TREES OF THE SIKKIM HILLS

RAI

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OF
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a guide to the identification
of species

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PREFACE

This book is written, basically, to facilitate a small group of people who are in some way connected with the trees growing on this part of the Himalayan region and specially those workers who are engaged in the field of surveilance, ecology and sylvan-botany of the Sikkimese trees. The text is meant to carry out identification of trees under field condition, taking the least time possible and demanding less effort in the process.

The size of the book has been kept to the barest minimum with as much incorporation of text materials as possible. The user may be able to see for himself that almost all the workout can be easily accomplished by the use of only an ordinary measuring scale and a $\times 10$ field-lens. Only the simplest and obvious characters are used. The small advantage picked up thus would, it is believed, more or less compensate for the many ommisions, which became unavoidable in the process of squeezing the text.

I sincerely hope that the work will prove useful to most of the users, and also believe that with a litlle extra patience a frequent user may become quite conversant with the basic ideas behind the identification method given here. My best efforts have mainly centered around in making this book as user-friendly as possible. Further suggestions/criticisms in this direction will be much appreciated.

Saga Dawa, 8 June 1990 L.K.R.

CONTENTS

How to use the key

The key to identification of species given in this book consists of two parts. The first one is the *major key* where three major characters of the leaf are grouped in triplets (eg. Serrate-Alternate-Exstipulate, Entire-opposite-stipulate, etc.). Each set of triplet is provided with their initials for easy reference. The initials are read from left to right and their positions are as follows -

First letters
- E—Entire
- S—Serrate
- P—Paripinnate
- I—Imparipinnate
- PAL—Palmate

Second letters
- A—Alternate
- O—Opposite

Third letters
- S—Stipulate
- E—Exstipulate

Working of the major key starts from this point. For example, if our sample specimen happens to be one with a *serrate* margin, *alternate* phyllotaxy, and with a *stipule* it goes to the code SAS. A sampling run at the major key is illustrated below :

S A E (if yes) to page 18
(if no)
S A S (if yes) to page 20
(if no)
S O E (if yes) to page 22
(if no)
and so forth...

The *minor key* is the second part of the key and constitutes characters which are grouped and sub-grouped, sometimes in graded steps. These proceed in a jumping fashion from one group of characters to the other till a close semblance of characters are reached, whenceforth it may run serially.

WORKING ON A SPECIMEN

Taking up a sample specimen this time we shall look into the *modus operandi* of the key.

Example 1. A simple leaf.

Prunus cerasoides, Don, the common Himalayan cherry tree

The leaf is a typical simple broadleaf type.

We can see the *serratures*, the phyllotaxy is *alternate*, and it is *stipulate* as stipules are found at its leaf axils. Observation of these three major characters will lead us to the SAS in the major key section (P. 6.).

MAJOR KEYS

Serrate-Alternate-Stipulate SAS ... .. p. 20

From the page number given at the right side of SAS we arrive at the minor key section (p. 18). Here we do the actual workouts to reach the species' identity. After coming at SAS at p.20 we shall find the characters grouped and arranged in a step-wise mode. We may then start from I., the text reads as follows :

I. Leaves 7-nerved at base usually, 5-7 nerved sometimes, hirsute above, pilose or hirsute midvein, stipules canoe-shaped, lamina halves may or may not be equal.

(The characters do not conform to our specimen so going on to A or B of I. is hopeless We shift to the next group of characters) —

II. Leaves 3-nerved at base, membranous, basal nerve pairs often reaching half the length of lamina, often more.

(No indication of similarity observed, so we move on to the next group.) —

III. Leaves membranous, ovate generally, serratures fine, petiole dorsally grooved, veins 9-11.

(We have in our specimen most of the characters enumerated here, (ie. at III.) Taking up the above cues we work further ahead and move a little closer this time. Dropping one step down we shall reach A of III.) -

A. Ovate, acute, petiole light green, faintly pubescent, stipules linear, adnate.

(Not close enough but we will have to see the others too which are grouped here. So after this we move to B.) -

B. Ovate to ovate-elliptic, acuminate, teeth lightly bidentate, petiole reddish, stipules feathery.

(The characters do match considerably and we shall be making a final check-up. The adjacent page number indicates 49 : we shift our sample to the description of specimen section on that page.) The text for III. B on p. 49 reads:

III. B Leaves arising singly, never in bunches, dimn. 16. 3 x 6 cm., midrib prominently raised beneath, reddish veins distinct, 9-10 each side, curving at the margin forming compartments.

Petiole 12 mm., reddish, 2 glands at the tip, distinct groove dorsally, stipules 13 mm.

