
Silent Valley : A correlation between pollen spectra and vegetation

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The paper embodies the results of pollen analysis of modern samples in order to work out the modern vegetation and pollen relationship. The study has revealed that the pollen/spores assemblage of the modern samples is almost uniform and coheres with the modern vegetation to the tune of 60 per cent. However, the arboreal pollen taxa are either absent or lowly present. The paucity of arboreals is often accounted due to entomophilous mode of pollination in most of the plants. Nevertheless, the predominance of saprophytic fungi present in the samples may have destroyed the pollen/spores.

Key-words —Palynology, Silent Valley, Arboreals, Quaternary (India).

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सारांश

शान्त घाटी : परागकण स्पेक्ट्रम एवं वनस्पति में सहसम्बन्ध

हरीपाल गुप्ता एवं समीर कुमार बेरा

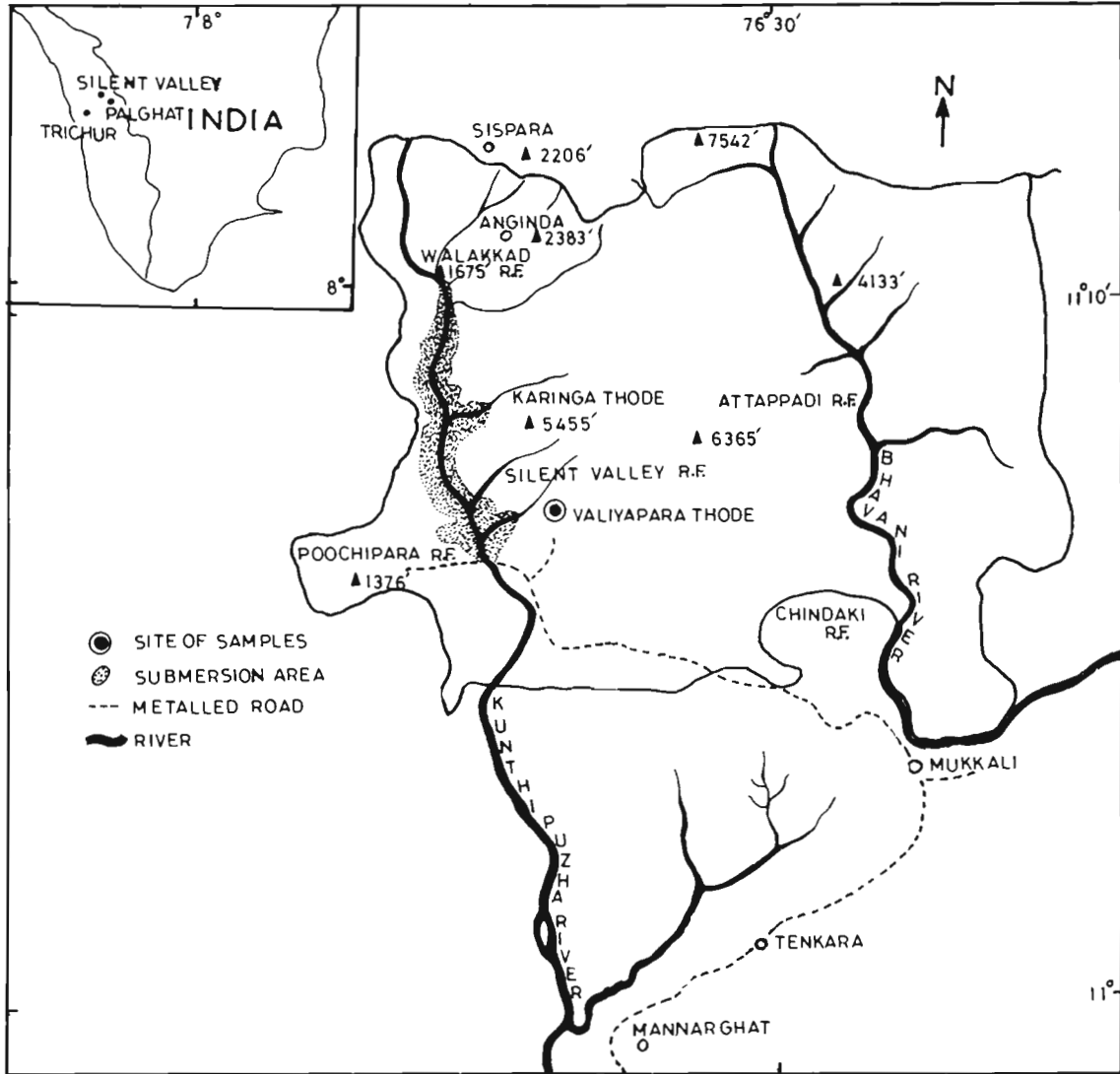
प्रस्तुत शोध-पत्र में वर्तमान वनस्पति एवं परागकण सहसम्बन्ध अन्वेषित करने हेतु शान्त घाटी से एकत्र नमूनों के परागकण विश्लेषण के परिणाम प्रदर्शित किये गये हैं। इस अध्ययन से व्यक्त होता है कि इन नमूनों से उपलब्ध परागकण/बीजाणु समुच्चय प्रायः एक जैसी ही है तथा वर्तमान वनस्पति से लगभग 60 प्रतिशत समानता व्यक्त करती है। तथापि, वृक्षीय परागकण वर्गक या तो अनुपस्थित हैं अथवा बहुत कम संख्या में विद्यमान हैं। इसकी कम मात्रा सम्भवतः इन पौधों में होने वाले कीट परागण के कारण हो सकती है। यद्यपि, नमूनों से प्राप्त मृतोपजीवी कवक के कारण भी इनकी संख्या में इतनी कमी हो सकती है।

