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Notes on Abnormal *Cypripedium* Flowers.

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[Read 16th June, 1892.]

(Plates I. & II.)

I. Cypripedium Sedeni.

The subject of the first of these notes is a flower of *Cypripedium Sedeni* (the well-known hybrid of *C. longifolium* and *C. Schlimii*), which occurred in the conservatory attached to the Botanical department at University College. The plant in question produced three flowers in the autumn of 1891; but it was only in the middle one of the three that any abnormality was observable.

A superficial glance at the flower showed that two labellums were present (Pl. I. fig. 1); but, in addition to this, the androecium was affected, and the ovary exhibited a diminution of parts and also concrescence, down one side, with the axis on which the flower was inserted. The obliquity in position displayed by the unfolded flower (fig. 1) is referable probably to this fusion of ovary and axis. The flower shows five prominent perianth members, *i.e.* two sepals (s_2 and s_3), the two labellums (p_2 and p_3), and a third petal (p_1) on the opposite side of the flower. The relations of the third sepal will be discussed below. The column in the centre possesses a stigma (*st.*, fig. 4) and a single anther (*an.*). There is no staminode present nor any trace of the usual lateral stamens. The anther is on the side of the column directed towards the unpaired flat petal, the stigma towards the labellums. The plane which passes through the unpaired petal (p_1) and between the two labellums includes the anther and stigma. Below the labellums—that is to say, outside the flower—is a curious attached structure which, since it is the key to the situation, must be described.

The attached Growth.—This is shown in fig. 2 slightly twisted out of its natural position (which is behind the flower in this view), and in fig. 3 in greater detail. The structure exhibits a longitudinal slit above, which runs from the insertion of the flower to its apex. There is a similar longitudinal slit along the under surface, running the entire length; but it is somewhat obscured by the close overlapping of its edges. Dissection shows

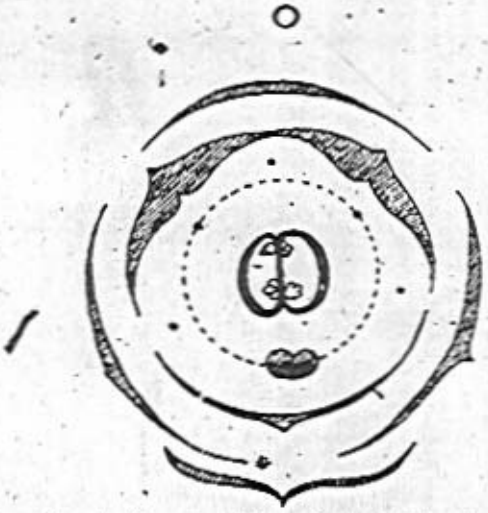
that these slits lead into an upper and lower chamber respectively (fig. 5), of which the lower is much the larger. A longitudinal partition, which is coextensive with the upper slit, forms the floor of the upper chamber and the roof of the lower one. A transverse section of the free part of this attached growth thus resembles the letter H. The upper chamber, which is empty, terminates at the point of insertion of the flower, and from this point downwards the growth is fused with the ovary of the flower (see fig. 5). The lower chamber (fig. 5) contains a flower-bud (b) on the side towards the ovary and a scale (s^1), which in its turn contains a flower-bud (b_1) and the rudiment of an axis (a). Finally, it should be noted that the apex (e, fig. 5) of the attached growth is bifid, a fact which gives support to the view that this growth is *double* in its nature, consisting of two excavated structures fused back to back, and opening the one by a slit above, the other by one below.

Interpretation of Parts.—The interpretation of the structures enumerated is as follows. It is so natural, that it is hardly liable to question. Examining fig. 2, it is seen that the expanded flower obviously arises in the axil of the bract b_1. Higher up we have the bract b_2 subtending a flower-bud. Between the points of insertion of b_1 and b_2 the axis is fused with the ovary of the first flower. Above the insertion of b_2 the axis—concealed from view in the "lower chamber"—becomes free, and bears (1) a bract b_3, the morphologically *upper* surface of which is fused in its proximal portion with the ovary of the expanded flower, whilst its distal part is similarly fused with the upper sepal of the expanded flower. The horizontal bar of the H is thus regarded as representing the fused portions of the bract b_3 and the upper sepal of the expanded first flower. This interpretation of the fused structures provides for the representation of the missing sepal, which is thus found in its proper place, though necessarily obscured.

