On the Localisation of Anthocyanin in the Spring Leaves of Some Trees and Shrubs in the Temperate Regions of Japan.

by

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The reddening of young leaves just developing in the spring time is so remarkable in the vicinity of Kanazawa that everyman never fails to observe it. Microscopical examinations of the tissues containing red pigment (anthocyanin) evince that they hold the pigment in solution in their cell-sap, which, of course, occupies the vacuole of the cells. My observations on the histological distribution of such periodic anthocyanin have been made on the trees and shrubs in that locality, which turn red most conspicuously.

The localisation of the pigment in the leaves is as follows, the number of genera being 44 in all :—

Names of Plants.	Hairs on lower epidermis	Lower epidermis	Lower hypodermal layer	Palisade Parenchyma Spongy Parenchyma	Vascular bundle	Upper hypodermal layer	Upper epidermis	Hairs on upper epidermis
1. <i>Juglans</i> (Ōgurumi) —Juglandaceae.	0		+			+		0
2. <i>Populus</i> (<i>nigra</i>)			(+)			+		
<i>Salix</i> (<i>Akame-yanagi</i>)			+	+		+		
<i>Okawa-yanagi</i> .			+	+				
<i>Neko-yanagi</i> .	0		+	+				0
<i>Yamaneko-yanagi</i>).	0		+	+		+		0
—Salicaceae.		(+)						
3. <i>Alnus</i> (<i>Hannoki</i> ,	(+)	(+)		+			(+)	0
<i>Yama-hannoki</i>).	0			+	+	+	(+)	0
—Betulaceae								

12. Ailanthus (Shinju)		+		+		+	(+)
—Simarubaceae							
13. Cedrela (Chanchin)		+				+	(+)
—Meliaceae							
14. Mallotus (Akame- gashiwa)	+						+
—Euphorbiaceae							
15. Rhus (Rō-noki, Fushi-noki, Yamaurushi)	0	+	+ ₃		+ ₂		0
	0	+	+ ₂	+ (+)		(+)	
	0	(+)	+	+ (+)		(+)	(+)
—Anacardiaceae							
16. Ilex (Mochinoki, Aotago)			(+2-3)	+ ₂₋₃ (+)			
				+			
—Aquifoliaceae							
17. Euonymus (Masaki)		(+)				+	
—Celastraceae							
18. Acer (Nomura, Tamuke, Tō-kaede)		(+)		+ (+)			
		(+)	+	+ (+)		(+)	
		(+)		+ (+)		(+)	
—Aceraceae							
19. Sterculia (Aogiri)	+						+
—Sterculiaceae							
20. Thea (Tsubaki, Sazankwa)				+ ₁₋₂ (+)			
				+ ₁₋₂ (+)			
Eurya (Sakaki, Hisakaki)				+ ₁₋₃ (+)			
				+			
Taonabo (Mokkoku)				+ (+)			
—Theaceae							
21. Stachyurus (Kifuji)			+ ₁₋₃	+			
—Stachyuraceae							
22. Lagerstroemia (Saru-suberi)		(+)	+ ₂	+			
—Lythraceae							
23. Punica (Zakuro)		+	+ ₃	+ + ₃		(+)	
—Punicaceae							
24. Cornus (Mizuki, Yama-hōshi)	0			+ +)			0
	0			+ (+)			0
—Cornaceae							

25. Leucothoe (Hanahiri-noki)	0			+ (+)			0
Vaccinum (Natsuhaze)	0	(+)	+ ₂	+ (+)		(+)	(+)
Tripetaleia (Hotsu-tsuji)	0	(+)		+ (+)		(+)	0
—Ericaceae							
26. Diospyros (Kaki)	0	(+)	+ ₂₋₃	+ (+)	+ ₂	(+)	0
—Ebenaceae							
27. Symplocos (Sawafutagi)	0			+ (+)	+		0
—Symplocaceae							
28. Styrax (Egonoki)	0		+	+ (+)			0
—Styracaceae							
29. Osmanthus (Hiiragi, Mokusei)	0		+	(+) (+)			0
—Oleaceae							
30. Clerodendron (Kusagi)	0	+				+	0
—Verbenaceae							
31. Viburnum							
(Yabu-demari, Gamazumi)	0		+	+ ₂ (+)	+ ₂		(+)
—Caprifoliaceae	0		+		+		0
Total	(6)	(30)	(34)	(45,42)	(16)	(28)	(10)
Confined.....	2	7	3	10	3	7	2
			[33]				

+ Anthocyanin well develops.

+₂ Two layers.

(+) Soon it disappears.

[Closely related.

0 Hairs present, but no anthocyanin.

I see that anthocyanin is, in a majority of 69 species, localised in the palisade (hypodermal layers when young) and spongy parenchyma in the spring leaves and that it is, in a few of them, confined to epidermis (*Rosa*, *Zanthoxylon*, *Cedrela*, *Euonymus* etc.) or to hairs (*Mallotus*, *Sterculia*). So the distribution of transitory anthocyanin in the young leaves is to be classified as:—

Hairs	Epidermis	Mesophyll	Epidermis and Mesophyll
3%	10%	47%	39%

It is also noticeable that the lower epidermis and the lower hypodermal layer are richer in the pigment than the upper ones in the young leaves.