Prunus cerasoides Don

A SUMMARY

1. Find out the nature of the leaf—whether broadleaf or conifer,
2. Determine whether the sample is simple leaf/compound leaf/ paripinnate/imparipinnate/palmate etc.,
3. Go to the major key section and match your sample with any of the characters outlined above.

4. Determine whether your sample is :
   a. For broadleaf : serrate or entire, alternate or opposite, stipulate or exstipulate,
   b. For conifers : leaves in fascicles or leaves not in fascicles.
5. Locate the page no., and reach the minor key section (at p. 18 and onwards.)
6. Workout your sample and start matching it with the characters at the minor keys,
7. Reach your closest possible match, locate the page number and turn to the description part (at p. 32 and onwards) of the sample.

ON THE EXAMINATION OF SAMPLES

1 Procure at least a twigful of leaves, assuring leaves of different ages.

2 Compound leaves are measured (in the text) from base of rachis to the tip of it (in paripinnate leaves) or to the tip of terminal leaflet (in case of imparipinnate leaves).

3 A leaf margin which is entire goes to the E and any other structure, however minute, obscure, sheltered as to become inconspicuous or indefinable, will bring it to S.

4 Stipules if deciduous are not always present on the plant, the fugacious type more so. The scars at the axils and also examination at the terminal regions may greatly help in deducing/locating one. In a situation where a sample becomes problematic it is suggested for making checks in the minor keys of both sections (stipulate/exstipulate).

5 Most of the compound leaves are easily recognisable and a few which pose problems are the big leaves which have large leaflets Owing to the 'feigning' of these leaflets as belonging to the SIMPLE leaf type a sample may become misleading. The best way to handle such sample would be to start at the COMPOUND key section (these are shorter) before going on to the SIMPLE.

MAJOR KEYS

A note on the leaf

The morphological description (Latin, *Morphos* = form) of leaf is "an appendage borne at the node of a stem." It is an important organ for all kinds of plant life and these are produced in plenty, specially by the trees. Leaves on trees are of many types and, though most of the time these are overlooked by us, they have a certain appeal and many trees can be identified just by looking at their leaves. For some reasons the leaves are comparatively less favoured than the flowers for the purpose of identification of species but it has been observed that under certain situations a leaf may provide a swift and easy access to a plant's identity than by any other method.

In the pages that follow we shall try to understand the different types of leaf and see how it can be successfully put to use in naming a plant.

A simple leaf : salient features

A simple leaf is represented in Fig. 1. The tip of a leaf is the *apex*, the leaf lining at the edge of leaf is the *margin* and the lowermost part towards the petiole is the *lamina base*. These three together make up the *leaf lamina* or *blade*.

Attatched lower to it comes the mesopodium or more commonly, the *petiole*.

In some cases we get a leaf which do not have petiole. This type of leaf is termed as *sessile* or a petiole-less leaf.

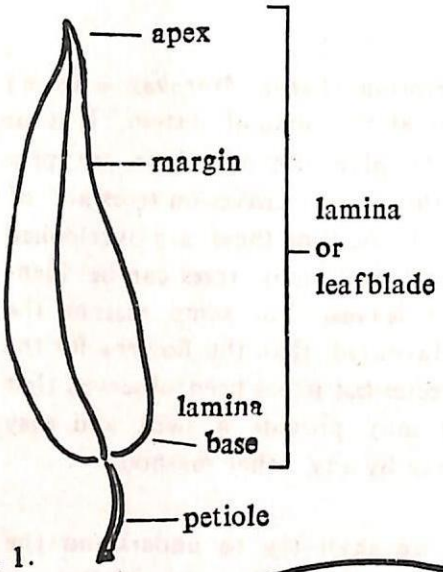

Fig. 1.

Fig. 1 A simple leaf. (diagrammatic)

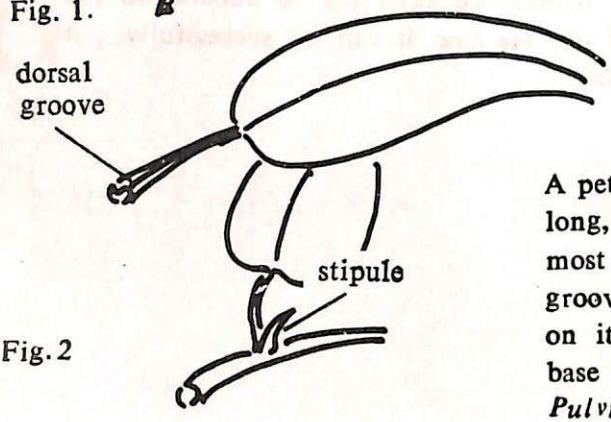

Fig. 2

A petiole can be short or long, smooth or hairy, and most of the time a dorsal groove or canal is found on it (Fig. 2). A swollen base of petiole becomes a *Pulvinus*.

