Chapter 4

EVOLUTION AND PHYLOGENY

1. MORPHOLOGICAL EVOLUTION

The major difficulty in tracing paths of evolution and phylogenesis hides in the fact that we evaluate the extent of primitiveness of particular characters basing on our notions about the primitiveness of taxa that possess those characters, and, at the same time, we decide on the primitiveness of the taxa basing on the primitiveness of their characters. Here we find ourselves in a vicious circle, where we can build as many phylogenetic schemes as we like, but their main feature, the direction of changes, will then always remain doubtful. In order to stop this meaningless rotation, we have to stick to something that lies beyond that orbit. This may be either distinct paleontological evidence or observation of characters that appear to be an obvious indication of relations between taxa. So far, the search for the origin of the
69 amentiferous plants on the whole and particularly the Salicaceae has not been very promising. However, tracing major evolutionary paths within the Salicaceae family can be more successful. Naturalness of the family Salicaceae as well as close relation between the willows and poplars are beyond question, even though there are distinctions in their pollen morphology (Kupriyanova 1965). Consequently, we get a solid base for our decisions regarding the extent of the primitiveness of particular groups within the genus *Salix*. Obviously, the most primitive groups are those closest to the poplars. Apparently, this is the subgenus *Salix*. Therefore, the most primitive characters are those of the subgenus *Salix*, particularly, those resembling features of the poplars. We can as well partially rely on observations of ontogenesis, teratological study, and general ideas when evaluating some of the characters.

On the basis of these initial assumptions, major trends of the morphological evolution within the genus *Salix* may be presented as follows (see Table 3).

Relying on the characters listed in Table 3, one may evaluate the extent of primitiveness or progressiveness of particular sections. Of course, one should keep in mind that these
70 evaluations will always be largely hypothetical. First of all, characters evolve independently, so that a taxon may appear to be primitive with regard to some of its characters and advanced when taking others into consideration. For example, *S. cardiophylla* is by all means very primitive as far as the structure of its buds and flowers is concerned. At the same time, its leaves show advanced anatomical structure. However, primitive characters definitely predominate in *S. cardiophylla*, so that the conclusion about general primitiveness of that species is hardly disputable.

To make a decision on the status of the section *Helix* is a far more difficult task. Here, we find an overall predomination of advanced characters (the buds of type 3, no distinct hypodermis in the leaves, black, persistent bracts, one nectary, connate stamens, etc.). However, along with these, there are also primitive features (flat denticulate leaves and colorless fugacious bracts in some species). One can think of two possible explanations: