

Herbarium leaf classification – how can classification be useful?

Herbarium classification		
Group: Year 9 pupils		Duration: 45 minutes
<p>Learning Objectives: <i>Students will be introduced to the following skills:</i></p> <ul style="list-style-type: none"> • Identifying different characteristics in plants, necessary for classification • Recognising features of leaf type - simple/compound, leaf margins and shape (using a glossary) • Identifying similarities within plant families • How to use a key and how to try to develop a new key to identify unknown plants <p>Through participating in the practical element of this activity pupils will develop their own diagnostic skills.</p> <p>English National curriculum: Key stage 3/4 : <i>Science</i> - Develop experimental skills by working scientifically Key stage 3: <i>Biology</i> - Genetics and evolution: the variation between species and between individuals of the same species means that some organisms compete more successfully, which can drive natural selection. Key stage 4: <i>Biology</i> - developing use of scientific vocabulary and nomenclature, methods of identifying species, developments in biology affecting classification.</p>		
Stage	Topic/Teaching Method/Activity	Resources Required
Introduction	<p>There are two parts to this activity, one is to follow and identify the photos of pressed specimens using the 'identifying <i>Rosaceae</i> key'. The other is to make a pressed plant specimen using plants from the school garden and create a key to name the genus.</p> <p>Reasons for classifying and identifying plants: <i>'Living organisms can be classified according to their characteristics. The binomial system names an organism using its genus and species. Keys can be used to identify different species.'</i></p> <p><i>'There are millions of species on our planet. Although species can be very different from each other, many have similar features that allow us to put them into groups. This is called classification.'</i></p> <p><i>'The binomial system is important because it allows scientists to accurately identify individual species.'</i> (BBC Bitesize website)</p>	RHS Website link: Carl Linnaeus and plant names

Pair or small group discussion	<p>Pose the question: Why is it important for us to be able to identify different plants? (Scientists estimate that there are about five million different species on Earth)</p> <p>Why do we use Latin for scientific names? Why not use common names?</p>	<p>Examples of real plants. If possible examples of different plants from the same family of plants e.g. the rose (<i>Rosaceae</i>) or mint (<i>Lamiaceae</i>) family</p>
Mini plenary	<p>Have students discussed/considered the following points:</p> <ul style="list-style-type: none"> ❖ The common name 'bluebell' refers to 3 different plants in England, Australia and the USA ❖ The Parsley or carrot family contain many edible plants but also include some of the most poisonous plants. ❖ 'All species of Mustard are edible, although some taste better than others. In other words, it doesn't matter which species of mustard you find. As long as you have correctly identified it as a member of the Mustard family, then you can safely try it and see if you want it in your salad or not'. <i>Thomas J Elpel (Botany in a day)</i> <p>Health and safety: Do not encourage students to attempt to identify and eat any plant without advice from an adult.</p>	<p>Resource: Bluebell identification <i>Hyacinthoides non-scripta</i> (England) <i>Sollya heterophylla</i> (Australia) <i>Mertensia virginica</i> (USA)</p> <p>RHS Website link: Carl Linnaeus and plant names</p>
Revise knowledge	<p>Plant anatomy</p> <p>Vocab: Female reproductive organ – carpel – stigma, style, ovary, ovule. Male reproductive organ – stamen – anther, filament</p> <p>Leaf: simple, compound, vein, stem, stalk</p>	<p>RHS Website link: Plant anatomy</p>
Introduce new vocab	<p>Leaflet - part of a compound leaf without a bud at the base of the stalk</p> <p>Petiole - stalk of a leaf</p> <p>Pinnate leaf – with leaflets arranged on either side of a central stalk.</p> <p>Palmate leaf – lobed or divided in hand-like fashion</p> <p>Leaf shapes – ovate, lanceolate, palmate, elliptic</p> <p>Leaf margins – toothed, smooth, crenate, serrate</p> <p>Leaf base and tip</p> <p>(See photo glossaries for further vocabulary)</p>	<p>Examples of different leaves with varying shapes, margins, tips and bases.</p> <p>Photo glossaries</p>

Whole group practical	<ul style="list-style-type: none"> • Give out the un-named photo resource cards of plants in the <i>Rosaceae</i> family • Or give out the plant identification key to students and display the herbarium specimen photos on your whiteboard. 	A3 Printed Herbarium key resource
Working in pairs	<ul style="list-style-type: none"> • In pairs work through the plant identification key. • Agree on a plant name • Check by comparing with the RHS Herbarium specimens or named photo resource cards. • If making their own herbarium specimens write the common or Latin name clearly on the label and place it with the plant. 	A3 Printed Herbarium key resource RHS Herbarium specimens RHS Herbarium specimen pictures
Whole group discussion	<p>What details should be included on the plant label? Why is it important to include as many details as possible? (Colour, location, date)</p>	
Feedback discussion	<p>All the specimens are members of the <i>Rosaceae</i> family – show examples of different edible fruits in this family (apple, peach, pear, plum, cherry, strawberry, blackberry) What characteristics do these plants have in common that puts them in the same plant family?</p> <p>Characteristics of <i>Rosaceae</i> include:</p> <ul style="list-style-type: none"> - may be herbaceous or woody shrub or tree - there are stipules at the base of each leaf - there are 5 sepals and 5 petals (unless doubled by breeding) - there are usually numerous stamens - they have an hypanthium which is a cup-like structure composed of the bases of petals, sepals and stamens fused together - there are a range of fruit types from fleshy drupes(plums, cherries, peaches), drupelets (blackberries, raspberries) and pomes (apples, crap apples, medlar) to achenes on a fleshy (strawberry) or dried receptacle (<i>Filipendula</i>, <i>Geum</i>, <i>Potentilla</i>,) or an achene or two enclosed by a dried receptacle (Lady's mantle – <i>Alchemilla</i>, Agrimony – <i>Agrimonia</i>) or a dried follicles enclosing the ovules/seeds (<i>Spiraea</i>) 	Click on RHS link for information/image apple peach pear plum cherry strawberry

Follow up	<p>Using collected plant specimens from the school grounds including leaves, stem and flowers if possible (e.g. laurel, privet, hawthorn, <i>Photinia</i> red robin, beech, hornbeam). Or plants from the school garden.</p> <ul style="list-style-type: none"> • Students are given a plant specimen to mount (to learn how to do this see website link in resources) • Use a small amount of PVA glue to mount plants. • Have labels prepared for each plant, stating where and when it was found. • Have a go at creating a new key using the herbarium glossary terms picture sheets. <p>Students swap keys with each other. Can they follow the new identification key successfully and name the genus of the plant?</p>	<p>Examples of plants collected from school grounds (including leaves, stems and flowers where possible) Herbarium glossary picture sheets</p> <p>RHS website link: How to make a herbarium specimen</p> <p>Click on RHS link for information/image Laurel Photinia Red Robin privet hawthorn beech hornbeam</p>
Health and safety	Wash hands thoroughly after touching unknown plants or wear gloves to alleviate the risk of allergies.	