At the leafbase we also get *stipule* (Fig. 2) - in pairs or sometimes united as a single structure (see also stipule p.14). A stipule usually covers a single bud at the axillary part (nodal region) and one or more buds at the terminal part (ie. at the branch tip or stem tip).

A petiole, usually, is attatched with the lamina at some point along the margin. Sometimes we come across a leaf which has its petiole not attatched along the leaf margin but coming out from the center of lamina (Fig. 3), or a little deep inside the margin. This type of petiole insertion will give rise to a *Peltate* leaf.

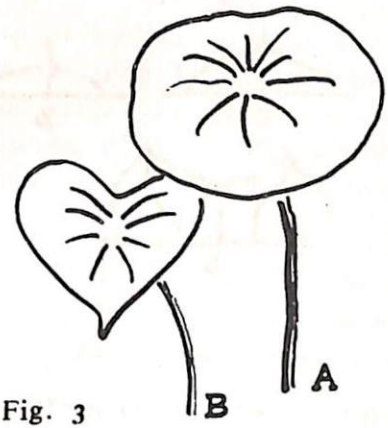

Fig. 3
Leaf insertion

The shapes of leaves

The range in shape displayed by the leaves is quite appreciably wide. But though the shapes are varied we can recognise some basic shapes which represent a large number of tree leaves. The four important ones are - lanceolate, ovate, elliptic and orbicular (Fig.4). A majority of leaves coming from the trees fall into these types.

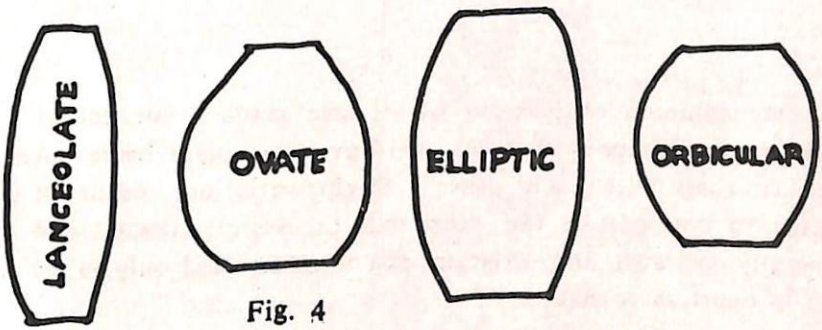

Fig. 4
The four basic shapes of leaf.

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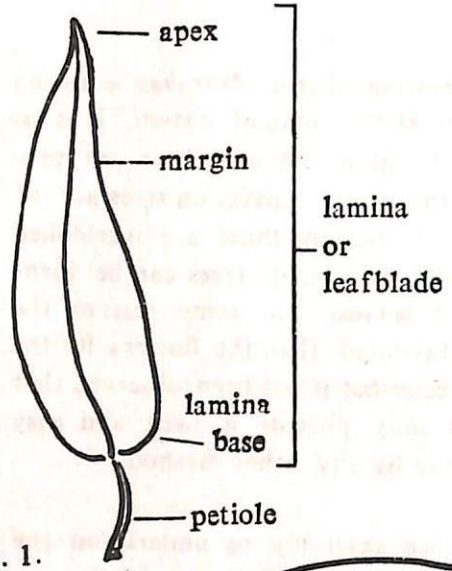

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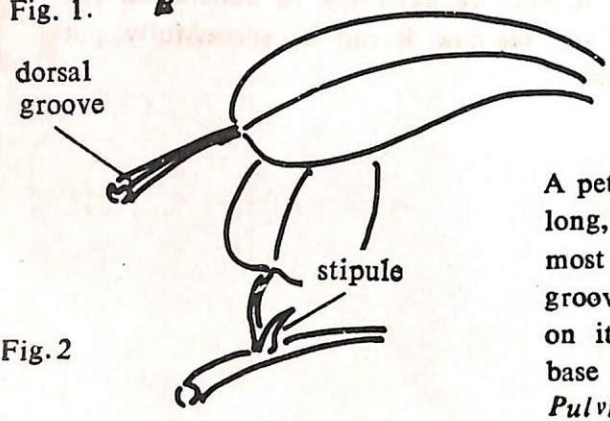

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It may be seen that the shape of a leaf, or rather, how it should look like, is grossly dictated by the lamina, apex and lamina bases Changing shapes are possible through different apices and lamina bases, eg. assigning an acuminate tip and acute lamina base to an ordinary ovate leaf type will change its shape closer towards a lanceolate type. Serratures, indentations, clefts or incisions along the margin also add a noticeable amount of change in leaf shape.

