small area. They play a very important part in the composition of the undergrowth of the woodlands. It is only rarely that they have any striking effect on the physiognomy. In these situations one finds species of _Brachysema, Daviesia, Oxylolium_ (Fig. 17), _Gastrolobium, Gompholobium_ and _Chorizema_. They are often stunted due to shade and local moisture conditions, but frequently occur together or in mixed communities. In the dry woodlands of the gravelly higher land, we find a particularly large number of _Gastrolobium_ species. These are the feared poison plants of the district. From here, they extend through the treeless shrubby areas further inland. The sandplains possess still other species, all of which show a high degree of xeromorphy. These include species of _Daviesia_ and _Jacksonia_ which appear so stiff and rigid that they give the impression of being formed of metal. Prickly aphyllous species of _Daviesia_, thorny species of _Mirbelia_, ericoid-leaved species of _Phyllota_ and _Brachysema_ all occur here. Their whole growth form consists of whitish-grey, curiously branched stem axes without any trace of leaves. As in the Proteaceae, we get the impression of the most extreme xeromorphism possible. We may finally note that members of the Podalyrieae are largely confined to the Southwest Province, and that only a few species extend beyond this region into the sandy wastes of the Eremaea. Those that do manage to survive there appear depauperate.

4. **Acacia**: About 130 species. (Fig. 19 [sic. Fig 18])

The most reliable approach to the understanding of the Western Australian species of _Acacia_ is provided by Pritzel (in Diels and Pritzel Fragm. Austr. occid. p. 276 on). There the adaptations present in the genus in Western Australia are treated in detail, while the differences between the two groups Bipinnatae and Phyllodineae are clearly set out.

The group Bipinnatae (in the moister parts of the area) contains some species which, because of their delicate leaves, represent the true “leguminous form”. Unfortunately there are very few such species in Western Australia. In the most favorable places there are quite imposing shrubs of this type (_A. nigricans, A. pentadenia_) with which the ecologically similar _Albizzia lophantha_ act as substitutes, although poor ones, for the Bipinnatae of Eastern Australia where tree-like growths have been developed. The remaining Bipinnatae of the west remain of lower stature but are of varied heights. The most striking example of this adaptive height graduation is met within the polymorphic series _Acacia pulchella_, which by reason of its wide distribution and frequent presence counts as one or the most important types of the south west. As a matter of fact this species exhibits a very wide range of forms; stately bushes with polyhedral leaves and poorly developed spines in the damp south west, and low dwarf shrubs with ericoid foliage, felt like integument or strongly developed stipular spines, on the sand heaths of the drier regions, being the extreme types developed.

Incomparably richer and more diverse in form are the Phyllodineae. “There are few genera in the vegetable kingdom which can approach the genus _Acacia_ so far as the richness and curiosity of leaf form is concerned.” This remark of Pritzel applies in particular to the Phyllodineae of the south west. Pritzel has also clearly indicated the importance of the adaptations in this feature. The presence of hair, the secretion of resin or wax, and the assumption of succulence, is only to be found in a few species: on the other hand the development of sclerotic tissue and the reduction of: the transpiration surface are xerophytic characters which are widespread. Needle-like small rhomic or triangular, ericoid, juncoeid, ulex-like phyllodes, and leafless forms result and occur in that confusing richness of form which is presented to us. A comparative study with reference to their relationships leads to an instructive insight into the complicated correlation of these
structures, one can see how coast species become xerophytic towards the interior and vice versa (see Pritzel loc. cit. p. 283).

The acacias are not uniformly distributed in the south-west. The moist regions possess chiefly the Bipinnatae but several Phyllodineae which in other respects must be considered in part as real Eremaean elements, occur in the coastal formations. Otherwise, the Phyllodineae are far in the background. Notwithstanding this however, a few species are widespread such as the scented *Acacia myrtifolia* which forms bushes not far from the south coast, and the species of *Acacia alata* which with its winged stems and pale coloured inflorescence, is a striking feature of the valleys in the hills.

In the drier parts of the woodland area and still more beyond its boundaries the importance of the Acacias increases rapidly. Most or the species are of low stature - heights above 0.5 - 1 m being rare. Like the Podalyrieae they are at home on the gravel and sandy soils and usually many species of different forms grow together, thus failing, to produce any uniform physiognomic effect. As a consequence we find members of the important groups Pungentes and Triangulares showing a predilection for communal growth, groups which favour the zone or moderate dryness which runs north east from the margin of the plateau. Nevertheless there are cases where a single species dominate even produces small single species stands. These species may not be clearly distinguished during many months of the year except by their uniformity contrasting with the tangle of the mixed vegetation. They stand out from afar however, when the flowers unfold. Then whole areas appear as if dipped in deep yellow and for the first time one recognizes that there are also landscapes in south-west Australia where *Acacia* blossom is an indication of the arrival or spring just as in the districts of south east Australia, where its praises have so often been sung.

5. **Epacridaceae**: About 160 species.