Within the lower chamber the presence of certain structures has been noted: a flower-bud b, a bract s^1, an additional flower-bud b_1, and the rudiment of the axis a (fig. 5). These are all inserted in their right positions. The axis a is the continuation of the main axis, and we must regard the sheathing structure, which forms the lower part of the H, as a bract (b_3, fig. 2) borne by this axis. The flower-bud b is situated in its axil. On the opposite side (*i. e.* away from the expanded deformed flower) is

the little bract s^1 (fig. 5), which in its turn subtends a tiny flower-bud b_1.

Passing on to the flower itself, the posterior or adaxial sepal has been recognized as the upper constituent of the H. The two other sepals lie in their proper positions, and there are three petalline structures alternating with them. Two of these are labelliform, and are inserted right and left of the reduced and modified sepal. The third petal is flat and ovate-lanceolate. This is in the position of the labellum of a normal *Cypripedium* flower. The two labellums similarly represent the two flat petals of a normal flower. This appears to be the simplest interpretation. The subjoined woodcut of the floral diagram of our flower shows the parts arranged so as to facilitate comparison



Floral diagram of *Cypripedium Sedeni* (abnormal specimen).

with the diagram of a normal flower. In the andrœcium we find the two stamens of the outer whorl to be absent, whilst the anterior (and median) stamen of the inner whorl is developed. Finally, in the ovary the median posterior carpel is wanting. The ovary is thus bi-carpellary. Nevertheless the vascular bundle corresponding to the missing carpel can still be traced; so that we cannot regard this carpel as totally suppressed.

We have in support of the view that the labellum has been simplified and the lateral petals transformed into labella, the fact that the median stamen of the inner whorl, superposed to the median petal, is present and fertile; while in most cases when the median petal has the form of a labellum it is absent altogether. Masters observes * that the absence of this stamen

* Journ. Linn. Soc., Bot. vol. xxii. p. 402.

seems to be correlated with the great development of the labellum, and in this case, when the median petal assumes a simple form, the anther is found to be well developed.

Again, according to Masters, "Cases of partial irregular peloria in *Cypripedium* are not very uncommon; as, for instance, flowers in which the lateral petals (or one of them) assume the saccate form of the lip. This may occur without any increase in the number of parts."

Various instances are also mentioned in the paper by Masters already quoted in which the two lateral sepals were distinct, as here, and in which the median petal was intermediate between a labellum and an ordinary petal, or even became quite simple in form.

The modified flower here described is still zygomorphic, and the plane of symmetry still passes through the petal corresponding to the labellum in other forms and through the sepal (here much reduced) which is opposite to it.

II. Monstrous Flower of Cypripedium Boxallii.

This flower presented a very strange appearance owing to the reduction and irregularity of its labellum. A sketch of the whole flower, as seen from in front, is given in Pl. I. fig. 7. The sepals and lateral petals were quite normal and well developed. The labellum, however, was very much twisted and contorted, and appeared to be much more reduced than was actually the case, in consequence of certain infoldings. The upper dorsal surface of the labellum had become attached to the lower part of the stigmatic surface (*b*, fig. 7), so that there were two small openings into the cavity of the labellum, one on either side of the adherent portion, instead of the usual single median aperture.

The column carried two fertile stamens, and the staminode was perfectly normal, except that it was slightly turned to the left away from the median vertical plane.

Only the upper part of the stigmatic surface was visible (*a*, fig. 7), since the upper fold of the labellum (*c*) was firmly adherent to the central portion of the stigma, and thus completely hid its lower portion from view.

