BIOLOGICAL ADAPTATIONS TO THE PERFIELD

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Key words: indensation, live sensing, plant structure

Abstract

Characteristics of plants and animals that represent adaptations to the perfield are identified. The function of some responses is identified.

Introduction

An indensation mechanism has been identified whereby plants obtain water from the atmosphere by responding to a universal energy field (Tunstall 2009a, 2010). The energy field encompasses the earth and likely the universe, and has therefore been termed the perfield. Devices that respond to the perfield are perfielders. Indensers are a class of perfielders.

Biota have evolved in the presence of the perfield and are well adapted to use it for a great diversity of purposes. Virtually all plants respond to the perfield, and animal forms examined also respond. This paper presents some adaptations to the perfield by plants and animals that have been identified to date.

Perfielder Designs

The design requirements for developing a response to the perfield are complex and will be addressed elsewhere. Briefly, basic forms of perfielders are essentially 1, 2 or 3 dimensional where 1D is wire frame, 2D flat, and 3D solid. These forms cannot be simply defined as they depend on relativities rather than absolute measurements, but 1D forms are similar to stems on a branch, leaves are 2D, and branches and trunks 3D.

The form of construction is important in determining the response. It is also important when combining several elements into a single structure as appropriate connections are needed to achieve a high response. 2D plant leaves typically attach to 1D elements but not to 3D, and their attachment is typically through special structures such as petioles.

Each element of the tree is responsive, and the combined response is much greater than given by the sum of the components. This has resulted in plants having well defined morphological forms, and structures such as petioles.

Exact definitions usually cannot be given as requirements are relative rather than absolute. Whether something is 1D, 2D or 3D can depend on size and/or relative proportions. The penchant for exact measurement that characterises current science is inappropriate when addressing perfielder designs.

Identifying whether an object is responsive to the perfield is possible because design requirements are highly specific, and tolerance levels can be small. The shape of the organism is important, the arrangement between different parts can be critical, and all elements that comprise the organism must be responsive for an organism to be highly responsive.

A range of organisms has been examined to identify the existence of a response to the perfield, and some have been tested to identify the nature of the response. For some, such as plants, the tests simply identify responsive arrangements, but constructed models have also been used to examine design constraints. Some tests identify the purpose of the response.

Responses differ with the forms of cubits (Tunstall 2009b), and the detailed responses given are for cubits favourable to organisms unless otherwise specified. Cubits unfavourable to organisms are referred to as **R**. Cubits can be regarded as the smallest module in the perfield. Cubits are roughly cubic and range in size from around 15 to 45cm.

The development of indensers is referred to here in anthropomorphic terms of design as that is how humans address developments. However, the designs seen in plants and animals have evolved over time through trial and error with natural selection operating on variability. The evolutionary considerations associated with the development of responses to the perfield are the same as for other characteristics of biota (Tunstall 2008).

Plants

Responses have been examined for live specimens of different plant structures. Also, some forms of leaves and different branching arrangements have been emulated by constructing models where this allows determination of optimum and limiting designs.

With higher plants the 2D leaves generally attach to 1D structures in stems, which commonly attach to 3D stems, trunks and/or roots. The arrangement of the elements, and their form of connection, are critical to the development of the response. For example, the connection between leaves and stems is typically via a petiole that effectively acts as a terminator for the leaf.

Leaves

Leaves have adapted to respond to the perfield as well as to intercept solar radiation and exchange gases with the atmosphere. Leaves of virtually all shapes respond to the perfield, and the common shapes provide good solutions. Aspects include the shape of the leaf base, the change in width of the leaf along its length, and the form of the tip and its thickness. Characteristic shapes arise because of limits to effective designs.

The leaf forms addressed in Table 1 are illustrated in Figs. 1 & 2. Detailed responses are given for cubits favourable to organic life. Responses in cubits unfavourable to organic life (**R**) are only summarised (Table 1). The term leaf is used generically to relate to the primary photosynthetic structures rather than a strict anatomical definition of a leaf.

Individual Xanthorrhoea leaves effectively have no response. *Cycas revoluta* leaves only respond in the orientation in which they are held on the plant. Juncus only responds when the tip is higher than the base, and is best when vertical. The sheaths at the base of the Juncus leaf are integral in producing the response.

Other needle-like leaves have more complex responses. Pinus and Callitris do not respond when the leaves point vertically down, but Casuarina leaves respond in all orientations. The response of the flat Lomandra leaf is similar to Pinus/Callitris but only responds when a flat surface faces up.

Responses of the needle like leaves in the **R** cubits vary from being the same as for other cubits to the response being reversed. Response in the **R** cubits are often weaker.

Flat leaves typically respond when the leaf surface is vertical but not horizontal (Hakea, Acacia phyllode, Eucalypt), with the response being independent of whether the leaf points up, down or sideways. The response is reversed in the **R** cubits for the Acacia and Eucalypt but not for the Hakea.

V shaped leaves respond with the leaf facing up but not when reversed (Eucalyptus, Salix), and this occurs with models. However, V shaped leaves can differ in other aspects of the response. Salix leaves do not respond when pointing up, or when the face of the leaf is vertical. The responses of definite V shaped leaves were reversed in the **R** cubits for all species.

Melaleuca leaves vary from being flat to having various levels of V. The response of the leaf tested, which had a slight V, was the same as for the V shaped Eucalypt leaf in favourable cubits. However, the Melaleuca had similar but lower responses in the **R** cubits than the favourable cubits but responses were reversed for the eucalypt. The compound Grevillia leaves tested had similar response patterns to the Melaleuca.

Leaves on Brachychiton trees are commonly dimorphic, and the different forms have different responses. The other commonality with the two species tested is that the responses are similar or the same in favourable and unfavourable cubits. Brachychiton trees likely depend strongly on indensation as *B rupestre* (r) is a bottle tree having a large pithy trunk, while wheat is not suppressed when growing in close proximity to *B populneus* (p) (Tunstall 1988).

Response patterns for all of the grasses tested were similar in the favourable cubits but with Themeda responding in all positions, oats not with the leaf pointing down, and wheat additionally not with the leaf face down. However, their responses in the **R** cubits differ considerably.

Poplar leaves do not respond when the upper side of the leaf faces down, or when the leaf is horizontal. However, they respond when in motion, as when blown by wind. The only other leaf examined that responds when in motion is *Themeda triandra*.

All plants have evolved to respond to the perfield, and there are clear evolutionary sequences. Xanthorhoea has very little response, and Cycas only responds in a highly specific orientation. More recent species have higher responses and respond in a greater range of orientations.

The V shaped leaf form appears to be modern. The V form provides a high response when the lamina is horizontal and is therefore well suited to intercepting radiation in its best orientations for indensing. The significance of the reversal of the response in the R cubits is unknown other than the R cubits are generally unfavourable to organic life.

The ability to remain responsive when in motion appears to be the most recent development. This should confer considerable advantage as wind reduces the effective path length for water vapour flow and thereby strongly promotes indensation. The ability to respond when in motion allows plants to indense when the environmental conditions are most favourable. With earlier leaf forms, such as Cycas and Acacia phyllodes, this constraint has been addressed by developing a rigid plant structure.

Virtually all leaves have smooth surfaces where smooth surfaces provide for the development of a high response to the perfield. The deposition of wax makes many leaves particularly smooth. However, as with other aspects of perfielder design, the concept of smoothness is relative and there is no explicit definition. Leaf surfaces can be covered by hairs and otherwise deviate from being smooth and still be effective indensers.