The statement has often been made that the sub-family Ericoideae is represented by the family Epacridaceae in Australia, and that the part the latter family plays corresponds to that of the Ericaceae in South Africa. The two groups do present many points of agreement due no doubt to a striking resemblance in their nature. Their geographically limited range and their restriction to somewhat dry, although not too dry, areas are important signs of this resemblance. Again, just as the family Ericaceae is absent from the Karroo plains of South Africa, so the Epacridaceae is practically missing from the Eremaea. Only 2 out of 160 species occur there. The family may thus be regarded as being more exclusively south-western than is the Proteaceae. The distribution of the species suggests that in general they thrive in a temperate climate with a rainfall of over 60 cm. The number of species adapted to more extreme climatic situations is very small.

The Epacridaceae, like the acacias of the south-west, are all shrubs. Most of them are low in stature, rarely being more than 1 m high. Their vegetative form is characterized by the narrow leathery type of leaf which is frequently needle-like or scale-like. Sclerenchymatous tissue is well developed. They possess many features which resemble those of the Myrtaceae. In terms of physiognomy, however, the family is much less important than the three previously mentioned families. Individual species like *Leucopogon Richei* and *L. australis*, found in the coastal woodlands, or the relatively large-leaved *L. verticillatus*, growing in the moist Jarrah forests, are prominent and undoubtedly are of great importance in characterizing these communities.

The majority of the species, however, are lost in the confused mass of so many similar-appearing neighbours in the bush. This is at least the case in the greater part of the south-west. However, the conditions are rather more favourable in the south-east part of the State, where a strong and in fact unparalleled concentration of epacrids occurs. The area involved lies between the Stirling Range and the south coast, extending as far east as Cape Arid. “Epacrids here play a big part in the composition of the lower shrub flora on the granitic coastal hills, on the sandy or clay swamp areas and on the extensive sand heaths. Masses of delicately structured dwarf shrubs (species of *Leucopogon, Andersonia* and *Oligorrhena, Needhamia*) cover the barren sandy ground. This is particularly true of swampy areas where bare patches of soil occur between bushy members of Myrtaceae and Proteaceae. Even though they are of little or no importance in the physiognomy of the vegetation, at least in the rainy season they add very considerably to the colour pattern of the landscape”.

1 Diels and Pritzel, Fragm. Austr. occid. p. 459
Fig. 18. *Acacia* - Typen der Südwest-Provinz: A *Acacia hastulata* Sm. B *Acacia alata* R. Br. C *Acacia myrtifolia* Willd. var. *angustifolia* Willd. D *Acacia pentadentia* Lindl. (Original)
Compared with this well-endowed area of the south-east, the southern Jarrah forests possess only a poor and drab epacrid flora. It is only when we reach the Swan River area in the north that the family is again well represented. In this region it has developed a number of xeromorphic forms. Their foliage feels harsher and more spiny to the touch than that of the south-eastern species. The dwarf type of plant characteristic of the Ericaceae is rare here, its place being taken by thick firm-leaved shrubs belonging to genera such as *Astroloma* and *Conostephium*.

On the whole there is no family which shows more sensitivity amongst the main groups of the Western Australian flora than the *Epacridaceae*. Nor one which is more strongly influenced and moulded by external conditions. These limitations, in fact, make it a most characteristic element of the vegetation of the Southwest Province.
6. **Goodeniaceae.** About 140 species. (Fig. 20)

In terms of number of species, this family occupies a position close to the Epacridaceae. However, it is vastly different when its ecological tolerances or its physiognomic effects are considered. Thus, while the epacrids are restricted in form, members of the Goodeniaceae exhibit a degree of diversity which is approached by few other components of the vegetation.

There are, however, no tree forms and even the number of tall shrubs is very limited. In coastal areas, however, one may frequently come across impressive species such as *Scaevola nitida* and *S. crassifolia* which are over 1 m high. Similarly in other areas, big shrub-like species of *Scaevola* or *Leschenaultia* may be present. In other genera the growth form remains low, the plants appearing as small bushes or even herbs.

Members of the Goodeniaceae are amongst the most adaptable elements of the Australian flora. In Western Australia they flourish in the Eremaea as well as in the Southwest Province. Also not only do they grow on the coast, but they also extend far inland. They are commonly found growing on damp clay sub-soils, on dry sand, in shady forest country and on open heaths. With the exception of the Acacias, there is no group with so many facets. As examples of this feature, we may mention the following forms: (a) ephemeral species with delicate and short-lived foliage (e.g. *Goodenia filiformis* and *Velleia cycnopotamica*); (b) woodland plants with large soft leaves (e.g. *Scaevola striata*); (c) woolly and felted species reminiscent of Mediterranean Labiates (e.g. *Verreauxia, Dampiera incana* and *Pentaptilon*); (d) ericoid undershrubs; and (e) perennial herbs with a cushion-like habit of growth.

Members of the Goodeniaceae are not gregarious plants and consequently, although they are found in almost all the plant communities, they play only a more-or-less minor part in the general picture of the landscape. In the northern part of the Southwest Province I have, however, seen shrub heaths on sandy soil where the slender grey-white forms of *Verreauxia Reinwardtii* are present everywhere between the bushes and influence the general colour scheme of the vegetation. Furthermore, in certain places on damp swampland, *Goodenia filiformis* is very common and so crowded together that the ground
seen from a distance appears to be covered with yellow patches. The above constitute
the only examples of real physiognomic importance.

