AVERAGE YIELDS IN GRAMMES OF THE YELLOW OR TWELVE MONTHS GUINEA YAM.

Gardens No. and Name.	Feb. 1915, to Nov. 1915 (the last Apr. 1915 to Nov. 1915.)	Jan. 1916, to Nov. 1916.	Dec. 1916, to Dec. 1917.	Feb. 1918, to April 1919.
314. Igangan alo ..	4904	{7544 / 5112}	1819	5856
338. Odo	3175	3142	2273	3111
348. from Paradeniya, Ceylon	1502	4975	1553	4662

AVERAGE YIELDS IN GRAMMES OF DIOSCOREA DUMETORUM, PAX.

Gardens No. and Name	July 1915 to Feb. 1916	Mar. 1916 to Dec. 1916	Dec. 1916 to Jan. 1918.	Feb. 1918 to Apr. 1919.
342. Nfamka	1247	1677	2328	639

	Feb. 1915 to Nov. 1915.	Jan. 1916 to Dec. 1916	Dec. 1916 to Jan. 1918.	Feb. 1918 to Apr. 1919.
344. Esura white ..	2636	2331	2063	1979
346. Esura yellow ..	3090	6126	1180	498
374. do. ..	1361	1417	1123	1764
382. Kamfu yellow ..	—	624	397	4196
392. Kamfu	—	794	936	—

I. H. BURKILL.

SOME NOTES ON THE POLLINATION OF FLOWERS IN THE BOTANIC GARDENS, SINGAPORE, AND IN OTHER PARTS OF THE MALAY PENINSULA.

The daily round in the Botanic Gardens, Singapore, with visits of inspection to Penang or to other places in the Peninsula have afforded scattered opportunities during seven years, of making notes upon the behaviour of insects in regard to flowers. These notes will be brought into one view here.

Apis.

Readers assuredly know what an important rôle the Hive bee, *Apis mellifica,* Linn., plays in the fertilisation of flowers in more northern climates. That domesticated *Apis* is absent from the Malay Peninsula, but *Apis indica,* Fabr., is present and is very similar in size and way of life; it can be domesticated also. It is plentiful in the Peninsula, and is capable of fulfilling the rôle of *A. mellifica* in all points in regard to flowers. It is accompanied in Malaya by the larger *Apis dorsata,* Fabr. and the lesser *Apis florea,* Fabr. The three do yeoman service.

They are common, commoner than the unobservant think, and find the whole of their food in flowers, rivalling the honey bee in diligence, while they raise large broods of young. Because their hunting grounds are so often in the tops of high trees, their occupations are not easily recorded, and their work passes unnoticed, except where their numbers happen to be so great that they attract attention by the hum of their buzzing. Yet it is a common experience to have attention drawn to the flowering of an *Eugenia,* an *Elaeocarpus,* a *Cratoxylon,* a *Kurrimia* or a *Bassia* by the sound of innumerable bees as upon lime-trees in flower in Britain.

The different flowers upon which the three species of *Apis* have been seen are enumerated in the annexed table. In addition unidentified species of *Apis* have been observed upon flowers of the following:—

Cupania pallidula, Hiern,	at Tebong, Malacca.
Erythrina lithosperma, Blume,	in Penang.
Poinciana regia, Bojer,	in Malacca.
Tristania Maingayi, Duthie,	in Penang.

In the Peninsula, *Apis dorsata* has come under observation oftenest as if the most abundant of the three species. It has been timed to visit the flowers of *Antigonum* at the rate of 20 per minute. *Apis indica* at the same time (midday on 18 viii. 1916) was observed to visit 30 flowers per minute. On another occasion various individuals of *Apis dorsata* were seen to visit, one 20 flowers per minute, another 32 flowers per minute, others intermediate numbers (29.i.1916). *Apis florea* upon the same species was seen to go to 20 flowers per minute.

The rate at which the insects work of course depends upon the shape of the flower visited and the number of flowers close together and the time of day. It was recorded in the Journal of the Asiatic Society of Bengal, N. S. ii. 1906, p. 516, that *Apis dorsata* visited varying numbers of flowers of the jute plant, *Corchorus capsularis,* at the average of 28 per minute, and that *Apis florea* visited at the rate 10 to 15, which is less that upon *Antigonum.*

At the rate of 25 flowers per minute in eight hours a bee can effect 12,000 pollinations, or 7,200 pollinations at the rate of 15. These are figures which give an idea of the possible effectiveness of a bee's daily work.