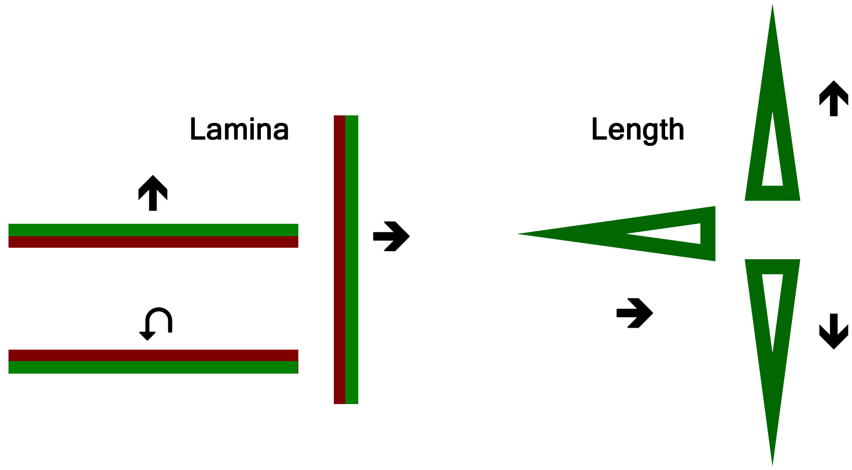

Table 1 Perfield response of forms of plant leaves in different orientations

	Lamina			Length			**R Cubits**
	↑	→	↶	↑	→	↓	
Xanthorrhoea	×	×	×	×	×	×	×
Juncus	na	na	na	✓	✓	×	All ✓but weak
Cycas	✓	✓	×	Low @ 45°			×
Pinus	na	na	na	✓	✓	×	✓all
Callitris	na	na	na	✓	✓	×	↓✓,→×,↑✓
Casuarina	na	na	na	✓	✓	✓	✓↓ only
Lomandra	✓	×	×	✓	✓	×	All ✓but weak
Hakea	✓	×	na	×	✓	✓	Same
Acacia phyllode	✓	×	na	✓	✓	✓	↶
Acacia bi-pinnate	×	✓	✓	✓	✓	✓	Weaker
Eucalypt flat	✓	×	na	✓	✓	✓	↶
Eucalypt V	✓	✓	×	✓	✓	✓	↶
Willow	✓	×	×	×	✓	✓	>< ↶
Melaleuca	✓	✓	×	✓	✓	✓	All weaker,↶✓
Grevillia a	✓	✓	×	✓	✓	✓	Similar
Grevillia b	✓	✓	×	✓	✓	✓	Same
Brachychiton p a	✓	✓	×	✓@ 45° down			✓
Brachychiton p b	✓	✓	×	✓	✓	✓	✓
Brachychiton r p	✓	✓	×	✓	✓	✓	Similar
Brachychiton r s	×	✓	×	✓	✓	✓	Weaker
Avena	✓	✓	✓	✓	✓	×	same
Triticum	✓	✓	×	✓	✓	×	complex
Themeda	✓	✓	✓	✓	✓	✓	↓✓,→×,↑✓
Poplar	✓	✓	×	✓	×	✓	Complex (><↶)

The detailed response information relates to most parts of the perfield.
The **R** cubits are generally unfavourable to organic life and the response is only summarised.

The requirement for all structural components to be responsive applies to all components including leaves. The rachis divides V shaped leaves into two sections where each section must have an appropriate shape while producing an appropriate shape when combined. Also, the rachis must have an appropriate shape. While tolerance levels when constructing models of such leaves are small there can be appreciable variation in forms, as often arises with variations in leaf morphology along a shoot.

Stems

Stems typically function as 1D structures which imposes a design constraint that the largest diameter must be less than 12mm. However, this constraint can be circumvented in various ways. One is by the development of hollow stems where this increases the maximum permissible diameter. For example, the hollow stems of *Eucalyptus populnea* increase the size of stems that can support a cluster of leaves while remaining strongly responsive, and thereby greatly increases the size and hence power of an indensing module. Another notable occurrence of hollow stems is bamboo but the arrangement of leaves is more complex than with *Eucalyptus populnea.*

A requirement that apparently cannot be circumvented is the relative heights of stems in a cluster. The central element must be the highest, with surrounding elements progressively becoming lower away from the central element. The shape derives from the growth of lateral branches being set relative to the apical shoot. This constraint produces the characteristic form of all higher plants whereby the shape formed by the external extremities of the foliage is convex. This growth characteristic has long been known and is termed apical dominance.

Expressions of apical dominance can differ between plant forms. With conifers (gymnosperms) the constraint applies to the entire tree with cone shapes being common. With eucalypts the apical shoot can loose dominance but the relative height constraint then applies to separate branches. Mature Eucalypt canopies tend to be an assemblage of domed shaped clusters of foliage subtended on large branches that attach to the trunk. However, as with other plants, the shapes of the clusters are convex, as is the overall arrangement of the clusters on the tree trunk. There are no concave surfaces to the extents of clusters of foliage on a branch.

Leaves seldom connect directly to stems, and with dicotyledons the connection is typically via petioles. While petioles can function to control the orientation of leaves, they also address requirements relating to the response to the perfield. The form of connection between stems and structures such as leaves and fruit is critical to developing a high response.