From the above account, it would be difficult to form a satisfactory picture of the
position really occupied by this family if it were not for the brightly coloured flowers of
many of the species. Thus, the dazzling red of *Leschenaultia formosa* and related species
is not equalled by anything in the Proteaceae, while the deep blue and violet colours,
common in the genera *Leschenaultia, Dampiera, Scaevola* and *Brunonia* are features of
the flora of Western Australia. One may sum up, therefore, by stating that although the
members of the Goodeniaceae scarcely influence the main features of the vegetative scene
in Western Australia, they do add some character to the whole.

7. **Cyperaceae**: About 110 species.
The Cyperaceae of the south-west Australia is one of the least studied families of the
flora. The discovery of many new species may be anticipated in the future.

Owing to the lack of detailed information, much more study is necessary before
our knowledge of the part played by the Cyperaceae in the make-up of the communities
can be adequately assessed in relation to other important families. I can, therefore, at
present only repeat the very provisional statements already made.

“The Cyperaceae of the region are present in most communities. It is only on the
inland sand plains that genera are poorly developed. Here they are only represented by
unusual genera such as *Caustis*.

I am also not very familiar with those species which are strongly hydrophytic. *Clad-
dium arthrophyllum* is typically present on the margins of lakes in the Swan River area,
while small species of *Cyperus, Scirpus* and *Chorisandra* are present as annual dwarf
plants on the margins of shallow ponds and ditches. In certain areas, on fine gravel one
also finds species of *Schoenus* together with members of the Centrolepidaceae.

In the shady woodlands of the extreme south-west, the family Cyperaceae appears
to be poorly represented. On the other hand, in the open communities on sand where
Jarrah and *Casuarina* are dominant, they sometimes occur as an essential feature of the
undergrowth. Sturdy species of *Gahnia, Cyathochaete, Tetraria, Tetrariopsis*, tall species
of *Lepidosperma*, and above all the striking genus *Mesomelaena*, are commonly present
there amongst the low shrubs of the undergrowth. They do not, however, form closed
communities.

*Lepidosperma gladiatum* and *Scirpus nodosus* are characteristic plants of the coastal
dunes. Both are also common on the sandy coastal regions throughout Australia.

*Evandra aristata* grows thickly enough to form true associations of peculiar beauty
on the swampy soil of the south coast. The stems which are almost 1.5 m high are often
closely crowded together so that their graceful panicles are well exposed.”

8. **Liliaceae**: About 80 species.
By far the most important representatives of the Liliaceae of the south-west are the
Grass-trees already described. All the remaining species belong to the perennial herb
flora of the region. Some of these are bulbous, while others are rhizomatous. Many are
widespread and common in the Southwest Province, but only a few are striking enough
to influence the general picture of the vegetation.

In the winter wet season, before the flowering period of the shrubs has really commenced,
the countryside is brightened with the white star-like flowers of *Anguillaria dioica* and *Burchar-
dia umbellata*. These are comparable with the much more numerous bulbous plants present
in the Mediterranean or Cape regions in spring. Later on *Chamaescllia*, with its bright blue
perianth (an equally common plant in the south-west) commences to flower. More important
perhaps than these is *Borya nitida* (Fig. 21). This is a remarkable plant which, with its firm
cushions, is generally an indicator of granite, although it also occurs on clay soils.

The genus *Xerotes* (*Lomandra*) also deserves mention as its species occur in all com-
munities. Although there is scarcely one which in external appearance is as impressive

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1 Diels and Pritzel, Fragm. Austr. occid. p. 78

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as many of the eastern Australian species, e.g. X. longifolia, the constant occurrence of these delicate plants in the most diverse situations gives Xerotes a place amongst the more important constituents of the flora.

Members of the Liliaceae in the Southwest Province are very closely related to the eastern Australian forms. Many species occur in the Eremaea and are almost pan-Australian in their distribution. The number of species in the Southwest Province is, however, so high that the Liliaceae must be ranked amongst its most characteristic families.

9. Stylidiaceae. About 75 species. (Fig. 22)

It would appear from the detailed discussion of this family in Diels and Pritzel, Fragm. Austr. occid. p. 582 on, that it has much in common with the Goodeniaceae. This is particularly true insofar as its participation in many diverse communities is concerned. It is this constant presence of the Stylidiaceae in the south-west which reminds one of that much more important group, the Goodeniaceae. The family Stylidiaceae differs, however, in the fact that its members are much more common in the Southwest Province, and more particularly in the more southern areas of that Province. This constitutes the “centre of their distribution and endemism”. To the north, to the east, and towards the interior, the number of species diminishes rapidly. Beyond the 40 cm isohyet, i.e. the boundary of the Eremaea, few species occur. Passing up to or beyond the 20 cm isohyet, the number becomes exceedingly small, being essentially represented by Stylidium limbatum, St. yilgarnense and St. Merrallii.

Vegetatively the family falls into two groups, namely: (a) annuals or semi-annual species; (b) perennial species.