In order to discover the nature of this attachment of the labellum to the stigma, I cut through the column vertically a little to the left of the median plane. Fig. 8 represents a view

of the right-hand cut surface after the section. There was a large canal traversing the column longitudinally, which communicated above with the cavity of the labellum, and opened out under its adherent dorsal portion, *c*. This canal was subsequently traced downwards, and was found to be continuous below with the cavity of the ovary.

The upper dorsal part of the labellum, *c* (Pl. I. figs. 7, 8; Pl. II. fig. 9), below the point of its attachment to the stigma, *b*, was found to be continued down this canal as a folded flap or downgrowth, which hung quite freely in the abnormal passage, being only suspended at the point *b*, and nowhere else attached to the column.

The nature of the downgrowth of the labellum, enclosed in this canal, was best demonstrated by transverse sections taken at various levels. It was thin and membranous, and traversed by five longitudinal vascular strands. At the upper end it was folded lengthwise in three (fig. (1)), but towards its lower free extremity it became much narrower (fig. (3)) and terminated in a blunt point.

A general plan of a median vertical section of the flower is given in fig. 9, to show the relative position and relation of the labellum and its downgrowth to the column and other parts of the flower. The sepals and lateral petals are cut away, and the labellum is represented diagrammatically, the folds of the prolonged portion lying in the abnormal canal being omitted for the sake of clearness. It will be noticed that the ovarian cavity is not closed above, but is continued into the canal passing through the base of the flower and column, and so is in direct communication with the exterior. The small figures (1) . . . . (6) represent transverse sections through the flower, the respective levels from which they are taken being indicated in Pl. II. fig. 9 by corresponding numbers.

The note on *C. Sedeni* is communicated in view of the interest of the hybrid from its extreme liability to exhibit monstrous growths, so as to put on record a new variation till such time as it may be possible to deal with the hybrid in this respect exhaustively. That on *C. Boxalli* is of interest as an isolated instance in which an orchid ovary has, so to speak, swallowed a portion of the labellum of the same flower. The specimen was communicated by Dr. Maxwell T. Masters.

EXPLANATION OF PLATES I. & II.

PLATE I.—*Cypripedium Sedeni*.

Fig. 1. The modified flower, from the front.

p_1. Median petal.

p_2, p_3. Lateral petals transformed into labella.

s_2, s_3. Lateral sepals (distinct).

Fig. 2. The modified flower, postero-lateral view.

s_1. Median sepal, here fused with a bract, b_1.

f. b_2. Floral bud and subtending bract, next youngest in age to the modified flower.

Other letters as in fig. 1.

Fig. 3. Ovary with attached bract, &c., from the front.

b. Bud seen through the lamina of the attached bract, which has been rendered semitransparent by spirit.

c.b. Outer border of bract formed by the overlapping edges of its lamina.

c. Bifid extremity formed by the apex of the bract and by the apex of the fused median sepal, s_1.

Fig. 4. Side view of column, after removal of perianth.

an. Anther.

st. Stigmatic surface.

Fig. 5. Semi-diagrammatic view of the ovary and attached bract, the anterior part of the lamina being partially removed in order to show the contents of the lower chamber *in situ*.

b. Flower-bud subtended by the attached bract.

c. Its ovary cut across.

b_1. Younger flower-bud; s', its subtending bract.

a. Apex of the floral axis.

Fig. 6. Front view of the column, after removal of the two labella.

s_1. The median sepal, forming the upper chamber.

Fig. 7. View of complete flower, from the front.

a. Upper part of stigmatic surface.

b. Part of stigma to which the labellum adheres.

c. Adherent portion of labellum.

Fig. 8. Upper part of column, cut through vertically a little to the left of the middle line to show insertion of labellum.