Here and all through unless otherwise stated the insects were sucking honey.

Apis dorsata	Apis indica	Apis florea
Dillenia indica, Linn. collecting pollen in Singapore.		*Pittosporum ferrugineum*, Ait. in Singapore.
Xanthophyllum Curtisii., King, in Singapore, freely		
Camellia theifera, Griff. rarely in Singapore	*Durio zibethinus*, D C. in Singapore.	*Elaeocarpus Griffithii*, Mast., freely, in Singapore.
Roucheria griffithiana, Planch. in Singapore, abundantly.	*Erythroxylum Coca*, Lam. abundantly, in Singapore.	
Kurrimia paniculata, Wall. in Singapore, abundantly.		
Derris thyrsiflora, Benth. in Singapore, freely.	*Derris thyrsiflora*, Benth. in Singapore.	
Peltophorum ferrugineum, Benth. abandantly, in Singapore.		*Peltophorum ferrugineum*, Benth. freely, in Singapore.
Pterocarpus indica, Willd. freely, in Singapore, Penang and Port Swettenham: also abundantly at Taiping by moonlight at 9 p.m.	*Mimosa pudica*, Linn., every now and then, collecting pollen, Singapore and Penang.	
Mimosa pudica, Linn. frequently collecting pollen, in Singapore, Penang, Kuala Lumpur and Port Swettenham.		
Albizzia moluccana, Miq. in Singapore.		
Eugenia grandis, Wight, in Singapore.		
Eugenia lineata Duthie, abundantly, in Singapore.		
Eugenia mooniana, Wight, in Singapore.		

Apis dorsata	Apis indica	Apis florea
Passiflora foetida, Linn , in Port Swettenham.		
Tridax procumbens, Linn. in Port Swettenham.	*Oldenlandia diffiusa*, Roxb., rarely, in Singapore.	
Cosmos sulphureus, Cav. occasionally, in Singapore and Malacca.		
Wulffia stenoglossa, DC. sparingly, in Singapore.		
Lactuca , in Port Swettenham.	*Bzumea balsamifera*, DC., Tampin.	
Jacquemontia violacea, Choisy, in Singapore.	*Jacquemontia violrcea*, Choisy, regularly, in Singapore.	
Antigonon leptopus, Hook. and *A. guatemalense*, Meissn. freely, in Malacca.	*Antigonon leptopus*, Hook., and *A. guatemalense*, Meissn. very freely, in Malacca and Klang.	*Antigonon leptopus*,, Hook. and *A guatemalense* Meissn., freely, in Malacca.
Cymbidium finlaysonianum, Lindl., rarely, in Singapore	*Dendrobium crumenatum*, Sw. rarely, in Singapore.	
Cocos nucifera, Linn freely, in Singapore.	*Cocos nucifera*, Linn. in Singapore.	
Chrysalidocarpus lutescens, Wendl. freely, in Singapore.	*Arenga saccharifera*, Labill. in Singapore.	*Zoysia pungens*. Willd. collecting pollen in Singapore.
Dictyosperma album, W. and D. freely, in Singapore.	*Dictyosperma aibum* , W. & D., in Singapore.	
Oreodoxa regia, H. B. K., in Singapore.		

Apis however on the palms is overwhelmingly found on male flowers, or on flowers in their male stage, obtaining food without giving what would seem to be an adequate return. It is also interesting to see it collecting pollen from the fallen male flowers of *Arenga saccharifera*. This which it has often been seen to do in the Malay Peninsula, has been described also from Calcutta (*Journal of the Asiatic Society of Bengal* N. S. xii, 1916, p. 264), where both *Apis indica* and *A. florea* were seen doing it; *Apis indica* only has been seen doing it in Singapore. Barbosa Rodrigues (Les noces des Palmiers), has recorded that bees visit fallen flowers of the palm *Gulielma speciosa* in Rio de Janeiro, adding that they fly up into the crowns of the trees subsequently and pollinate the female flowers.