The first group, which falls into Bentham’s Stylidium Ser. Tenellae and Corymbo-sae, together with the genus Levenhoookia are ephemerals. They appear in large numbers after a heavy fall of rain has moistened the soil, and over a short period (a few weeks) they almost completely cover the soil with their white or bright pink flowers. In growth form (apart from the floral parts), these members of the Stylidiaceae are simple - consisting of
a short stem and little else apart from two small delicate leaves.

The structure of the perennial species is more complicated and diverse than that of the annuals. However, they do not match the diversity shown in the Goodeniaceae. All the perennials are herbs. In most species the leaves are arranged in a tight rosette. Mostly they do not persist beyond the dry season but die down and appear anew each year. This allows the development of a somewhat more delicate type of leaf. Branching of the perennial axis is rather restricted in many species and the individuals too limited in their occurrence to be of much value physiognomically. In others, however, extensive branching occurs, resulting in the formation of thick mats. These are often so large that here and there the ground is completely covered solely by these plants. *Stylidium repens* and *St. Dielsianum* are the most important of such species. The former species in particular occurs frequently on sandy soil, covering the ground with a dense network of branches. Some of these perennial species thus attain a significance similar to that which results from the gregarious development of the ephemeral forms. The majority of Stylidiaceae do not, however, produce this effect and only detailed observations will indicate how general the distribution of the group is in the south-west.

The woodland areas of the south-west are rich in species and in particular the shady forests of the south. Here, the leafy species of the Sect. Rhynchangium are common. The light open woodlands of the western coast and of the somewhat more northerly region are also well colonized. In moist, sheltered places close to the south coast one finds a peculiar climbing species (*Stylidium scandens*) which possesses hooked leaves.

The annuals, as mentioned above, favour the more swampy areas. In the more sheltered spots of such areas, *St. junceum* is often found. Species peculiar to gravelly and sandy areas also occur but in general, however, these are usually closely related to those of the wooded areas.

10. **Orchidaceae:** About 75 species. (Fig. 23)

The orchids of south-west Australia present a remarkable contrast to many of the other important families of the country. As pointed out in Diels and Pritzel, Fragm. Austr. occid. pp. 114, 115), they do not on the whole possess any independently developed local features. They in fact agree in all important characters with the Orchidaceae of eastern Australia. They thus differ greatly from the Podalyrieae, the Epacridaceae, the genus *Stylidium*, and various others. They present many analogies to the Cyperaceae (although to a lesser extent), they supply some physiognomically effective additions to the vegetation of the district.

All the orchids of the south-west are terrestrial. Their vegetative organs are functional only in the rainy season. During the dry summer they remain dormant below ground. In their mode of occurrence, these orchids have much in common with the terrestrial orchids of other countries.

Typical examples are present in the south-west, illustrating features held in common. They include the following: (a) the dependence on a certain amount of humus in the soil; (b) the crowded occurrence of one species in places; and (c) the still more frequent, yet very scattered occurrence of species of *Drakaea* and *Caleana*, together with *Caladenia serratus*.

The specific edaphic conditions required by the different species are rather dissimilar. *Epiblema grandiflorum* is often found growing in waterlogged conditions. Many species of *Prasophyllum*, *Microtis* and *Diuris* serve as indicators of high soil-moisture content. The majority of the species grow in the soaked sand in high rainfall areas. The gravel (laterite) of the high country, however, also carries numerous species (in particular the less water-dependent members of the genus *Caladenia*). Some of these, such as *Caladenia gemmata* and *C. hirta* appear actually to be restricted to the inner (Wandoo) region of the plateau.

The occurrence of many species in shady or otherwise sheltered localities may be correlated with moisture requirements. The predilection of *Pterostylis* for growing in such areas is so strong that one must include its species amongst the few true shade-loving
plants of Western Australia. Many of them occur only on the forest floor, while dwarf forms of *Pterostylis pyramidalis* frequently grow between the ferns and moss in niches in granite rocks. In such shady situations, the small plant is so independent of direct moisture that it can occur in otherwise quite dry areas of the Eremaea. Apart from such entirely local and easily explainable exceptions, orchids do not flourish east of annual rainfall line of 0 cm.

In more open situations, the orchid flora is typified in the first instance by the genus *Caladenia*. This has bright-coloured flowers and shows considerable diversity and originality in the structure of its perianth. In this connection, it is remarkable how frequently numerous individuals suddenly appear following a bush fire. In fact, some species have actually only been recorded at such spots. This would suggest that burning off is necessary to reduce the shade cover sufficiently for the plant to come to maturity. During the vegetative phase before flowering, the plants are so inconspicuous that they may easily be overlooked.

**11. Sterculiaceae:** About 70 species. (Fig. 24)

This family is not confined to the south-west. As shown later, because of its Australia-wide distribution and its constitution, it may be regarded as one of the most instructive elements of the Australian flora.

It is important in the Southwest Province because of its presence in very different communities and its corresponding diversity in species form.