SILENT VALLEY, as the name implies, enjoys a silent atmosphere during the nights. The silence in the Silent Valley is owing to the absence of an insect belonging to *Cicada* sp. which is otherwise present everywhere and makes the surrounding noisy. The reason is to why this insect absents from whole of the valley is not known yet. Silent Valley is one of the biggest forest reserves located in Palghat Division (11° 05' - 11° 12' N long.: 76° 26' - 76° 35' E lat.) and covers 8951.65 hectares of forest (Working Plan—1984-85) and lies on a plateau to the north of Man-narghat. It is bordered by Nilgiris on northeast; Palghat gap on the east; Anamalai on the south and Trichur on the southwest (Map 1). There are many hilltops in the Silent Valley, all of which drain into

Kunthipuzha River which originates from Silent Valley and is the only drainage system there. The lowest elevation is 625 m on the southern boundary where Kunthipuzha runs down the ghats and the highest peak in the high ridges all around the plateau is Anginda peak on the north eastern boundary in the Nilgiris. The object of the present study is to find out the interplay of pollen/spores and their relationship with the modern vegetation in the Silent Valley

CLIMATE

There is appreciable variation in temperature and precipitation in Silent Valley chiefly due to the difference in elevation ranging from the plateau to the all around surrounding high mountain ridges. This variation in the climate has much impact on the type of vegetation met at different elevations. The plains



Map 1

are warm and humid and the montanes are cool and dry (Champion & Seth, 1968). The valley is warm and humid from June to October and cool and dry from November to January. During March to April strong

speedy winds blow causing drying of the forest which encourages the spread of forest fires.