Apis indica has been seen sucking honey from fallen flowers of the Durian, *Durio zibethinus*, DC., in Singapore. *Apis dorsata* has been observed to go from calyx to calyx of *Leucas linifolia*, Spreng., obtaining honey after the corolla had fallen, and at the same time neglecting intact open flowers upon the plants.

In the table of the flowers visited by *Apis* indications are given of the frequence or rarity of the insects upon the plants named. All orchids appear to be but rarely visited. *Dendrobium crumenatum*, for instance, despite its conspicuousness and scent, rarely attracts a bee; but *Apis dorsata* is well suited for the pollination of its stigma and has been seen upon one of the rare occasions of its visits to do it. Another orchid, *Cymbidium finlaysonianum*, is rarely visited by *Apis dorsata*, but when visited the visits are effective. Brooke and Hewett have recorded the insect as a rare visitor to the flower in Sarawak, just as it is in Singapore (*Journal of the Straits Branch of the Royal Asiatic Society*, No. 54, 181, p. 106). Ridley in that Journal, (No. 44, 1905, p. 228) records *Apis dorsata* as a visitor to *Grammatophyllum speciosum*, Bl.

Xylocopa.

Larger than *Apis* and much more obtrusive, are the *Xylocopas*, large bees with strong jaws, by which they tunnel into dead timber to make their nests. The males are unimportant as pollinators, but the females get all their food and the food of their young upon flowers. Two species are common, *i.e.* the large black *X. latipes*, Fabr., and the smaller yellow and black *X. aestuans*, Lepel.; a third *X. coerulea*, Lepel., is not uncommon.

Xylocopa latipes is a great robber of flowers, which it rapidly bites open by means of its jaws, biting usually in the middle line just above the calyx at the nearest available point for the honey. It has been seen systematically biting the following flowers:—

Ipomoea digitata, Linn., in the Botanic Gardens, Singapore, the plant being a native of the Tropics generally.

Bignonia magnifica, Bull, in Singapore, the plant being a native of New Granada.

Tecoma leucoxylon, Mart., in the Botanic Gardens, Singapore, the plant being a native of the West Indies.

Jacaranda ovalifolia, R. Br., in Singapore, Tampin, Malacca, and Jasin, the tree being a native of South America.

Schlegelia parasitica, Griseb., in Singapore, a native of the West Indies.

Thunbergia erecta, T. Anders., in Singapore, a native of East Africa.

Asystasia coromandeliana, Nees, in Singapore and in Penang, a native of the East Indies.

Ruellia macrophylla, Vahl, in Singapore, a native of South America.

When biting the flowers of *Asystasia* it works at the rate of 7 to 11 per minute; and the male insect has been seen doing the same along with the female. When robbing *Ipomoea paniculata* it tears open the buds ready to expand, an act already described by Mr. H. N. Ridley in the *Journal of the Straits Branch of the Royal Asiatic Society,* No. 44, 1905, p. 229, as done by it upon the slightly smaller *Ipomoea palmata,* Forsk., a species also pantropical.

Tubular flowers upon which *X. latipes* has been seen to visit in the intended way are:—

Fagraea fragrans, Roxb., in Singapore.

Fagraea racemosa, Jack, in Penang.

Thunbergia grandiflora, Roxb., in Singapore, Penang and Tebong in Malacca.

Thunbergia laurifolia, Lindl., in Singapore and Penang.

Eranthemum reticulatum, Hort., in Singapore.

Caryopteris wallichiana, Schau., in Singapore.

All these are eastern plants, whereas the tubular flowers which the bee robs are often American. The close connection of the bee with the two Thunbergias has been remarked in the *Journal of the Asiatic Society of Bengal,* N. S. ii., 1906, pp. 511-514 and xii., 1916, p. 245.

Xylocopa latipes seems to be the insect most suited to the upside-down *Leguminosae,* and in Singapore regularly visits the flowers of:—

Canavalia ensiformis, DC.

Centrosema Plumieri, Benth.

Apparently their fruit setting is almost dependant upon the insect.