Under rare occasion we come across a plant which displays two, three or sometimes even more, very differently shaped leaves. This condition is known as *polymorphy* and the leaves are known as *polymorphous.*

Venation on the lamina

The intricate network formed by the *veins* or *nerves* on a leaf makes its venation pattern (Fig. 6). These small vessels carry out transportation of food materials and water in the leaves and as such are an integral part on any leaf.

A simple leaf venation generally is made up by a *midvein* at the center, running lengthwise (sometimes thrown to one side, eg. in the leaf rain tree,), and there are of course the veins which come out from the midvein and run towards the margin.

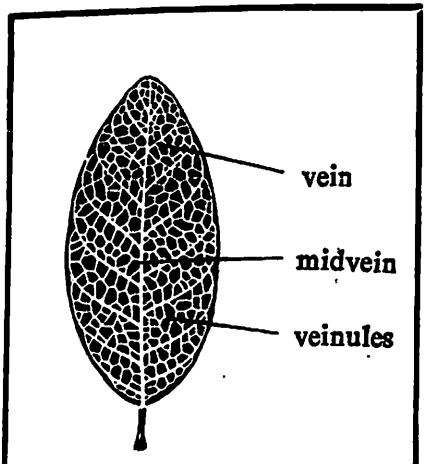


Fig . 6
A simple leaf : venation

Veinlets are even smaller vessels which come out from the veins. These are mainly responsible for the networks or *anastomosation*, usually visible at the under-side of the leaf.

In any standard text we may get two major venation types, namely, *reticulate venation* (when the veins form a reticulum or network all over the lamina) and *parallel* or *striate venation* (when the main nerves or *costa*, runs lengthwise and the veinlets are arranged transversely, eg. in *Cinnamomum spp.* Fig. 7).

Parallel venation is usually found in the monocotyledonous group of plants and all the venation types, ie. *unicostate, multicostate convergent* and *multicostate divergent* etc. are found in it. In unicostate leaves when the veins coming out are strictly in pairs running towards the margin in parallel, the venation becomes a *penninerve.*

As the veins in multicostate leaves are more or less equally represented, there seems difficulty in marking out one particular vein which may be safely pointed out as the midvein. In such condition any one of the veins is called a *costum* (pl. *costa*) and no midrib is dilineated, eg. in the leaves of maple, *Cinnamomum spp.* (Fig. 7). The costa of such leaves are usually referred to as nerves.

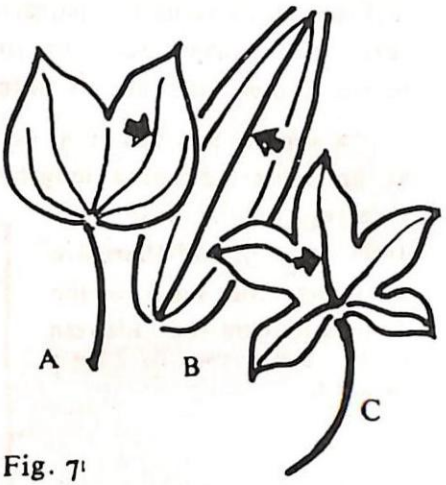


Fig. 7

Costum (⬆) of some leaves; *A. Bauhinia, B. Cinnamomum, C. Maple.*

Veins together sometimes make compartment of different shapes. These may be distinct, faint or hardly discernible. Two types of compartments are usually found, viz , the rectangular-shaped and the ones with swaying outline (Fig. 8),

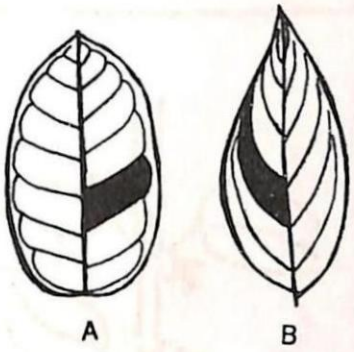


Fig. 8

Two types of compartments formed by venation pattern. A. rectangular, B. swaying.

Serratures

Teeth at the margin of leaf lamina create the leaf serratures and these display variations much in its shape as well as in size. Four major categories may be recognized, viz., even, uneven, regular, and irrigular.