Trunks and large branches

It is not known whether tree trunks function as 3D or 1D elements[1], but it is likely that many large diameter solid trunks are 3D. Obvious aspects of perfielder design are the radial symmetry of trunks and the nature of the bark. With smooth barked eucalypts the outside of the trunk defines the external surface for the development of a response, but with rough barked species the effective external surface will be just outside the bark cambium. Regular bark shedding maintains a smooth surface with smoothed bark species. With rough barked species

[1] It appears that they can be either depending on the form of construction and proportions, and that for some plants a 1D trunk can change into 3D.

the rough bark is effectively dissociated from the trunk and interferes little with the response. However, it serves to protect the effective surface from damage. Paperbarks are an example.

Roots

Roots have not been examined other than some used for food, such as parsnips. All roots that function as storage structures respond to the perfield, but the response usually depends on orientation. The root of ginger, for example, only has maximum response when in the normal growth position (Table 1). Parsnips do not respond when horizontal. The one commonality is that all respond strongly in their natural orientation.

The general situation for roots is expected to be similar to trunks and stems. Large homogeneous solid structures are 3D and fine structures 1D. The anastomosing structure of roots provides excellent connection between the plant and the ground. The connection to the earth appears to be particularly important for both indensation and the storage of indensed water.

Table 2 Perfield response of plant structures used for food when subject to different orientations

	Orientation		
Roots & Tubers	↑	↓	→
Beetroot	✔	✔	✔
Ginger root	✔	✓	✓
Garlic corm	✔	✔	✓
Parsnip	✔	✔	✗
Sweet potato	✔	✔	✗
Radish, round	✔	✔	✗
Carrot	✔	✗	✓
Fruit			
Peas, snow	✔	✔	✔
Okra	✔	✔	✗
Chilli	✔	✔	✔
Tomato	✔	✗	✔
Corn in husk & leaves removed	✔	✔	✔
Tomato, single and bunch	✔	✗	✔
Grapes, single and bunch	✔	✗	✔
Coconut	✔	✔	✔
Pomegranate	✔	✔	✗
Pear	✔	✓	✓
Banana	✔	✗	✗
Leaf			
Wombock	✔	✔	✔
Brussels sprouts	✔	✔	✔
Lettuce, iceberg	✔	✔	✗

Fruit

All fruits respond strongly to the perfield when in good condition. The better their condition the better the response. Overripe, aged, and rotten fruit has little or no response.

The response of fruits can depend on their orientation (Table 2) and arrangement. An individual banana has a lower response than a hand of bananas. The response of a bunch of bananas is expected to be high. The responses of grapes and tomatoes are highest when in bunches.

The structural arrangement of fruits is diverse but most appear to function as 3D forms. This generally requires an outer fruit wall to be consistently thicker than 12mm, but this constraint can be circumvented in various ways. With tomatoes and capsicums, for example, the walls are usually only around 5mm thick but internal 'braces' increase its effective thickness such that the fruits function as a 3D structures (Fig. 3).

Coconut

A de-husked coconut gave a good response despite being a little old. The response was not obviously affected when the coconut juice was drained through 1.5mm holes, or when it was cut in half and tightly bound back together using tape. However, the response was eliminated by reducing the thickness of the kernel to about 11. 5mm over an area of 15 square. The kernel thickness ranged from around 12.2 to 14.2 mm thick and the shell thickness from around 2.6 to 4.8mm thick. Coconuts function as 3D structures due to the thickness of the kernel.

Pineapple

Pineapples are excellent indensers and are commercially grown in climates and edaphic locations favourable for indensation. Their design is particularly complex. The outer section is composed of segments arranged in spirals, commonly 7 in one direction and 13 in the other. The number of spirals can differ considerably. They can also be symmetric, as with 13 spirals in each direction.

Segments of the pineapple fruit contain flowers within chambers, with a small outlet from the chamber being covered by a scale leaf. The central core or stem of the pineapple is woody and provides connection to the ground. The area between the flowers and stem is filled with open tissue containing abundant air spaces of highly disparate size and arrangement (the part that is eaten).

The indensing response primarily derives from outer layer and the stem as the vacuolated tissue is effectively non responsive. However, the vacuolated tissue provides a large water store.

