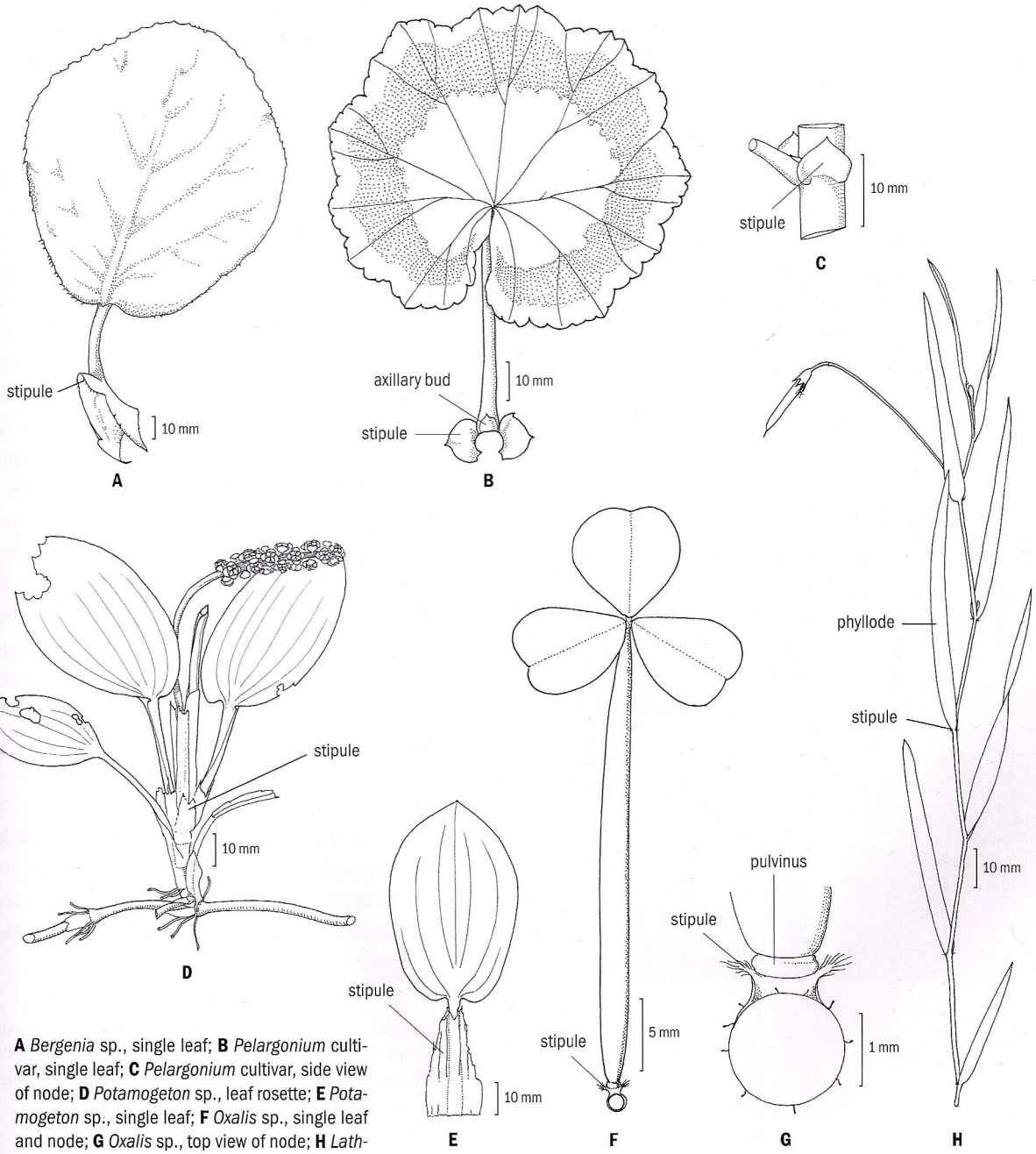
Stipule, Outgrowth at Base of Leaf Stalk

A stipule is an outgrowth associated with the base of a leaf developing from part of the leaf primordium in the early stages. Plant species are termed stipulate (with stipules) or exstipulate (without stipules). Stipules are not common in monocotyledons, where they usually occur one per leaf (77B). Stipules of dicotyledons are paired, typically one on either side of the point of insertion of the petiole on the stem (75B).

A B

A *Liriodendron tulipifera*. The pair of stipules at the base of each leaf petiole protects the next youngest leaf, seen here silhouetted inside. **B** *Liriodendron tulipifera*. The flower bud is protected by the pair of enlarged stipules of an associated leaf.

However, there are many positional variations that often include fusion of structures (76). Stipules may be relatively small and insignificant (75F, H), often scale-like (83C, 106B), and may fall off early in the life of the leaf, leaving a scar (104A). Stipules may be modified into a number of structures (78), especially spines (20, 65B). These are lignified (woody) and usually persist after the rest of the leaf has fallen. Stipules often protect younger organs in the bud (74A, B) and then fall when the bud develops. Conversely stipules can be very conspicuous and leaf-like (17, 77A, 79E) or resemble entire leaves (77E, 93E) from which they may be recognized by the absence of associated axillary buds. It is quite possible that in some cases structures traditionally described as stipules (as in members of the Rubiaceae, 77E; see Rutishauser 1984) in fact represent whole leaves. The structures in question themselves bear outgrowths (colleters, 106) that could be rudimentary stipules, and thus all members of the whorl of "leaves" at a node would be foliar in origin, some with axillary buds, some without. Similar ambiguous nodal outgrowths occur in the genus *Acacia* (Rutishauser and Sattler 1986; Sattler et al. 1988) and in the family Vitaceae (Lacroix and Posluszny 1989). Stipule interpretation thus enters the realms of philosophical botany (15; Rutishauser and Isler 2001), which perhaps paradoxically, but happily, encourages a careful conjunction of developmental morphology and developmental genetics.



A *Bergenia* sp., single leaf; **B** *Pelargonium* cultivar, single leaf; **C** *Pelargonium* cultivar, side view of node; **D** *Potamogeton* sp., leaf rosette; **E** *Potamogeton* sp., single leaf; **F** *Oxalis* sp., single leaf and node; **G** *Oxalis* sp., top view of node; **H** *Lathyrus nissolia*, leaf with a flattened petiole (phyllode, 64).