tatis, breviter petiolatis, primum præcipue ad venulas pilosulis, denique supra glabrescentibus, racemis præcocibus multifloris erectis apicem versus ramulorum confertis, bracteis minutis ovatis caducis, floribus pedicellatis 3–4-fasciculatis, petalis membranaceis calyce longioribus, ovario glabro.

Hab. Old Calabar, collected by the *Rev. W. C. Thomson.*

But two species of this genus were previously known, viz. *P. Malayana* and *P. Madagascariensis*, natives respectively of the Malayan peninsula and of Madagascar. *P. Guineensis* forms, therefore, an interesting addition to the few congeneric representatives in West Tropical Africa of purely Malayan or of Malayan and at the same time Madagascar or Ceylon species. This new *Paropsia* differs remarkably in habit from its congeners in its precocious flowers, which are arranged in leafless racemes crowded towards the ends of the branches instead of in the axils of the leaves. The flowers, however, are fascicled in the axils of minute caducous bracts. Excepting in the more membranous and glabrous petals and glabrous ovary, I do not remark any important difference in the flowers of *P. Guineensis*, unless it be a tendency of the ovules to develope towards the upper part, or above the middle, of the placentary lines of the ovary instead of below the middle, or towards the base of the cavity.

On the Individual Sterility and Cross-Impregnation of certain Species of *Oncidium*. By Mr. John Scott, of the Royal Botanic Gardens, Edinburgh. Communicated by C. Darwin, Esq., F.R.S. & L.S.

[Read June 2, 1864.]

The writings of Kölreuter, Gärtner, and others furnish us with several illustrations of hermaphrodite plants whose two sexual elements are so modified in their action on each other that they are utterly sterile; the individual goodness of both the male and female elements being nevertheless shown by their facility in uniting with other individuals of the same species or with distinct species. With the view of further illustrating these singular phenomena, I, at the suggestion of Mr. Darwin, commenced a series of experiments, in repetition of those made by previous observers, as well as original experiments on distinct subjects. I have already communicated a few of these to the Botanic Society of Edinburgh (*vide* 'Proceedings,' 1863), of which, from their more or less immediate relation with the present notice, I will give a

brief preliminary abstract. The species experimented upon were the *Oncidium sphacelatum*, *O. altissimum*, *O. divaricatum* var. *cupreum*, *O. graminifolium*, and *O. ornithorhynchum*.

First, I impregnated six flowers of the *O. sphacelatum* with pollinia of the *O. divaricatum* var. *cupreum*, from which I obtained four fine plump capsules. These being in an immature state, when I made my communication to the Botanic Society of Edinburgh, I was unable to say anything respecting the condition of the seeds. Now, as I have examined the capsules, I may state that each was well filled with seeds, of which about one-fifth were embryonated.

Secondly, I applied the pollinia of *O. sphacelatum* to the stigmas of six flowers of the *O. graminifolium*, from which I obtained one good capsule with one-fourth of embryonated seeds. I failed to effect a reciprocal cross by applying pollinia from *O. graminifolium* to the stigmas of *O. sphacelatum*, as all the flowers thus operated upon dropped early.

Thirdly, I applied the pollinia of *O. sphacelatum* to the stigmas of *O. ornithorhynchum*, and from four flowers thus impregnated I obtained one capsule. On dissection I was disappointed by finding that it contained few seeds, and of these a very high percentage presented merely a loose transparent testa, entirely destitute of an embryo. I did not succeed in impregnating *O. sphacelatum* by pollinia of *O. ornithorhynchum*, though the capsules thus treated in several instances showed symptoms of swelling.

Fourthly, I tried repeatedly to fertilize *O. sphacelatum* with the pollinia of *O. altissimum*, and also to reciprocally fertilize *O. altissimum* by pollinia of *O. sphacelatum*, yet in both cases I utterly failed. It is here worthy of remark, as showing how completely independent the conjunctive capacity of two distinct species may be of their systematic affinities, that the *O. altissimum* and *O. sphacelatum*, which I have thus failed to cross, are nevertheless so closely allied as to have been regarded as conspecific, whereas in the previously given fertile unions of *O. sphacelatum* with *O. divaricatum* var. *cupreum*, *O. graminifolium*, and *O. ornithorhynchum*, there are great dissimilarities in the specific characters.

Fifthly, I impregnated a number of flowers on different plants of the *O. sphacelatum* with their own pollinia, yet in no instance did a single capsule swell. The only external signs the flowers afforded of being affected by the pollinia were the closing of the stigmatic orifice, twenty-four hours or so after their application, and the slightly earlier withering of the flowers. On the plant of *O. sphacelatum*, previously noticed as readily susceptible to fertilization by

the pollinia of *O. divaricatum cupreum*, I fertilized upwards of 200 flowers with own pollinia, yet every capsule proved abortive. That this inveterate abortion of the capsules was neither due to the non-emission nor to the non-penetration of the pollen-tubes, I satisfied myself by the dissection and examination of the columns of many of these flowers as they dropped off, and in all I invariably found an abundance of pollen-tubes.