Seeds

The reference position for seed testing was the naturally stable state when separated from the fruit. This represents the natural orientation of the seeds when placed on a flat surface. The edge position is less stable while the point down position is usually highly unstable.

All seeds examined had a strong response when oriented in a naturally stable position (Table 3). The response was generally zero in highly unstable positions, such as on a point. Seeds in intermediate positions, as on an elongate edge, usually provided an intermediate response.

While seeds on edges are unstable on flat surfaces this orientation can be stable in soils due to cracks.

All seed capsules examined respond to the perfield. Examples of seeds and capsules examined for their response are given in Fig. 4.

Table 3 Responses of seeds to the perfield with different orientations

	Shape	Most Stable	Edge	Point down
Mandarin	Ovoid tear drop	✔	✓	✘
Lemon	Ovoid tear drop	✔	✓	✘
Almond	Ovoid tear drop	✔	✓	✘
Almond model		✘	✓	✔
Pumpkin	Flattened tear drop	✔	✓	✘
Cucumber	Flattened ovoid	✔	✓	✘
Avocado	Sphere	✔	✔	✔
Coconut	Sphere	✔	✔	✔
Bean broad fresh	Indented flattened ovoid	✔	✓	✘
Bean model	Indented flattened ovoid	✔	✓	✘
Corn	Concave angular	✔	✓	✘
Corn model	Concave angular	✔	✓	✘

Plant Effects

Indensation

The best known plant response is ginspiration whereby plants acquire water from the atmosphere via indensation. The existence of indensation was previously demonstrated using constructed devices (Tunstall 2009a). Its occurrence with plants is illustrated in Fig. 5 where, with grasses, the indensed droplets are aligned with the stomata. All occurrences illustrated were under evaporative conditions, with conditions at midday on sunny days being highly so.

Plants clearly obtain water through indensation, and indensation is promoted by wind and high humidity. However, the amounts of water involved have yet to be quantified. Similarly, mechanisms used by plants to store indensed water are only just being identified. Indensation is obviously important to the development of vegetation but the significance of indensed water relative to rainfall is essentially unknown. This situation may continue for some time as the significance of indensation will vary with climate and the type of vegetation.

Plant development

Neutered perfield response

While the chillies in Fig. 3 are essentially the same age the green one is normal while the red one is stunted and has ripened prematurely. The perfield response of the red chilli has been neutered by damage to the calyx. With chillies the calyx cap acts as a terminator providing an appropriate connection between the fruit and the plant. Damage to the connection prevented the development of the normal association between the plant and the fruit.

Depauperate vegetation

While the environment in red cubits is unfavourable to plants the environment within other modules of the perfield is even more so. The most unfavourable modules have the working label of Nasty 1 and Nasty 2 (N1 and N2) as they are associated with the sick building syndrome. Observations to date indicate that N1 and N2 occur alongside each other in association with a larger perfield structure.

Vegetation occurring in Nasty Blocks is depauperate compared to adjacent areas (Fig. 6). If trees exist they are highly stunted. Grasses are similarly suppressed. The ground vegetation in Fig. 6b is primarily Lomandra.

Teopea seeds

The seed of Telopa (Waratah) has a single wing that acts as a helicopter blade that rotates the seed as it falls. However, the seed falls straight to the ground without rotation or any parachuting effect when dropped in a location where the field is strongly shielded through absorption or reflection. The adsorption test site was under the dense canopy of a well foliated *Brachychiton populneus*.

Animals

All animals have evolved to be responsive to the field and, given the basic constraints to developing a response, all component structures are responsive. The most obvious responsive structures are horns and tusks, but individual bones and all other parts of animal bodies are also responsive.

For a high response to the perfield the elements must be connected appropriately. The appropriateness depends on the elements having compatible forms as well as a correct form of connection. The design considerations are complex.

The response of basic animal forms has been investigated by constructing models. These incorporate the main elements of the form and have mainly been constructed from selected stone or wood. For some the basic form has been represented by a silhouette whereby the shape is cut from ‘sheet’ material of an appropriate thickness. The examples in Fig. 7 illustrate a range of animal forms.

Proteid forms can be most readily represented as two dimensional shapes, and there is a great diversity of forms. While the shapes may appear simple they are subtle, and small changes can negate the response.