The kind and degree of adaptation in the family is somewhat different from that presented by the Leguminosae, Proteaceae and Epacridaceae. For example, the regulation of transpiration appears to be controlled much more by the presence of hairs on the leaves than it is in the three other families. A woolly integument is thus rather common (the only species in which woolly-hairedness remains poorly developed are the so-called “shade-loving” ones). Reduction in leaf area is a second but less important factor in the control of water loss. Incurving of the leaf margins leads to the development of the ericoid or coriaceous form. Aphylly and the development of marked sclerophyllous tissue do not occur in the West Australian Sterculiaceae.

The tallest species grow in the woodlands of the moist south coast where *Ruelingia* shrubs to 3 and 4 metres high occur. This, however is unusual and most species (e.g. *Thomasia, Lasiopetalum* and *Guichenotia*) growing in exposed places on gravelly slopes rarely exceed 1 metre in height. They are not particularly gregarious and seldom form large communities. When, however, species of *Guichenotia* and others are in full flower, their red colour makes them most conspicuous in the bush. On sandy heaths and in clayey areas they are not common enough to produce any physiognomic effect.

**12. Restionaceae:** About 60 species. (Fig. 25)

All the genera of the Restionaceae which are present in Australia are also present in south-west Australia. A great number of them are in fact endemic to this region, including the entire Diplanthereae group. In the Eremaea, the family is still present, although rather poorly represented. In the south-west itself, the higher rainfall areas are clearly favoured, at least in terms of numbers of members of the family Restionaceae present.

The conditions under which members of the western Restionaceae grow are very diverse. They are only absent, as far as my observations go, from the loamy soils of the Eremaea and the western transition zone to this region. However, some xeromorphic species do survive there. They are present in all other communities, although the majority of the species grow best where adequate ground water is present.

As a consequence, they are particularly characteristic of flat alluvial areas where the clay or loamy soil, deficient in humus becomes waterlogged during the winter wet season. They are also present in the deep south where, even in summer, the soil still has a very high moisture content.

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In such places the tallest species of the family are found. “They grow in large stiff tussocks or clumps separated from each other by bare ground. This presents an unusual picture which often recurs in suitable areas throughout the south-west. Many species of Lepyrodiad and most of the tall species of Leptocarpus and Chaetanthus, together with some species of Restio, participate in this flora on alluvial soils”.

Where the waterlogged soil of the low-lying areas is richer in humus, e.g. in the south, other species are found. In such places, e.g. near King George Sound, Hypolaena gracillima is present. The felted, inextricably tangled branches form thickets over 1 m high.

Species of Anarthria, Hypolaena, Loxocarya and Lepyroda grow well on heath-like, slightly humic, sandy soils. This is the type of soil which carries so many Restionaceous plants in the Cape region [South Africa]. The occurrence of individual species is determined by the degree of moisture present. The vegetative form is very variable, but tall and vigorous species like the Cannamois of the Cape, have not developed in the Restionaceous flora of Western Australia.

On the permeable sandy soils carrying open woodland, often where there is some degree of shade, Lyginia barbata is a characteristic plant in the undergrowth.

In sandy areas of the drier districts, a strongly developed xeromorphic group of Restionaceous plants is present. Ecdieiocelea monostachya, for instance, which is often so gregarious as to form large communities, occurs here (Plate XIX). The genus Lepidobolus extends further into the Eremaeae. Its representative, L. deserti, extends as far as the 20 cm rainfall isohyet.

This invasion of regions with such a low rainfall is an important feature of the south-west Australian Restionaceae. In eastern Australia and also in South Africa, members of the family do not colonize such extremely dry areas.

1 Fragm. Austr. occid. p. 84.
13. **Rutaceae:** About 60 species.

Despite its possessing a fairly large number of species, the family Rutaceae is relatively unimportant physiognomically in Western Australia. The main interest of the family lies rather in its relationships and its plant geography\(^1\).

The Rutaceae is also a group which is not confined solely to the south-west. Recently it has been shown that a considerable number of representatives are present in the southern Eremaea.

The family has developed many characteristic features in the Southwest Province, and consequently qualifies for inclusion amongst the typical elements of the flora. We may note, for example, those very peculiar endemic genera which, in their floristic structure and organization, show analogies with *Darwinia* in the Myrtaceae. These genera are *Geleznowia*, *Chorilaena* and *Diplolaena*, in which the inflorescences are crowded into heads, the whole being surrounded with corolla-like, often brightly coloured bracts. This feature has clearly evolved independently in each of the three genera.

The genus *Boronia* (Fig. 26) is the main member of the family in Western Australia (it possess the largest number of species). There are scarcely any communities from which it is completely absent. It must not be forgotten, however, that in general it behaves as a hydrophytic type. In Diels and Pritzel (Fragm. Austr. occid. p. 317) I have expressed myself on this point as follows:

“...The regions favoured by *Boronia* are those where the highest rainfall occurs. Even within these areas the species tend to grow best in those places where the water content of the soil remains high for the longest period. The little valleys and drainage channels of the most southern forest areas with their very moist soils constitute the best habitats. This is where the *Boronia* species with the most beautiful flowers grow. In these areas, where they are often closely associated with members of the Myrtaceae, we find the finest examples of the Heterandrae. These include the rose-red *Boronia lanuginosa* and *B. megastigma*. The last named species possesses the dark-brown scented flowers which are famous throughout the whole of Australia. On the clayey depressions which as a rule are waterlogged in winter, less spectacular species such as *B. juncea* are present.