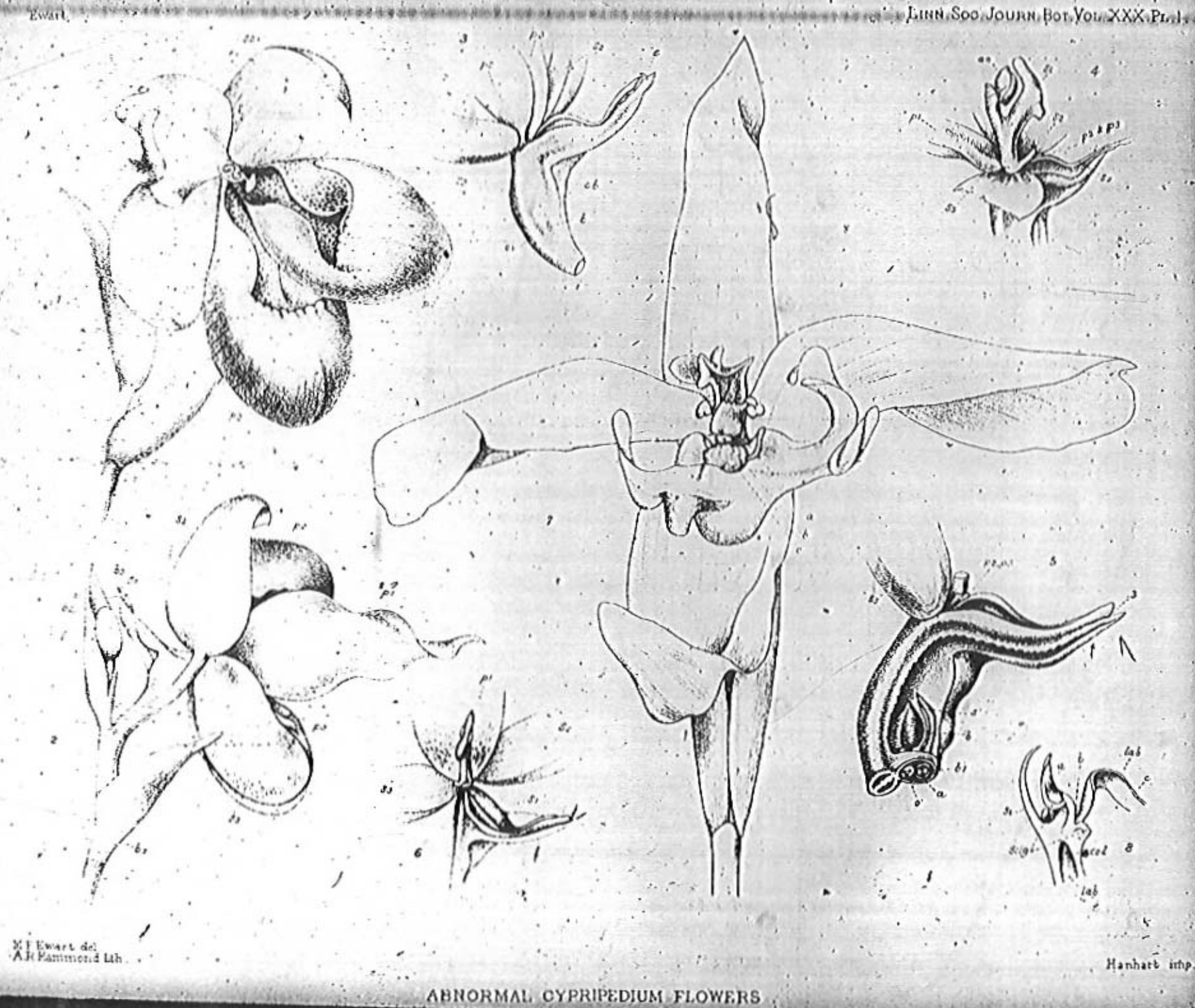
a, *b*, *c*, as in fig. 7. The downgrowth of the labellum is seen in the opened canal.

PLATE II.—*Cypripedium Boxalli*.

Fig. 9. Diagrammatic view of flower, cut in half longitudinally. The sepals and lateral petals have been removed, and the labellum with its downgrowth is shown in outline.

b, *c*, as in figs. 7 and 8.