As with plant structures the response of animal forms can depend on orientation. This has not been evaluated for many models because a two dimensional representation can alter the orientation response, but some of the responses are noteworthy. For example, 2D and 3D representations of the possum glider is only responsive when oriented at 45° where this is similar to the glide angle of the animal. The 2D model of the roosting fruit bat is responsive when the head is vertically down as well as up.

Well constructed ant forms have particularly high responses. Moreover, they respond strongly in all orientations. The separation of different body segments by well defined choke points represents a complex design that is highly effective in developing a strong response to the perfield.

Constraints for designs responsive to the perfield result in disparate forms of biota having similar forms. For example, the perfielder design is similar for the hydatid, ant, and fungal sporangium. This represents one form of convergent evolution.

Radial symmetry provides the simplest means of achieving a response to the perfield, as with a sphere. However, this imposes considerable limitations on design when other constraints have to be addressed. Bilateral symmetry similarly provides a simple means of producing a response to the perfield with greatly reduced design limitations. Bilateral symmetry is common in animals, particularly in the most complex animals such as vertebrates.

While bilateral symmetry can provide a good response it is not essential. Indeed, forms lacking symmetry can develop much higher responses than can be achieved with bilateral symmetry, and asymmetry is common in early evolutionary developments. This could arise because the limited design constraints imposed by simple life forms and/or the importance of the perfield to the organisms.

Human body

The general response of the human body was investigated by testing play doh models (Fig. 6), and by observations on my body. The human body has a high response when upright and horizontal (face up or down) but no response when upside down as when hung by the feet. It also has a high response in the foetal position that is largely independent of orientation, but the side up position is weak.

The response of the linear body form is best with legs together and arms to the side, either with fingers pressed against naked legs or with fists clenched. The latter is the historic Egyptian pose.

In the best responsive position the body maximally obtains energy from the perfield, but there are losses. Fingers appear to be the main emission points but all pointed parts of the body emit. These include the tip of the nose, ear lobes (very weak), nipples, penis, and toes. Pressing fingers against the body projects emissions from the fingers back to the body. Crossing legs at bare ankles effectively provides a termination that isolates feet from the body and so minimises losses from toes.

The body morphology incorporates structures that minimise losses and degradation of response that can arise with openings. Lips constitute a terminator around the mouth and essentially prevent that hole from negating the response of the head. The same form of termination arises with the anus. The arrangement with the vagina and penis differs in that the termination structure serves to effectively close the hole. The foreskin does serve a purpose which is the same as for the vulva. Eyelids similarly serve to close a hole.

The holes in the ears and nose represent a different design whereby the hole is an integral part of the responsive structure and is fixed in shape. With such structures the shape of holes is as important as the shape of the solid part of the structure.

Live sensing

The ways in which animals use energy obtained from the perfield are essentially unknown. However, a few are clear while others are likely. For example, the glide angle dependence of the possum glider model indicates that animals can use the perfield in an analogous manner to its use by plants in indensation.

The most dramatic use of the field by animals is in live sensing. This effectively represents the 'sixth sense' whereby animals can sense the presence of other live animals from their energy emissions. The operation of this sense is evidenced in the formation flying of flocks of birds, and the dropping of pigeons in flight just before a hawk is about to strike from behind. Given the viewing angles of pigeons there is no chance of their being able to view the rapidly approaching hawk but they are well aware of its presence when it is close. With flocks, the close proximity is necessary to maintain sensing contact.

This sensing ability of birds was observed with a Golden Whistler (*Pachycephala pectoralis*) caught by a cat. Despite the bird looking at a hand held directly in front of its vision it responded to the rapid movement of a hand that had been stationary around 10cm behind its head. There was no possibility of the bird viewing the object that it responded to.

Heads of the fish Snapper (*Chrysophrys auratus*) were dissected to identify live sensing structures. Two were identified, each being composite structures. One is located on cheek and extends under the eye (Fig. 8). This is composed of multiple bone platelets with the associated skin being integral. The live sensing response is strongest to the front and functions when moving. The structure also lives senses laterally when stationary but the response is weak. The composite structure effectively has a single main point of attachment apart from the skin.

