

VIII. NOTES ON THE COLLECTION OF ZINGIBERACEAE

Since the time of Linnaeus taxonomists have said that Zingiberaceae need to be studied from living plants, and as though to emphasize this, too many collectors have thrust leafy shoots and inflorescences into the press, jotted down a few rather obvious field notes (or none) and left the taxonomist to do his worst. At first the trouble experienced was simply that of understanding the structure of a flower in which most of the petaloid parts are staminodal in origin. Individual flowers of many Zingiberaceae are soft and watery and often surrounded by mucilage. Roughly pressed, especially if pressed in the inflorescence, their structure is lost beyond recall.

As time went on the basic structural problems were elucidated. But the number of known Zingiberaceae has been constantly rising and with it the taxonomist's cry that material is still too often inadequate. Now it is not only floral form that is so often lost; the structure of the inflorescence, or of the cincinni making up the compound inflorescence, cannot be easily elucidated in the herbarium, and in more recent classifications (Valeton, Bull. Jard. Bot. Btzg ii 17, 1918; Holttum, Gard. Bull. 13, 1950) this has come to play a more and more important part.

Although a good modern collector automatically makes a special effort to preserve delicate flowers, he needs to know something about the plants before he begins to worry about details of the inflorescence and some other features that are important. Hence these notes, which aim to tell the collector what needs to be done if the material he sends home is to be adequate for scientific study. What we all want to avoid is the specimen that ends up with the annotation "Probably a new species but material inadequate for description".

The first thing to realize in looking at a ginger in flower is that the part one instinctively calls "inflorescence" may be a highly complex structure. On the main axis are borne the primary bracts; some of the outer ones may be empty, or they may subtend not single flowers but small inflorescences. It is these details that are so important. If a flower is removed to be pressed separately, it is important to take not just the petaloid "flower" but everything that is in the axil of the primary bract: pedicel, bracteoles and additional flower buds, if any. In many of the plants with dense inflorescences this will need careful excavation with a knife: it is quite useless pulling the flower itself.

Of course large thick inflorescences, like the "cones" of many species of Zingiber or Hornstedtia should be cut in half for pressing, not merely to make the specimen less bumpy, but

to enable one, in case of need, to make two specimens from a single inflorescence. If facilities are available, preservation in spirit of half one of these inflorescences, or when it is not too big even a whole one, is well worth while. But this must not be regarded as adequate preservation of individual flowers. A heavy inflorescence inevitably moves about in its container and the delicate flowers are smashed. One or two flowers should always be preserved in spirit, but these need tubes or small bottles.

It is always desirable to press individual flowers separately. Some small members of the family only have one flower open at a time: a good collection needs more flowers than plants. Others have the flowers more or less embedded in dense inflorescences: these need to be extricated and pressed carefully, not just left to take their chance in the inflorescence, when they will usually dry by withering and shriveling instead of flat under pressure. Yet others have open inflorescences at the ends of the leaf shoots: these are the easiest to handle in pressing, but nevertheless a collection of open flowers pressed separately will greatly enrich the specimen, which may only have one or two flowers open on a piece big enough to fill a sheet. All this pressing of individual flowers is best done in thin smooth-surfaced paper to which the flowers do not stick - it can be bought in rolls and a good supply should always be carried!

In species with basal inflorescences the bracts and bracteoles are usually persistent. But in genera with open terminal inflorescences, Alpinia, Cenolophon etc., they often fall quite early on, or even if they remain on the plant when it flowers they fall off very easily in the press. Be on the safe side and include notes on bracts and bracteoles in your field data.

In the early days of the taxonomy of Zingiberaceae it was sometimes only the fruit of the plant that was known. Fruits or seeds appeared on the market as spices and condiments and were given botanical names. Linnaeus's Amomum granum-paradisi was one of these and has had to be abandoned, for Grains of Paradise probably came from more than one species. In recent times however, knowledge of fruits has progressed very slowly, and where they have been collected it is not always easy to link them with flowering material. The use of fruit-characters as an aid in defining genera has scarcely begun. Fruits should always be sought, and in the case of ground-flowering species this may mean digging. How long fruits take to ripen, and how they are dispersed, are just wide wide gaps in our knowledge.

For species with aerial inflorescences notes on fruit dehiscence should be made wherever possible. "Irregular de-

hiscence" may be genuine, it may be an artefact of drying, due to pressure on the immature fruit-wall.

The importance of detailed field notes cannot be overstressed. For example, recent studies in Alpinia have shown the occurrence of monoecism in one section of the genus (Myriocrater). It appears that here only the lowermost (and occasionally the second) flowers of each cincinnus is fertile; thereafter the flowers are functionally male. No really satisfactory account of these sex-forms can be made in the herbarium and field observations are needed. These should be made on populations, to see if all the plants behave in the same way. The temporal relations of female and male flowering in different parts of the inflorescence also need study.

The tall leaf shoots associated with many Zingiberaceae present yet another problem. To collect the entire "frond" is neither practical nor desirable, the resultant herbarium specimen might well run to 10 or more sheets, most of them of no particular value. A section from the middle of a shoot is quite sufficient, provided notes are made on variation in ligule, petiole and lamina size throughout the entire shoot.

Finally, if the collector has not lost all enthusiasm for Zingiberaceae by now, information is needed on the relationship of the plane of distichy of the leaf shoot to the rhizome. In the tribes Hedychieae and Zingibereae it is thought to be parallel to the length of the rhizome; in Alpineae it is transverse. Such a character is unobservable in herbarium material and only a small proportion of known species have been checked. It is up to the field worker to verify or disprove this theory.

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