In communities growing on drier soil the number of species rapidly diminishes. In woodlands on clayey gravelly soils the beautiful forms of *B. ovata* and others may be seen. Species such as *B. cymosa* and *B. crassifolia*, which occur on the widespread gravel [laterite], show some xeromorphic features. More extreme xeromorphic species such as *B. inornata* and *B. xerophila* with its closely appressed hairs are present on the margins of the Eremaea. Other xeromorphs are to be found among the psammophyllous species growing on shrubheaths. *B. thymifolia* exemplifies the rolled-leaf type. Leaf reduction leading to almost complete aphyll is illustrated by the Cyaneae series: *B. ramosa* to *B. coerulescens*. These species grow excellently on sand”.

14. **Umbelliferae:** About 50 species. (Fig. 27)

The Umbelliferae of the south-west consist, firstly (and to a limited extent) of widely distributed annuals which are also well represented in the Eremaea (e.g. *Hydrocotyle* and *Didiscus*). Secondly (and to a larger extent), there are genera which reoccur in the moister parts of eastern Australia, although they are almost entirely lacking from the Eremaea. This second group is characteristic of the Southwest Province, since in adaptive diversity of form its members occur in all the botanical districts and communities. Only a few species, however, influence to any extent the vegetation picture. One which does is *Actinotus leucocephalus* (Fig. 27). This plant, the Edelweiss of the country, often occurs in masses covering the gravelly-sandy soil. Because of its beautiful white silky felted involucre, it is one of the most striking elements of the vegetation at the beginning of the wet season.

Hairiness of leaves is also a feature met with in many members of the Apiaceae growing in Western Australia (e.g. *Xanthosia*). A more common development, however, is the marked tendency towards aphyll. In this process, juncus-like species, such as *Tra-
chymene and Schoenolaena, have originated. Plants, which remind one of Muehlenbeckia, have evolved by the development of lateral expansions on the branches. As examples, we may mention Trachymene compressa and related species.

Drummond drew attention to an entirely different feature in referring to species in the genus Trachymene [Platysace] which develop subterranean bulbs. In some of these bulb-forming plants a partly ericoid type of leaf develops on above-ground parts (e.g. T. ericoides). Such plants appear decidedly unusual in the family Apiaceae.

15. Amaryllidaceae - Conostylideae: About 50 species. (Fig. 28)

Members of the Conostylideae rank high amongst the characteristic families of the Southwest Province. They are endemic to the region and this alone gives them some degree of importance. There is more to them than this, however, for in south-west Australia they must be regarded as the most important group of the Liliales. In the character of their hairy or woolly floral parts, their colour, and in fact their whole constitution, these plants present lines of evolution which are not seen elsewhere in the vegetation of the region.

Judged by taxonomic criteria, the genus Conostylis is by far the most important in the family. It is predominantly a xeromorphic type and vegetatively it resembles members of the Cyperaceae. It occurs characteristically on sandy soils and is very rich in closely related forms which differ in their type of adaptation. They grow uniformly well (a) in the open habitat characteristic of the Jarrah forests, (b) among the undergrowth of the dune depressions, and (c) on the nutritionally poor inland sand-plains. On soil with a clayey substratum they are less in evidence, and on loamy soils their role is insignificant. However, it should be mentioned that occasionally individual species do attain some importance through their close tussock-like habit of growth.

As well as the genus Conostylis we have Anigozanthos. This is ecologically and visually very important. It may be noted that the species of Anigozanthos can be clearly distinguished by well-defined characters, while the separation of Conostylis species presents difficulties due to the bewildering variety of forms. Individual species of Anigozanthos occur locally
in the smaller subdivisions of the province. Their boundaries coincide, for the most part, with the chief plant zones. The fact that they can easily be recognized by their strikingly brilliant and constant perianth colours makes them valuable as floristic types.

Almost all the species of *Anigozanthos* are tall plants. While still in the vegetative stage they initially remind one of the Cyperaceous genus, *Lepidosperma* (equally well distributed in Western Australia). During the flowering season, however, they become very important as they give character to their communities. This is particularly true of *A. flavida* (green-yellow flowers), which, together with *A. Manglesii*, grows well in wetter areas in the south. In this latter species the unusual proximity of two contrasting colours, namely bright red and parrot green, gives an almost barbaric appearance to the perianth.

As compared with *Conostylis*, *Anigozanthos* appears much more uniform vegetatively, although it occupies much more diverse habits. We have already noted that *A. flavida* thrives in wet conditions. The bright-green flowering *A. viridis* is found on the winter-wet clayey areas of the western coastal plain. *A. rufa* (with brown-purple flowers) and *A. pulcherrima* (with its beautiful yellow perianth) are often found growing on sandy soils bearing low bushy plants (the latter species is restricted to such sand-heaths). According to Drummond, *A. pulcherrima* is “the very loveliest plant which this country can boast”. *Macropodia fuliginosa*, with its strange black velvety panicles, grows mostly on gravelly ground. The remaining species are adapted to different soil conditions. All, however, appear to show a strong development in open areas, and particularly where the undergrowth has been thinned out by bush fires. The conspicuously coloured *Anigozanthos* flowers are much more common in occurrence in such vegetatively open areas than in denser communities.