The second live sensing structure is associated with the characteristic hump that develops at the back of the head of large Snapper. The prime detector lies just behind the bony hump, and is associated with two other similar structures. This detector live senses in the forward direction and operates when moving as well as stationary. The hump serves to amplify the response and increase the directionality. Live sensing with the composite structure (Fig. 8) is forward, lateral and upwards, and operates when in motion.

Live sensing camouflage

Live sensing is used in hunting thus the ability to camouflage their live response signal is beneficial to potential prey. Patterns of colour on animals that make animals stand out to human vision can do the opposite with live sensing. The most obvious is the harlequin/anemone fish where the colour banding effectively segments the responsive whole fish into a number of non responsive segments. The anemone used by the fish for protection does not sense the presence of the fish due to the patterns nullifying the live signal from the fish. However, movement of the fish is essential for the camouflage to work. The same form of camouflage is used by the anemone shrimp (Fig. 8) but this works when the shrimp is stationary.

Navigation

Many fish and birds have unexplained navigation capabilities. A possibility for fish is the otoliths located in the eyes (Fig. 8). These calcareous spheres have exceptional sensitivity to the perfield and vibrate vigorously when held stationary by their suspension. The motion ceases after a few seconds but resumes when the otolith is moved and held stationary in a new location. Theoretically the spatial characteristics of the perfield can be used for location and navigation given sufficiently sensitive devices.

References

Tunstall, B.R. (2008). Evolutionary Direction II On www.eric.com.au 62 pp

Tunstall, BR (1988). Suppression of wheat growth by different tree species. On www.eric.com.au 4pp.

Tunstall, BR (2009a). Indenser Operation On www.eric.com.au 10 pp

Tunstall, B.R. (2009b). Provision of Information on the Perfield On www.eric.com.au 7 pp

Tunstall, BR (2010). Overt indensation by plants On www.eric.com.au 5pp

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Fig. 1 Images of leaf forms

Fig. 2 Images of leaf forms

Poplar

a Brachychiton populneus b

a Brachychiton rupestre. b

Cycas

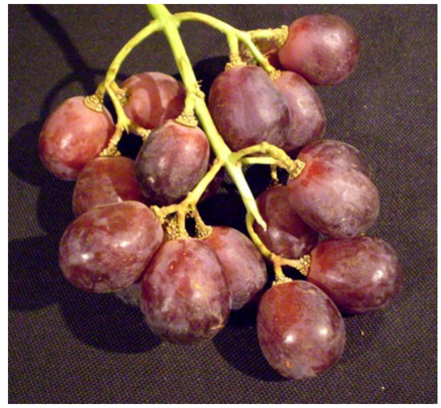
Grevellia b

Grevellia a

Acacia bi-pinnate

Fig. 3 Images of fruit

Capsicum (vertical section)



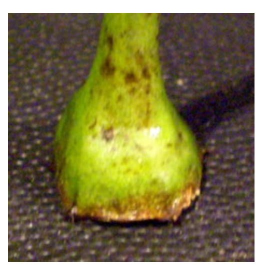
Grape bunch

Tomato (horizontal section)