Such then is a brief abstract of the experiments illustrative of the peculiarities in the reproductive economy of certain species of *Oncidium*, as communicated to the Botanic Society of Edinburgh, and I will now proceed to give in fuller detail a series of experiments which I have lately made on the above and other species of *Oncidium* in the Royal Botanic Gardens of Edinburgh, as further illustrating the capriciousness of their relations in respect to fertility. Those which I have now to record were performed upon two perfectly self-sterile plants of *O. microchilum*—respectively given in the sequel as Nos. 1 and 2—and plants of the *O. ornithorhynchum* and *O. divaricatum cupreum*; they are as follows:—

First, I inserted pollinia of *O. microchilum* (No. 2) into the stigmatic chamber of eight flowers of the *O. ornithorhynchum*; of these, three produced capsules containing about 21 per cent. of good seed. I also tried the converse experiment, and applied pollinia from the *O. ornithorhynchum* to the stigmatic chambers of twelve flowers of the *O. microchilum* (No. 2), but in this case I failed in causing a single capsule to swell. To satisfy myself that this abortion of the capsules was not simply due to the non-development of the pollen-tubes, I dissected the columns of many of the flowers, and found in each an abundance of pollen-tubes.

Secondly, I inserted pollinia from the *O. microchilum* (No. 1) into the stigmatic chambers of eight flowers of the *O. ornithorhynchum*, and obtained five capsules. Of these one was perfectly developed, but yielded no good seed; the others, however, were well developed, and yielded about 16 per cent. of good seed. I tried the converse experiment likewise, and applied pollinia from the *O. ornithorhynchum* to the stigmatic chambers of twelve flowers of the *O. microchilum* (No. 1), yet I failed to obtain a single good capsule, though I had hopes, from the early development of two of them, that the results would have been otherwise; both dropped prematurely, although on dissection of the columns of several of the flowers I found an abundance of pollen-tubes. As shown, however, the pollinia of the *O. ornithorhynchum* in the present as in the above case, though thus absolutely ineffective in the fertilization of *O. microchilum* (No. 1), are nevertheless good,

as I have proved by their application to their own stigmas as well as to those of *O. pumile*, fertile unions having in several instances been thus effected.

Thirdly, I inserted pollinia of *O. microchilum* (No. 2) into the stigmatic chambers of six flowers of the *O. divaricatum cupreum*, and obtained three capsules, which yielded about 36 per cent. of good seed. I likewise tried the converse experiment, and applied pollinia of the *O. divaricatum cupreum* to the stigmas of six flowers of the *O. microchilum* (No. 2), yet though two of these produced capsules, I could not, after a most careful examination of their contents, detect an embryonated seed. I repeated this experiment on twelve other flowers with even less success than before, as every capsule aborted.

Fourthly, I inserted pollinia of *O. microchilum* (No. 1) into the stigmatic chambers of six flowers of *O. divaricatum cupreum*, and obtained four capsules, which contained about 34 per cent. of good seed. By the converse experiment I had, from six flowers of the *O. microchilum* (No. 1), impregnated by pollinia of *O. divaricatum cupreum*, two capsules, which yielded 42 per cent. of good seed.

Fifthly, I inserted pollinia of *O. microchilum* (No. 2) into the stigmatic chambers of six flowers of the *O. microchilum* (No. 1), and obtained five capsules, of which four were good, yielding about 75 per cent. of embryonated seeds. I also tried the converse experiment, and applied pollinia (known to be good from their action on other species) of *O. microchilum* (No. 1) to the stigmas of six flowers of *O. microchilum* (No. 2), but in this case every capsule aborted. Struck with the great difference in the results of these reciprocal crosses, I repeated the last experiment, and impregnated in the same manner twelve other flowers of the *O. microchilum* (No. 1), but the result was similar, all the flowers proving abortive.

Sixthly, I impregnated twelve flowers of *O. microchilum* (No. 1) by its own pollen, yet not one produced a capsule. I repeated this experiment on twelve other flowers with the same result. The insusceptibility of this plant to fertilization by its own pollen interested me, so that I again and again repeated the experiment, but the foregoing results were repeated, not one capsule ever having set. I may state that on dissection of the columns of a number of these flowers, I invariably found them abundantly permeated by the pollen-tubes.