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*Fig. 27. Umbelliferae der Südwest-Provinz: A Xanthoria rotundifolia DC. B Trachymene compressa (Lab.) Spreng. C, D Actinotus leucophalus Benth. (Original.)*

The genus *Hibbertia* of the Dilleniaceae (with which we are inclined to group the genus *Candollea* of many authors) grows under geographically somewhat similar conditions to the genus *Stylium*. This is at least the case in south-western Australia where *Hibbertia* occurs in many communities, particularly in the south-west. In contrast to *Stylium*, however, the habit of growth is quite different.

The species are all shrub - some even being of imposing size. *Hibbertia cuneiformis*, for example, a characteristic plant of the coastal woodland, can reach a height of 2 to 3 metres. Specimens of *Hibbertia montana* have been found to exceed 1 m. Apart from such well-developed shrubs, the genus runs through the whole range of size adaptation to environment similar to that seen amongst members of the Goodeniaceae. Climbers, however, such as those which occur in eastern Australia, are not present in Western Australia (see Ch. 4, Sect. F.)

Many species are present in the thick undergrowth of the southern woodlands near rivers and in valleys. These species, which have soft leaves, are the adaptive counterparts of certain members of the Rutaceae and Sterculiaceae which occur in the same area. On the boundaries of the area of distribution of *Eucalyptus marginata*, where it is drier, and on the light sand of the western coastal plain, it is possible to see a gradual reduction and change in the size and shape of the foliage of *Hibbertia hypericoides*. The normal type of plant bearing linear leaves with incurved margins is illustrated (Fig. 29).

![Hibbertia hypericoides illustration](image)

*Hibbertia* does not appear to flourish on the rich clay lowlands. However, its growth on sandy soil - noticed in the south - holds good as one travels north and east. Many species of *Hibbertia* are present on the sand plains. They all show the ericoid type of leaf which is physiognomically dominant in those areas. *Hibbertia conspicua*, the only completely leafless species of the genus, also occurs on these sand-heaths.
17. *Drosera*: About 30 species. (Fig. 30)

*Drosera* is an important element of the Western Australian flora. As it also occurs in the eastern States, many useful comparisons may be made. The genus, however, is only poorly represented in the Eremaean.

In the Southwest Province, representatives of two taxonomically separate groups are present, namely: (a) the Section Rorella; and (b) the Section Ergaleium. The first of these contains the true xeromorphic species which survive the dry season with their terminal leaf buds well protected. They are very small plants, and consequently too insignificant to influence the appearance of the vegetation. The second group, on the other hand, contains some species which are physiognomically quite effective. The above-ground parts are, however, short-lived. They perennate by bulbs. Shoots appear above ground only in the wet season, being then frequently present over the whole of the south-west on both porous and hard sub-soils.

Soon after the commencement of the break of season rains, the rosulate species (recognizable by the basal rosette of crowded leaves) begin to show their delicate white flowers. They carry on the assimilatory process between April and June.

They are followed by species with alternate stalked leaves (Fig. 30). These appear first on the heavy clayey ground of the alluvial regions. Simple species such as *Drosera* *heterophylla* and *D. Huegelii*, which flower in June and July, come first. Then larger forms such as *D. macrantha* develop on light sand and gravel. This species exercises a peculiar effect in the lower undergrowth because of its climbing habit of growth.

The conclusion of the *Drosera* season is marked by *D. gigantea*, the tallest and most richly branched species in the genus. It is found in favourable places on swampy land and flowers even as late as November. In the section Ergaleium, all members need adequate soil moisture during their vegetative phase.

18. *Centrolepidaceae*: About 15 species. (Fig. 31)

There is no other part of the world where the small family *Centrolepidaceae* is so well represented as in the south-western part of Australia. All the genera widespread over the whole continent occur in this area, together with the endemic West Australian genera *Hydatella* and *Aphelia*. However, in contrast to this strong south-western occurrence, the family *Centrolepidaceae* appears to be poorly represented in the Eremaea. At least one finds very few species there.

The following extract, taken from Diels and Pritzel, Fragm. Austr. occ. p. 92, represents the extent of our knowledge of the conditions under which members of the *Centrolepidaceae* occur in the Southwest Province. “All the Western Australian species are quite small annual plants. Some in fact are quite tiny and even moss-like. They grow on the sandy clay areas moistened by the winter rains, and in more climatically favourable regions on the loose humus-containing sand. Despite their small size, they may appear quite striking on the margins of ponds, particularly in the latter half of the rainy season. This is due to the crowded character of their occurrence. Together with the dwarf plants of other families, they then form either independent associations or else a kind of undergrowth among the taller-growing community of perennial herbs. Usually several species occur together. If one discovers a particular species, one can usually count on finding others in its vicinity. *Aphelia cyperoides* is the only species which is occasionally found covering large areas of moist soil to the apparent exclusion of other plants. Members of the group Diplanthereae have, so far, only been found living and flowering under water.”