Palghat Division exhibits wide range of rainfall varying from less than 1,000 mm in the Gotiarkandy

PLATE 1

(All figures x 1000)

- | | |
|-------------------------------|--------------------------|
| 1-3. <i>Euonymus</i> sp. | 14. <i>Polygala</i> sp. |
| 4, 5. <i>Pavetta</i> sp. | 15. <i>Senectio</i> sp. |
| 6. <i>Ilex</i> sp. | 16. Asteraceae |
| 7. <i>Strobilanthes</i> sp. | 17. <i>Artemisia</i> sp. |
| 8. <i>Berberis</i> sp. | 18. <i>Csbeckia</i> sp. |
| 9. <i>Palaquium</i> sp. | 19. <i>Viburnum</i> sp. |
| 10. <i>Symplocos</i> sp. | 20. Oleaceae |
| 11. <i>Polygonum plebejum</i> | 21. <i>Ligustrum</i> sp. |
| 12. <i>Elaeocarpus</i> sp. | 22. <i>Polygala</i> sp. |
| 13. Anacardiaceae | 23. <i>Impatiens</i> sp. |

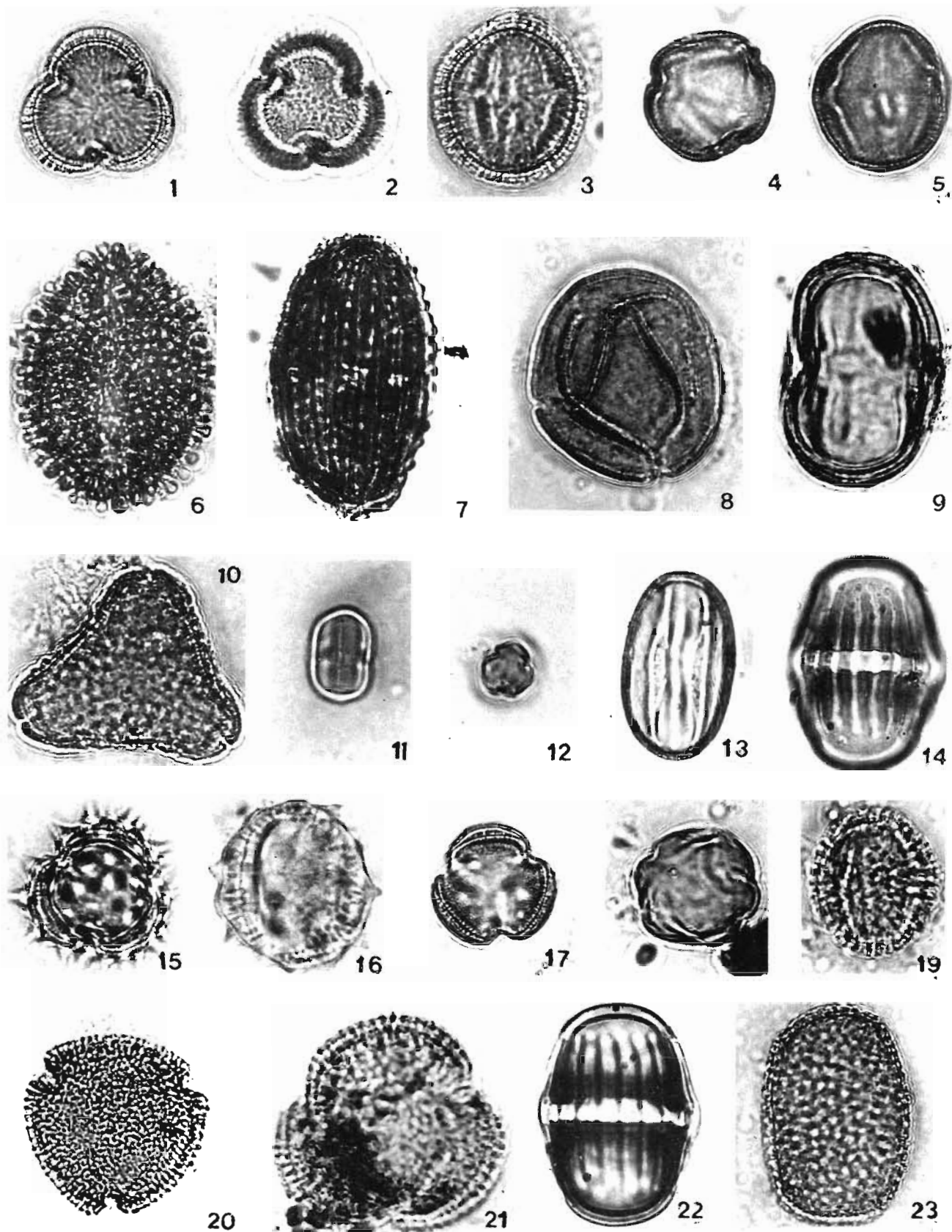
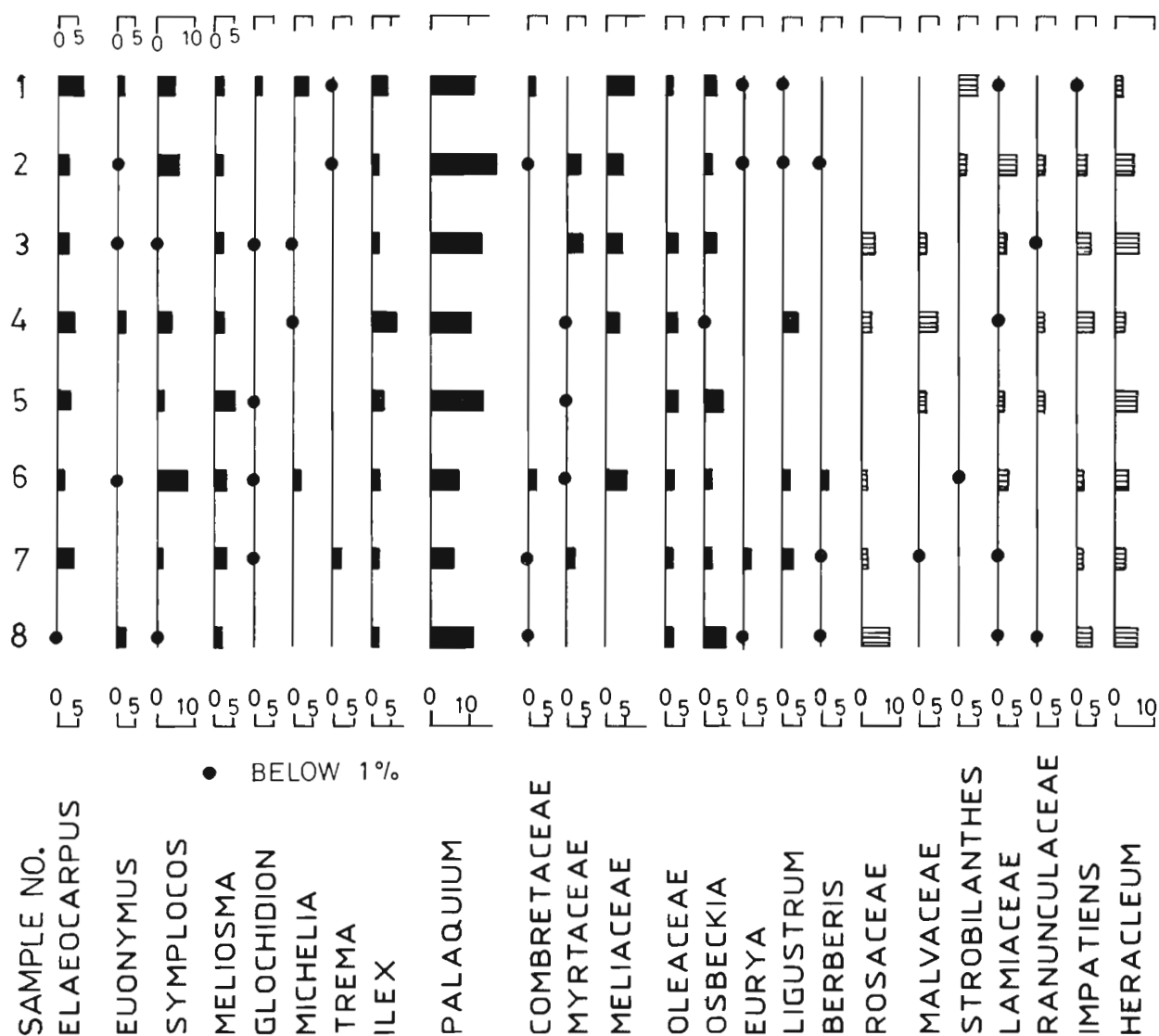