Seventhly, I impregnated twelve flowers of *O. microchilum* (No. 2) by its own pollen; nevertheless, though in this instance again pollen-tubes were freely developed, they failed in effecting

a fertilizing influence: not one capsule swelled. By a repetition of this experiment on twelve flowers, I had nearly the same results, one flower alone producing a capsule; but this dropped off prematurely and contained no embryonated seeds. From this indication, however, of a certain degree of susceptibility in this plant to its own pollinic influence, I repeated the above experiment on a vast number of flowers, but the result in all was the same; and I observed in no single instance even the slightest symptom of a capsule swelling.

For the sake of clearness I will here give, in a tabulated form, the results of the above experiments, thus:—

Unions between *Oncidium microchilum*, *O. divaricatum* var. *cupreum*, and *O. ornithorhynchum*.

	Number of flowers fertilized.	Total number of capsules produced.	Number of good capsules.	Estimated total number of seeds produced.	Estimated number of good seeds.	By calculation. Total seeds.	By calculation. Good seeds.
1. *O. ornithorhynchum* by pollinia of *O. microchilum* (No. 2)	8	3	3	20,200	4,242	or as 1000 to 210	
2. *O. microchilum* (No. 2) by pollinia of *O. ornithorhynchum*	12	0					
3. *O. ornithorhynchum* by pollinia of *O. microchilum* (No. 1)	8	5	4	23,360	3,737	or as 1000 to 160	
4. *O. microchilum* (No. 1) by pollinia of *O. ornithorhynchum*	12	2	0				
5. *O. divaricatum cupreum* by pollinia of *O. microchilum* (No. 2) ...	6	3	3	22,050	7,938	or as 1000 to 360	
6. *O. microchilum* (No. 2) by pollinia of *O. divaricatum cupreum* ...	18	2	0				
7. *O. divaricatum cupreum* by pollinia of *O. microchilum* (No. 1) ...	6	4	4	26,240	8,922	or as 1000 to 340	
8. *O. microchilum* (No. 1) by pollinia of *O. divaricatum cupreum* ...	6	2	2	17,700	7,434	or as 1000 to 420	
9. *O. microchilum* (No. 1) by pollinia of *O. microchilum* (No. 2) ...	6	5	4	45,800	34,350	or as 1000 to 750	
10. *O. microchilum* (No. 2) by pollinia of *O. microchilum* (No. 1) ...	18	0					
11. *O. microchilum* (No. 1) by own pollen.....	24	1	0				
12. *O. microchilum* (No. 2) by own pollen.....	24	0					

In the first four columns of the above Table the number of flowers fertilized and the total number of capsules and seeds produced are shown; in the fifth column I have given, by a careful microscopic examination in each case of 1000 seeds, the relative number of embryonated seeds produced; and lastly, in the column at the right hand, for facility of comparison, the exact number of good seeds produced per 1000 of the total product is given.

By a summary comparison of these results we have the following highly interesting facts disclosed. First, we see that the male element of *O. microchilum* (No. 1) will fertilize the female element of the two distinct species, *O. ornithorhynchum* and *O. divaricatum cupreum*, and yet be completely impotent upon its own female element; nevertheless the susceptibility of the latter (female element) to fertilization is shown by its fertile unions with another individual of the same species, and likewise by a fertile union with an individual of a distinct species, namely, *O. divaricatum cupreum*. Secondly, the male element of *O. microchilum* (No. 2) will fertilize the female element of *O. ornithorhynchum* and *O. divaricatum cupreum*, and likewise another individual of its own species, though on its own female element it is utterly ineffective.

On a New Genus of *Moraceæ*, from Sumatra and Singapore. By Mr. SALPIZ KURZ, Curator of the Herbarium of the Botanic Gardens, Calcutta. With a Note by Dr. ANDERSON. Communicated by T. ANDERSON, M.D., F.L.S.

[Read June 2, 1864.]

[PLATE XIII.]

THE plant, of which a generic diagnosis and a specific description are appended by Mr. Kurz, the newly appointed Curator of the Herbarium of the Calcutta Botanic Gardens, is an imperfectly described species, which yields some of the valuable timber known as Iron-wood in the Dutch East Indian Possessions.

Messrs. Teijsmann and Binnendyk, in describing another tree, *Eusideroxylon Zwageri*, T. et B., which produces Iron-wood (*vide* Tydschrift voor Nederl. Indie, 1863), enumerate the species known to them to afford the same class of timber. These are, *Eusideroxylon Zwageri*, T. et B.; *Namia vera*, Miq.; *Intsia Amboinensis*, Thouars; *Cassia florida*, Vahl; *Memecylon ferreum*, Blume; *Stadmannia Sideroxylon*, DC.; *Dodonæa Waitziana*,