Aspidiaceae of Copeland (1947) is a very large family with 65 genera and about 2950 species. This includes four of Christensen's (1938) subfamilies, the Onocleoidae, Woodsioideae, Dryopteridoideae and Elaphoglossoideae and also the tribe Athyrieae of Asplenioideae. In his classification Ching (1940) included the members of Copeland's Aspidiaceae in part of Thelypteroid-Asplenoid series and in part of Cyatheoid-Aspidioid series. Dickason (1946) included members of Copeland's Aspidiaceae in his D and E groups under Filicales. Holttum (1947), on the other hand included these genera in Thelypteridaceae and Dennstaedtiaceae (as subfamilies, Dryopteridoideae, Tectarioideae and Athyrioideae). Pichi-Sermolli (1958) included Copeland's Aspidiaceae under five families, viz., Thelypteridaceae, Aspleniaceae, Athyriaceae, Aspidiaceae and Lomariopsidaceae. In his classification Nayar (1970) distributed members of Aspidiaceae among Dryopteridaceae, Lomariopsidaceae and Thelypteridaceae.

Cytological evidences confirm the suggested shifting of some of the genera included in Copeland's Aspidiaceae.
A perusal of literature on cytology (see Chiarugi, 1960; Fabbri, 1963, 1965; Bir, 1973 and Mutui, 1975) reveals that in the majority of genera of Copeland's Aspidiaceae the chromosome numbers are based on $x = 41$ or $40$ (with the exception $x = 42$ in Cystopteris) while the genera Thelypteris, Cyclosorus, Ampelopteris, Abacopteris and Leptogramma are all based on $x = 36, 35, 34, 32, 31, 29, 28$ and $27$. Chromosome numbers in most of the species investigated during the present study are also based on $x = 41$ (with the exception $x = 40$ in Dryopteris boryana and Athyrium hohennackarianum), while species of Thelypteris, Cyclosorus and Ampelopteris on $x = 36, 35$ or $31$. On the basis of cytological discontinuity, previous investigators like Manton and Sledge (1954), Mehra (1961) and Abraham et al. (1962) have suggested that Thelypteris and allied genera may be separated from Copeland's Aspidiaceae to an independent family. The present study also shows that Thelypteris, Ampelopteris and Cyclosorus placed in the family Aspidiaceae by Copeland are cytologically unrelated to the remaining genera. This is supported by morphological evidences also. Thelypteris and allied genera are morphologically very distinct from the other genera of Copeland's Aspidiaceae (Christensen, 1938; Ching, 1940; Pichi-Sermolli, 1958, 1959). Further, Christensen (1938) has pointed out that the Dryopteroid ferns have many vascular bundles in the stipes and that
their sporangia are never setose, whereas the Thelypteroid ferns have two vascular strands in their stipe towards the base and later they unite into a single U-shaped strand as the strands go up and that the sporangia are setose. Based on these morphological dissimilarities of *Thelypteris* and allied group from other members of Copeland's Aspidiaceae, Holttum (1947) separated them into an independent family Thelypteridaceae. He further explained that even though members of *Thelypteris* group and other genera of Aspidiaceae show some morphological similarities in certain characters like indusia, it does not denote any relationship between these groups.

Nayar and Kaur (1968) have reported the Vittaria-type of spore germination and Drynaria-type of prothallial development in Thelypteridaceae. Spore germination in species of *Thelypteris*, *Cyclosorus* and *Ampelopteris* studied during the present investigation is of the Vittaria-type, as recorded by Nayar and Kaur (1968). But the prothallial development in all these genera was either the Adiantum-type or Aspidium-type. Moreover, stellate hairs as recorded in *Cyclosorus* group, *Ampelopteris* and *Thelypteris* by Stokey (1960), Atkinson and Stokey (1964) and Nayar and Kaur (1971) have not been observed in any of the present materials. This shows that *Thelypteris*, *Cyclosorus* and *Ampelopteris* do not differ much from the remaining
Aspidiaceae on gametophyte morphology. Moreover, these two groups share much more characters in common, viz., the Vittaria-type of spore germination, Adiantum or Aspidium type of prothallial development, cordate and symmetrical prothalli, simple, unicellular and papillate hairs and reproductive organs. Gametophyte morphology (present study), therefore, may not be used as a dependable criterion in classification.