PLATE 1



Text-figure 1—Recent pollen spectra from Silent Valley, Kerala (percentages calculated in terms of total land plants pollen excluding ferns).

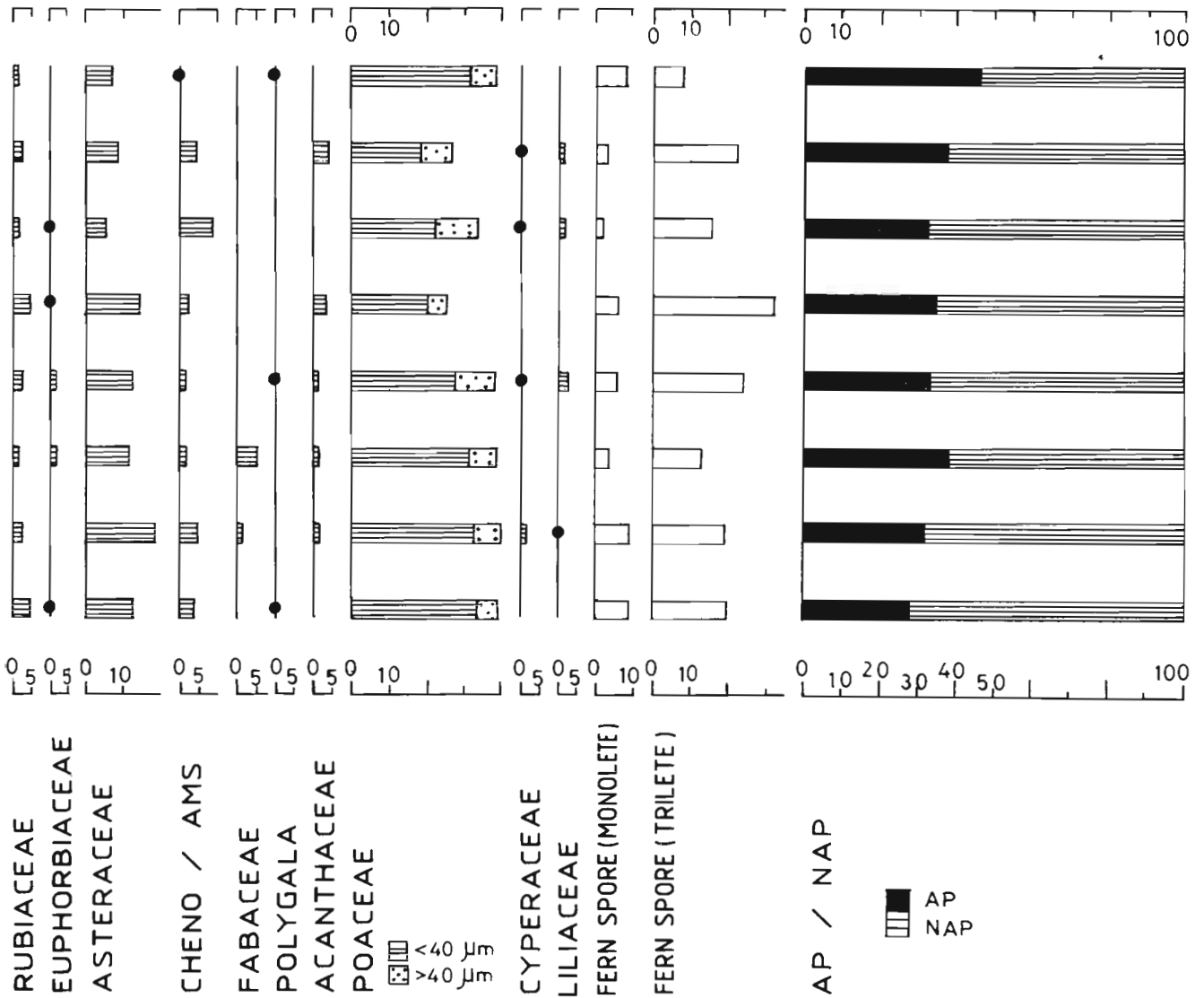
and Edvani areas to more than 6,000 mm in the protected hills. However, higher precipitation is not always a generalised feature of high hill. Contrary to this concept, there are areas located at an elevation between 100 to 120 m a.s.l and receive higher precipitation but support semi-evergreen vegetation. Likewise, there are high hills of about 1,200 m a.s.l. which receive low rainfall but support deciduous vegetation.

