

Adding Side Notes to a PDF File

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THE FORMS OF THE HYBRIDS

Experiments which in previous years were made with ornamental plants have already afforded evidence that the hybrids, as a rule, are not exactly intermediate between the parental species. With some of the more striking characters, those, for instance, which relate to the form and size of the leaves, the pubescence of the several parts, etc., the intermediate, indeed, is nearly always to be seen; in other cases, however, one of the two parental characters is so preponderant that it is difficult, or quite impossible, to detect the other in the hybrid.

This is precisely the case with the Pea hybrids. In the case of each of the seven crosses the hybrid-character resembles that of one of the parental forms so closely that the other either escapes observation completely or cannot be detected with certainty. This circumstance is of great importance in the determination and classification of the forms under which the offspring of the hybrids appear. Henceforth in this paper those characters which are transmitted entire, or almost unchanged in the hybridization, and therefore in themselves constitute the characters of the hybrid, are termed the *dominant*, and those which become latent in the process *recessive*. The expression *recessive* has been chosen because the characters thereby designated withdraw or entirely disappear in the hybrids, but nevertheless reappear unchanged in their progeny, as will be demonstrated later on.

It was furthermore shown by the whole of the experiments that it is perfectly immaterial whether the dominant character belongs to the seed plant or to the pollen plant; the form of the hybrid remains identical in both cases. This interesting fact was also emphasized by Gärtner, with the remark that even the most practiced expert is not in a position to determine in a hybrid which of the two parental species was the seed or the pollen plant.

Suppose you have access to some PDF file to which you would like to attach side notes, as ...

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Here, Mendel presents one of his basic **qualitative** findings:

In external appearance, hybrid plants look like only one of the parental strains, but they produce progeny that resemble **both** parental strains. Therefore, the hybrid must be carrying genetic determinants for both parental traits, but is itself expressing only one of them.

Thus, Mendel distinguishes between the characters that are actually expressed in the hybrid (**dominant**) and those that must be present, but latent (**recessive**).

Mendel states that, across *all* of his experiments, reciprocal crosses always gave exactly the same results.

Anyone who has tried to do this, starting with finished PDF (created by someone else) knows that this can be technically tricky, even if it is logically simple.

Versuche über Pflanzenhybriden

7

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CLASSICAL GENETICS

Logically, all you need to do is be able to identify exactly where in the original text comments should be placed . . .

9:16-28::Mendel asserts that, despite the risks, he believes that unexpected pollination occurred only rarely and then to such a slight extent that such occurrences were "quite incapable of disturbing the general result."

9:36-40::Mendel off-handedly notes that he had already done some preliminary experiments with *ornamental plants* and that this has led him to believe that "hybrids, as a rule, are not exactly intermediate between the parental species."

9:49-69::Here, Mendel presents one of his basic **qualitative** findings:
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9:71-77::Mendel states that, across ***all*** of his experiments, reciprocal crosses always gave exactly the same results.

10:77-84::Here Mendel reports his fundamental **quantitative** finding: Although hybrid plants themselves resemble the parents with the dominant trait, they produce progeny that resemble both parents and they do so in the ratio of three dominants to one recessive.

11:16-20::The pattern of three dominants to one recessive proved to be true for all of the crosses.

11:29-35::Again, Mendel asserts that reciprocal crosses always gave equivalent results and therefore he will lump together the data from reciprocal crosses.

12:16-48::Here again, Mendel exhibits his quantitative approach to genetic analysis and his sensitivity to statistical issues.
This table illustrates the **variation** in his findings when the results from single plants are considered.
From this, Mendel concludes that appropriately large sample sizes are required to avoid errors due to natural variation.
While this may seem routine today, at the time Mendel was working, none of the modern standard statistical techniques such as analysis of variance, the X^2 test, or regression analysis had yet been invented.

13:50-61::Here Mendel notes that plants that express the dominant trait can either be of the parental type (true-breeding) or of the hybrid type (producing mixed progeny).
This anticipates the later distinction between **phenotype** (the appearance of an organism) and **genotype** (its actual genetic make up).

... and then be able to specify what comments should go where.

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You also need to obtain some physical parameters from the original file . . .

```

=====
// Set the attributes of the source file to be annotated
//-----
MaxPages  ::   41
           // integer, the number of pages in source doc

//.....

TextLeft  ::   2.25
           // real, the distance in inches between the left
           // edge of the page and the left edge of text in
           // the source doc

//.....

TextRight ::   2.25
           // real, the distance in inches between the
           // right edge of the page and the right edge of
           // text in the source doc

//.....

TextTop   ::   1.65
           // real, the distance in inches between the top
           // edge of the page and the top line of text in
           // the source doc

//.....

TextBot   ::   1.65
           // real, the distance in inches between the bot
           // edge of the page and the bot line of text in
           // the source doc

//.....

PgWidth   ::   8.5
           // real, the width of the source doc in inches

//.....

PgHeight  ::  11.0
           // real, the height of the source doc in inches

//-----
// Set the attributes of the annotation file to be produced
//-----

Margin    ::   0.5
           // real, the distance in inches on the edges of
           // of the output page that should remain free of
           // sidenotes

//.....

MinNoteSpace ::  0.25
           // real, the minimum distance allowed between
           // vertically adjacent sidenotes

//.....

maxTries  ::  100
           // integer, the maximum number of times the
           // program will attempt to respace side notes
           // that are colliding with each other. The
           // bigger this number, the better the spacing