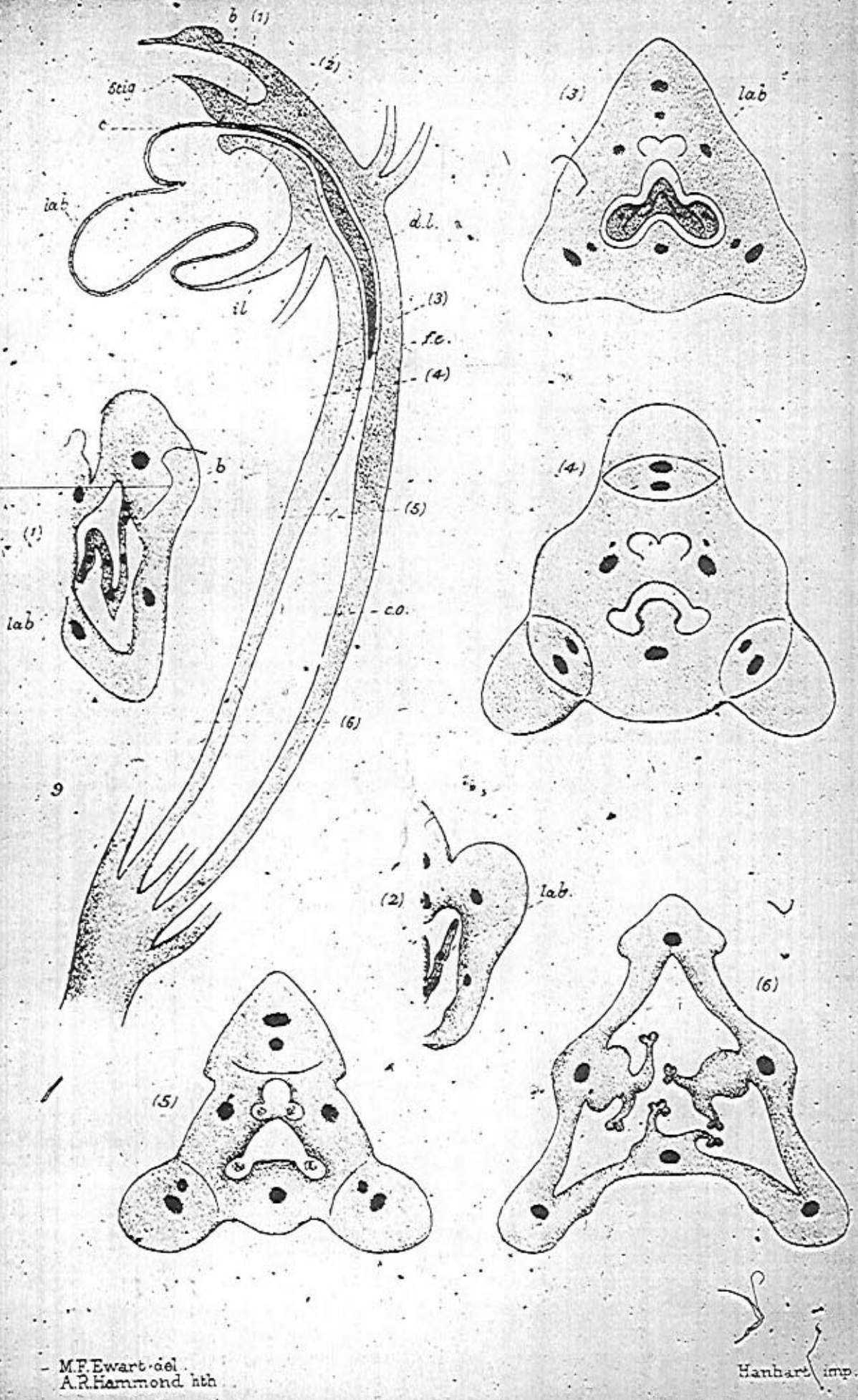
The figures (1) .... (6) represent transverse sections of the flower taken at the levels correspondingly numbered in fig. 9.



W. J. Ewart del.
A. H. Hammond Lith.

Hanhart imp.

ABNORMAL CYPRIPEDIUM FLOWERS



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