Although the number of species is small, this parasitic genus may reasonably be included amongst the characteristic genera of the south-west. This is because although it is well represented in south-eastern Australia, it appears to be almost lacking from the Eremaea. I have already indicated elsewhere (Diels and Pritzel, Fragm. Austr. occ. p. 201) that this genus
cannot be termed “more or less maritime” as stated by Bentham. This is because it occurs not only over the whole area of the Southwest Province but also extends well inland.

The role of Cassytha in the vegetative physiognomy of the south-west should not be under-estimated. C. racemosa, which forms great complicated networks like a Cuscuta, is very widespread. These masses often hang down a metre or so from the branches of trees and shrubs (Plate XXIX). The small species are parasitic on the bushes of the shrub-heaths. Occasionally they are so numerous that their wiry strands, which run from bush to bush, can appreciably slow one’s progress through the area.

20. Families also common in the Eremaea (Families and genera which are strongly represented and of considerable physiognomic importance in the Southwest Province but which are equally important in the Eremaea.)

Among the important elements of the flora of the Southwest Province there are several which cannot be considered as truly characteristic of the province because they feature equally well in the Eremaea. In fact, in suitable areas, they occur over the whole of central Australia.

The Compositae and Amaranthaceae are the most important families. The Compositae (about 140 species) is a family well endowed with gregarious plants. This is particularly well marked amongst the annual ‘Everlastings’. Many of them occur in the south-west, and some, e.g. Helipterum Manglesii, with its nodding colourful heads (Fig. 53), is everywhere of physiognomic value. Members of the Compositae develop most strongly where the vegetation takes on an Eremaean facies. Wherever they occur in the south-west
they retain certain Eremaean peculiarities. These naturally are more pronounced in the Eremaea itself, where they first developed. On these grounds, the Compositae should be treated as one of the characteristic families of the Eremaea.

The above applies also, and perhaps to an even greater extent, in the Amaranthaceae. About 20 species in this family occur in the south-west.

This situation differs, however, from that found in the Rhamnaceae, in Pimelea, and in the Haloragaceae. These groups are too widely distributed and too important in the Eremaea to be considered as character plants of the Southwest Province. It must be noted also that their centre of origin is not the Eremaea, as is the case with Compositae and Amaranthaceae. They are pan-Australian families with the most striking powers of adaptation to different conditions. The number of species present in the south-west lies somewhere between 30 and 40.

Members of the Rhamnaceae are always shrub-like in growth form and vary from tall plants with soft leaves through all stages of reduction to rigid dwarf plants with reduced foliage. The ericoid type of plant, which exhibits many points of convergence with the Epacridaceae (or Erica) both in the form of the inflorescence and its white colour, is particularly widespread.

The genus Pimelea also consists of shrubs and perennial herbs which are quite variable in height. The most impressive species resemble willow bushes. These range from shrubs 3 to 4 m high, e.g. Pimelea clavata, to low perennial herbs up to 30 cm high. In other respects, the general appearance is much more uniform than that of the Rhamnaceae. It is always somewhat variable, but does not develop extreme forms. The leaf also does not show much variation in shape. In certain cases, where due to climatic stress, it is unable to carry on its functions in the summer. Regular leaf fall takes place. This is illustrated by P. microcephala and others.

Pimelea is present in all West Australian communities, and because of its gregarious occurrence and striking flowers, its species often become physiognomically important. This is particularly the case on the clayey alluvium. The species present there show a tendency to form obvious communities and to produce a fine decorative effect with their rose-red or white flowers.

Physiognomically, members of the family Haloragaceae are of quite subordinate rank. The 30 species are partly slender annuals and partly small perennial herbs. The versatile genus Haloragis is strongly represented in the whole vegetation scene and contains some interesting adaptive forms. Nevertheless it is only of second- or third-rate importance when the overall elements of the flora are considered.

21. Families under represented in the Southwest Province

If one examines the general floristic character of the south-west, a striking feature will be apparent: namely, the relatively few members of the families Graminaceae and Compositae which are present. Strictly speaking, this holds true for the purely south-western part of the area, i.e. that part between the Swan River and King George Sound. In this triangle one finds a flora which, considering the overall importance of the family Compositae in terms of the wider south-west Australian flora, is perhaps the poorest in species of any comparable temperate region.

The same holds good for the Graminaceae. The occurrence of grasses on sandy soils is extremely poor. Griseback’s statement, in “Vegetation der Erde” (11, 216) quoting Drummond1, that the sandy areas of the Swan River Colony are “preferably used as grassland” is absolutely incorrect.

In the drier parts and consequently in the northern and eastern landscapes, particularly on loamy ground, both families are well represented. This appears to be because Eremaean elements have either invaded the district without showing any alteration in form or have become acclimatized through modification.

The rarity of occurrence of members of the and Graminaceae and Compositae in south-west Australia is very difficult to understand. Climatically similar areas, e.g. the Mediterranean area and the Cape region of South Africa, are rich in members of both these families. Moreover, introduced species of both, particularly annuals, do remarkably well in south-west Australia. Briza maxima, for example, is at present more common than any of the indigenous grasses.

1 I have not found such a remark in Drummond’s writings. A misunderstanding must have occurred.