VEGETATION

In the Silent Valley, the forests above 1,500 m a.s.l., mostly form a dense close canopy with tall trees often with a rounded crown. The foliage is with its

varied tints and great beauty to the forest. The boles and branches are festooned with mosses, lichens, ferns and epiphytes. Above 1900 m a.s.l., the hill tops are interrupted by stretches of rocky cliffs and are generally exposed without any vegetation. However, patchy Shola forests do occur in folds, hollows and depressions where high degree of soil moisture is trapped.

The principal trees constituting the Shola forest in Silent Valley (Nayar, 1980a; Manilal, 1988) are : *Elaeocarpus ferrugineus*, *E. munroii*, *Poeciloneuron indicum*, *Calophyllum elatum*, *Cullenia exarillata*, *C. excelsa*, *Palaquium ellipticum*, *Canarium strictum*, *Litsea wightiana*, *Xanthophyllum flavescens*, *Artocarpus heterophyllum*, *Holigharna arnottiana*,



Actinodaphne campanulata, *Garcinia morella*, *Meliosma wightii*, *M. arnottiana*, *Schefflera racemosa*, *Symplocos foliosa*, *S. obtusa*, *S. pendula*, *Euonymus* sp., *Rhododendron nilagiricum*, *Sygygium arnottianum*, *Gordonia obtusa*, *Hydnocarpus alpina*, *Photinia lindleyana* var. *tomentosa*, *Cinnamomum wightii*, *C. perottetii* and *Alsophila* sp. (tree fern). The understory plants are *Lasianthus coffeoides*, *Berberis tinctoria*, *Eurya japonica*, *Rhamnus wightii*, *Oldenlandia stylosa*, *Viburnum* sp., *Dodonaea viscosa*, *Ligustrum perottetii* and *Strobilanthes* sp. Canes are also present in the Sholas but at lower elevation. *Impatiens* spp. are quite common in the moist shaded situations. These forests are rich in epiphytes, mosses, lichens, ferns

and many orchids. Grasses are interspersed within the forests but chiefly inhabit treeless exposures in the Silent Valley and contribute to the grasslands in Palghat Division. Major grasslands, though occur at low elevations, are divided as under:

(i). Low level grasslands occurring below 1,500 m a.s.l., and

(ii). High level grasslands occurring above 1,500 m a.s.l. Low level grasslands occur in the wet evergreen forest in Silent Valley but the bigger patches are seen on the hill tops and the ridges descending down to the valley. These grasslands attain edaphic climax as they colonize on rocky surface with poor soil beneath. Since the valley proper harbours a thick soil profile, it is colonized by some

stray deciduous tree taxa like *Phyllanthus*, *Dalbergia*, *Phoenix*, *Wendendia* and *Carya*, etc.