Tomato bunch

Pineapple segments

Chilli Fruits



Calyx caps from chillies

Fig. 4 A Images of seeds and seed models B Images of models of seed capsules

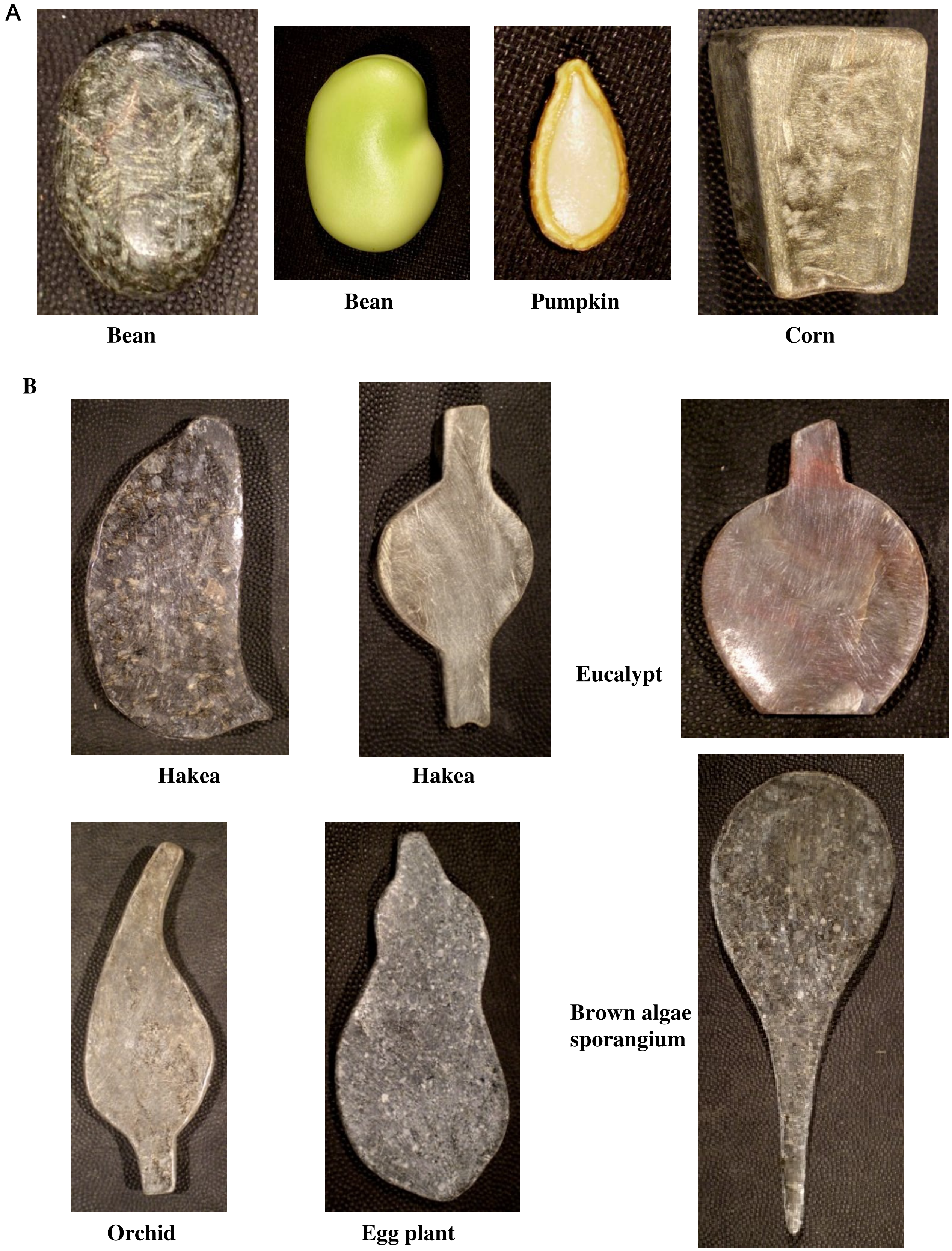


Fig. 5 Water droplets on plant leaves and an indenser produced through indensation.

Clover leaves 11am, 7/10 cloud, good breeze

Paspalum leaves, 6am

Clover leaflet 11am, full sun good breeze

Horizontal oat leaf segment, 6am

Water droplets on the inside of a constructed indenser. Evaporative conditions.

Fig. 6 Images of normal vegetation (A) and in adjacent and nearby 'Nasty Blocks' (B, C)
Play doh model of a human form

Fig. 7 Images of stone and wooden models of organic life forms


Bacterium


Amoebae


Dinoflagellate


Pteropod


Fungal Sporangium


Mushroom


Hydatid


Ant (soldier)


Bivalve Mollusc


Fish Larva


Budgerigar

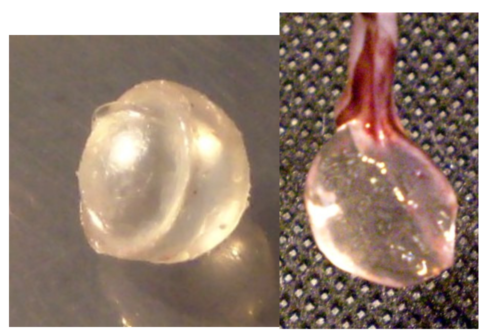

Glider Possum

Fig. 8 Images of fish live sensing structures, otoliths, and an anemone shrimp

Snapper external live sensing structure

Snapper internal live sensing structure

Anemone shrimp



Squid otoliths