Taxonomists differ greatly in their opinion about the phylogeny of various genera of Copeland's Aspidiaceae. Copeland (1947) is of the opinion that primitive members of his Aspidiaceae have an origin cognate with Cyatheaceae. Bower (1928) proposed that the origin of Dryopteris and its allies (he does not distinguish Thelypteris from Dryopteris) is from Cyatheaceae and this in turn has evolved from Gleicheniaceae, an intermediate being Lophosoria. Holttum (1947, 1949) disagrees with this view. He believes that Dennstaedtioid origin for these groups is the more likely one. Christensen (1938) puts emphasis on the distinctness of the Thelypteris group and placed it in a separate group in his sub-family Dryopteridoideae. He pointed out that they are quite distinct from Dryopteris and without near relatives outside the family. Holttum (1947) placed Thelypteris and near allies in a separate family, Thelypteridaceae, though the true Dryopteridoid
ferns (with which Thelypteris is united by Copeland) are not. Holttum (1947) also proposed that Thelypteris group perhaps originated from Gleicheniaceae, not by way of Cyatheaceae, but independently as another evolutionary line. Mehra (1961) has strongly argued that Gleicheniaceae would be the probable ancestor of Thelypteridaceae and Aspidiaceae. He further suggested that Cyatheaceae could not have given risen to Aspidiaceae and Woodsiaceae because of the different chromosome numbers, viz., n = 69 in Cyatheaceae and n = 41 in other two groups. But it may be noted that the Gleichenioid origin of Thelypteris and allied genera, as proposed by Holttum (1947) and Mehra (1961) cannot be possible in the sense that there is no cytological relation between the chromosome number n = 39 in Gleicheniaceae and n = 70 and 69 in Cyatheaceae. Haploid number n = 35 is very common in the genus Thelypteris. This number, probably, is related to n = 70 the most commonly occurring number in the family Cyatheaceae. Presence of n = 35 in Thelypteris (present study) shows some relationship between Cyatheaceae and Thelypteris group. It is, therefore, suggested that Cyatheaceae would be the probable ancestor from which Thelypteris group of plants arose. Abraham et al. (1962), on cytological basis also proposed the Cyatheoid origin for Thelypteris and allied genera.

Bower has drawn a relationship between Dryopteris and allied genera and Cyatheaceae. Nayar and Kaur (1971)
have also drawn up a Cyatheoid origin for *Dryopteris*. But cytological evidence of \( n = 41 \), characteristic of *Dryopteris* (as well as the primitive genera of Copeland's Aspidiaceae) would not support Bower's contention. Evidence from the gametophyte morphology (Stokey, 1930) does not throw any light on the relationship between the above groups. Regarding the relationship between the Dryopteroid ferns and Cyatheaceae, Holttum (1947) remarks, "Bower's evidence does not demonstrate the affinity with *Dennstaedtia* is equally likely, or in some cases more likely, and the evidence from prothalli is against him". He suggested Dennstaedtioid origin for *Dryopteris*. But it may be noted that *Dennstaedtia* is characterised by \( x = 30, 31, 32, 33, 34 \) and 47. These numbers are in any way not related to the haploid number \( n = 40 \) and 41 in the Dryopteroid group. This clearly shows that the Dennstaedtioid origin for *Dryopteris* group as proposed by Holttum (1947) is not in conformity with cytological evidence.

Abraham et al. (1962) do not favour Holttum's contention of the origin of the sub-families, Dryopteridoideae, Tectarioideae and Athyrioideae (in the family Dennstaedtiaceae) from Dennstaedtia type. They further suggested that Aspidiaceae appear to have no close relatives, though an origin cognate with Gleicheniaceae need not be excluded. Pichi-Sermolli (1958) suggested an
origin for Aspidials from Gleicheniaceous stock. This seems to be possible since the basic chromosome numbers of Gleicheniaceae is \( x = 39 \) and of Dryopteris group is \( n = 41 \) or 40. Present cytological evidence (\( n = 41 \) and 40 in Dryopteris) also supports Pichi-Sermolli's proposal of Dryopteris and related groups as having originated from Gleicheniaceous stock.