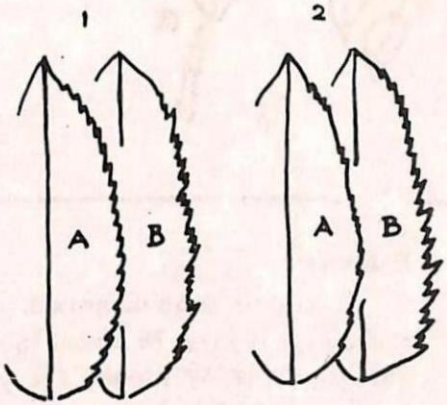


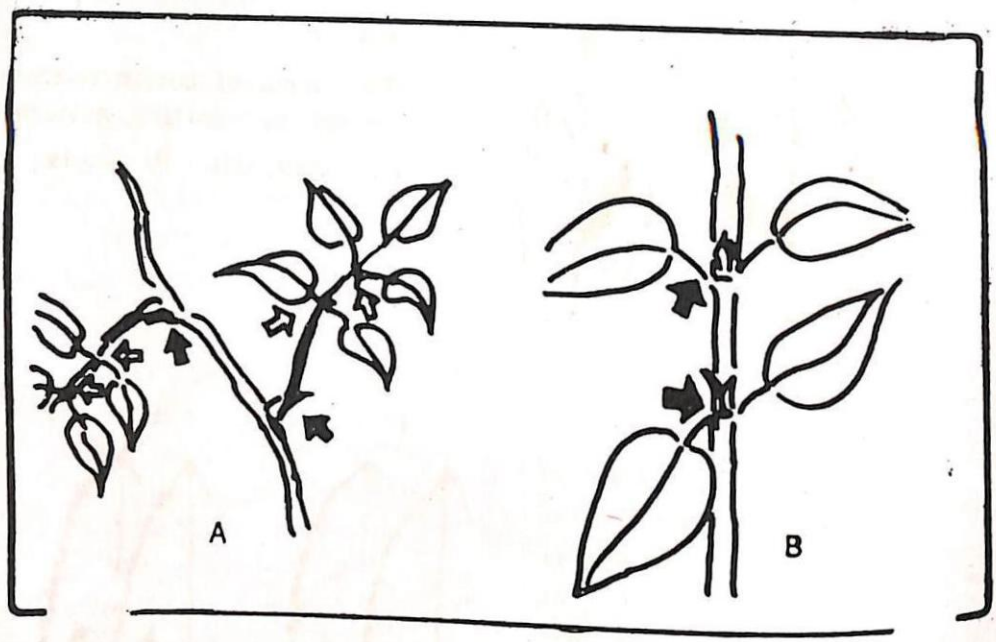
Fig 9

Serratures. 1A. Even, 1B. Uneven 2A. Irregular, 2B. Regular.

Teeth are even when all projections are of equal size and uneven serratures give out projections which are uneven in size.

Similarly, teeth may be termed regular when the projection occur at a regular interval and irregular when these are irregularly emerging, Teeth are sometimes absent at some part along the margin thereby making gaps; in such case too the serrature become irregular.

Fig. Where to look for the stipules (⬆) and stipels (⇧) A. Pinnate leaf, B. Opposite decussate phyllotaxy,



Stipules

A stipule is an outgrowth coming out at the axil of a leaf Sometimes it may be absent in a specimen. The function of this organ is to protect the young leaves or buds. Various types may be found

On a leaf axil a pair of stipule is common but often these are fused together to form a single structure. A leaf with stipule is *stipulate* and when without one it is known as *exstipulate*.

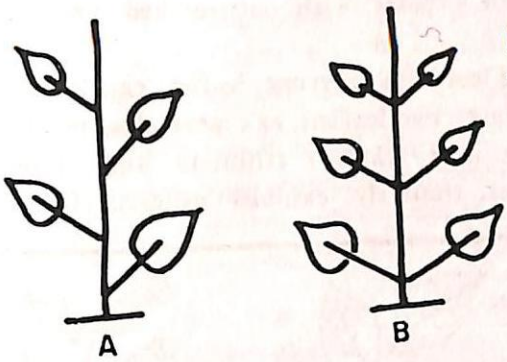
In compound leaves, the stipule-like structure at the leaflet axil is called a *stipel*. A leaflet with stipel is termed *stipel-late*.

A stipule for a compound leaf may be found at the base of rachis and whatever structures that are fouud at the leaflet axils are merely stipels. The leaflet axils not give out axillary buds.

Phyllotaxy

The pattern of arrangement of leaves on a stem, (L. *phyllos* = leaf, *ptaxis* = arrangement).

The two types of phyllotaxy found in majority of plants are *alternate* and *opposite* (Fig.11).



F. Fig.11
The basic phyllotaxy ; (schematic). A. Alternate, B. Opposite.

Two types of opposite phyllotaxy, A. Opposite decussate, B. Opposite superposed.