In the moist and sheltered localities where fire either does not reach or retreated for past several years, the sholas gradually encroach into the grasslands in order to reclaim their lost territory. But in the extensive grasslands the phenomenon is just reverse, where the grasslands are invading into the sholas. In the newly burnt areas the marginal Shola vegetation is completely destroyed giving way to the grasses and ferns.

MODERN POLLEN / VEGETATION RELATIONSHIP

An attempt is made to evaluate the interplay of pollen and their frequency relationship with the modern vegetation growing in the Silent Valley (Text-figure 1). Eight surface samples of the Silent Valley were pollen analysed and observed that 40-45 per cent tree components are represented in the samples procured from the thickets of the forest. However, the tree pollen frequency reduced relatively to 28-38 per cent in the samples collected from along the river channel. Detailed information of the site of samples is provided below :

Location	Nature
Thickets of the forest	Moss cushion
Thickets of the forest	Moss cushion
Dry exposed bare hill top	Surface soil
Along the road cutting	Surface soil
Along the road cutting	Surface soil
Hill top	Surface soil
Along the river	Surface soil
From the river edge	Surface soil

POLLEN COMPOSITION OF SURFACE SAMPLES

Sample nos. 1 and 2 collected from the thickets do not record the total representation of arboreal Shola components. Rather the tree taxa are only present to the tune of 40-45 per cent of the total vegetation. The important forest elements recorded positionwise are: *Palaquium*, *Elaeocarpus*, *Symplocos*, *Ilex*, *Meliosma*, *Osbeckia*, *Euonymus*, *Michelia*, *Glochidion*, Meliaceae, Combretaceae, Myrtaceae, Oleaceae, etc. However, *Trema*, *Eurya*, *Ligustrum* and *Berberis* are present either sporadically or in low profile. Some herbaceous taxa truly associated with Shola forest, are recorded in high to moderate values and represented by Asteraceae, *Heracleum*, *Impatiens*, *Strobilanthes*, etc.

The ground vegetation is predominated by Poaceae, Rubiaceae, Lamiaceae, Ranunculaceae, Acanthaceae, Cyperaceae, Liliaceae and *Polygala* either in low values or sporadic. Aquatic taxa are totally absent from the vegetation scenario but ferns are present in abundance.

Sample nos. 3-8 are the soil samples collected either from outskirts of the forest or within 1-2 km from the forest. Almost all the samples exhibit the same palynological picture except for a slight reduction in overall values of arboreal taxa and a corresponding increase in the nonarboreals. The total representation of arboreal taxa is between 28 - 30 per cent of the vegetation except for sample no. 6 which was collected from bare hill top. Qualitatively, almost all the taxa encountered in sample nos. 1 and 2 are represented in these samples but for minor variations in their values. For instance *Elaeocarpus*, *Euonymus* and *Palaquium* have decreased but *Symplocos*, *Meliosma* and *Osbeckia* have relatively improved as compared to sample nos. 1 and 2. However, no evident change is reflected in ground vegetation except that of Poaceae and Asteraceae which improved considerably.

DISCUSSION AND CONCLUSION

The palynology of eight surface samples was conducted from forested as well as open land in the Silent Valley and it has been observed that the interplay of pollen /spores is almost uniform and more or less cohere with the existing vegetation. However, all the elements are not represented in the samples and the taxa recorded are not present to their full capacity. The first and foremost reason being so is the entomophily which is prevalent amongst the Shola forest constituents. Amongst the plants having entomophilous mode of pollination, the pollen grains are neither produced in higher quantity nor their pollen are in high quantity in the pollen rain. Another vital reason for the paucity of arboreal pollen could be the preponderance of fungi, mostly saprophytic in the forest humus, which cause considerable destruction of some pollen taxa.

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