```

... and then be able to specify those physical parameters to the typesetting program.

```

//-----
// Set the attributes of the sidenotes to be produced
//-----

NoteFontFamily :: MS_standard
                // ansistring, the name of the font family to
                // be used for typesetting the sidenotes.
                // The currently available sources are:
                //
                //   DejaVu
                //   Bell
                //   FreeFont
                //   Libertine
                //   CM_unicode
                //   MS_standard

//.....

NoteFontSet    :: serif
                // ansistring, the name of the fontset inside
                // font family, to be used for typesetting.
                // The available sources are: serif, sans,
                // serifmono, sansmono, ByHand, display

//.....

NoteFontSize   :: 8.0
                // real, the size of the font to be used in the
                // sidenotes

//.....

SUBsize        :: 0.80
                // real, the RELATIVE size of the font to be
                // used for sub- and superscripts in the
                // sidenotes. Thus, if SUBsize = 1.0, then
                // sub- and superscripts are written the same
                // size as the side note text. If SUBsize =
                // 0.75, the they are 75% the size, etc

//.....

SUBdrop        :: 0.3
                // real, the RELATIVE size of the drop below
                // the baseline to be used for printing
                // subscripts in the sidenotes. Thus, if
                // SUBdrop = 0.3, then subscripts are dropped
                // 30% of the font size below the baseline.
                // With a 10-point font, that would be a 3-point
                // drop.

//.....

SUPlift        :: 0.4
                // real, the RELATIVE size of the lift above
                // the baseline to be used for printing
                // superscripts in the sidenotes. Thus, if
                // SUPlift = 0.6, then superscripts are lifted
                // 60% of the font size above the baseline.
                // With a 10-point font, that would be a 6-point
                // lift.

//.....

NoteColor      :: 152 : 24 : 14 // ESP-red 132 : 24 : 14
                // the color in which to set the type. The
                // options are an RGB value given as, e.g.,

```

You also need to specify the typesetting parameters for the sidenotes.

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With all of that, the typesetting program and system should be able to produce a side-note annotated file, here seen in proof format ...

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4:15-26::Embedding HTML-style tags in the source text makes it possible to produce typeset side notes in `<i>italics</i>` or in `bold` or in `<i>bold italics</i>`. It is also possible to include superscripts like `N²` or subscripts like `F₁`.

4:15-35::The typesetting systems supports generic UTF-8 encoding for nearly all European languages, so that comments may be written in the English language, ή στην ελληνική γλώσσα, nebo v českém jazyce, или на русском языке, ou dans la langue française, vagy a magyar nyelv, lub w języku polskim, eller i det norske språket, or ...

To set side notes for a scientific paper you will probably need access to some characters outside the basic set, along with the ability to do super- and subscripts...

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Those who survey the work done in this department will arrive at the conviction that among all the numerous experiments made, not one has been carried out to such an extent and in such a way as to make it possible to determine the number of different forms under which the offspring of the hybrids appear, or to arrange these forms with certainty according to their separate generations, or definitely to ascertain their statistical relations.

It requires indeed some courage to undertake a labor of such far-reaching extent; this appears, however, to be the only right way by which we can finally reach the solution of a question the importance of which cannot be overestimated in connection with the history of the evolution of organic forms.

The paper now presented records the results of such a detailed experiment. This experiment was practically confined to a small plant group, and is now, after eight years' pursuit, concluded in all essentials. Whether the plan upon which the separate experiments were conducted and carried out was the best suited to attain the desired end is left to the friendly decision of the reader.

SELECTION OF THE EXPERIMENTAL PLANTS

The value and utility of any experiment are determined by the fitness of the material to the purpose for which it is used, and thus in the case before us it cannot be immaterial what plants are subjected to experiment and in what manner such experiment is conducted.

The selection of the plant group which shall serve for experiments of this kind must be made with all possible care if it be desired to avoid from the outset every risk of questionable results.

The experimental plants must necessarily:

1. Possess constant differentiating characteristics
2. The hybrids of such plants must, during the flowering period, be protected from the influence of all foreign pollen, or be easily capable of such protection.

The hybrids and their offspring should suffer no marked disturbance in their fertility in the successive generations.

Accidental impregnation by foreign pollen, if it occurred during the experiments and were not recognized, would lead to entirely erroneous conclusions. Reduced fertility or entire sterility of certain forms, such as occurs in the offspring of many hybrids, would render

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Actually, this system reads any UTF-8 encoded source file and can typeset pretty much any character in most European languages.