X. latipes visits many Leguminosae which carry their flowers in a normal way, such as:—

Dioclea lasiocarpa, Mart., in Singapore, freely.
Derris thyrsiflora, Benth., in Singapore, rarely.
Dolichos Lablab, Linn., in Penang and Butterworth.
Cajanus indicus, Spreng., in Singapore.
Pterocarpus indica, Willd., in Singapore.
Peltophorum ferrugineum, Benth., in Singapore, freely.
Cassia corymbosa, Lam., in Penang.
Cassia alata, Linn., in Penang and at Alor Gajah.
Cassia javanica, Linn., in Penang.
Cassia siamea, Lam., in Singapore.
Saraca thaipingensis, Cantl., in Singapore, freely.
Saraca declinata, Miq., in Singapore, freely.
Saraca indica, Linn., in Singapore, freely.

It is a particularly busy insect upon *Dioclea*, *Peltophorum* and the *Saracas*.

It has been recorded as visiting also:—
Cratoxylon polyanthum, Korth., in Singapore.
Pterospermum acerifolium, Willd., in Singapore.
Adinandra dumosa, Jack, in Singapore.
Hiptage Madhablota, Gaertn., in Singapore.
Eugenia zeylanica, Wight, in Singapore.
Melastoma malabathricum, Linn., in Singapore, at Tampin and at Alor Gajah.
Turnera odorata, Rich., at Jasin.
Morinda citrifolia, Linn., at Tampin.
Lantana Camara, Linn., on Government Hill, Penang.
Grammatophyllum speciosum, Blume, in Singapore.

Of these it is common and diligent upon *Cratoxylon* particularly. It is more often seen on *Melastoma malabathricum* than the extremely meagre return of honey would seem to justify. On the flowers of *Grammatophyllum* it is not at home; it tries one or two and in the writer's experience soon quits the plant; but when observed by Mr. H. N. Ridley, in the *Journal of the Straits Branch of the Royal Asiatic Society* No. 44, 1905, p. 228, it commonly visited the flowers, and by its weight so depressed the lip that it did not pollinate them.

It is rather clumsy upon the flowers of *Turnera,* rarely taking all the available honey, because it treats the flower as if bilaterally symmetrical. As a consequence of its considerable weight the flower nods when visited, and the bee then visits either above or below the sexual organs but not both, and does not make a circuit of the five nectaries. The pollen of the plant may thus be caught on the bee's back or on the bee's belly; but it has been seen that quite a sufficient amount may be carried.

Xylocopa aestuans bites flowers just as *X. latipes* does. It settles outside and make a hole in the middle line of most of them; but on *Dolichos Lablab* it may settle and turning to the left bite a hole upon the right side of the calyx where the honey is most

accessible to its short tongue. That it should bite upon the right side and not upon the left is most interesting; for *Bombus haemorrhoidalis,* Smith, a Bumble Bee of the Himalaya has been recorded (*Journal of the Asiatic Society of Bengal,* N. S. ii, 1906, p. 524) as biting upon the right side of the corollas of a *Scutellaria.* Such a development of a left-handedness in Bees might be invoked to account for the peculiar twist found in flowers so distinct from one another as *Dicliptera* in the Acanthaceae, *Pedicularis* in the Scrophulariaceae, *Plocoglottis* in the Orchidaceae, and others. It has been seen to bite the calyces of *Clitorea Ternatea,* Linn., in Malacca, but no record has been preserved of the position of the bite.

X. aestuans has been seen using old holes in the flowers of *Clitoria cajanifolia,* Benth., in Singapore, holes which it may have made in an earlier part of the day, but it was not seen at the biting. These holes were also on the right side of the flower.

It has been seen biting the following flowers in the middle line of the corolla,—

Torenia Fournieri, Linden, in Singapore, the plant being a native of Indo-China.

Bignonia magnifica, Bull, in Singapore, the plant being a native of New Granada.

Barleria cristata, Linn., in Singapore, the plant being a native of India.

Ruellia tuberosa, Linn., in Malacca, the plant being a native of America.

Asystasia coromandeliana, Nees, in Singapore, Penang, Kuala Lumpur, Malacca and at Tebong in Malacca, the plant being Indo-Malayan.

Hosea Lobbii Ridl., in Singapore, the plant being a native of Borneo.

The countries of the origin of the flowers bitten by the two Xylocopas, *X. latipes* and *X. aestuans* have been given above after each name.

Six of the plants are native of the New World, and consequently are new sources of food which our gardens provide to these insects: eight are native of the Old World, being one from Africa and seven from the Indo-Malayan tropics.

Like *X. latipes, X. aestuans* has been seen upon upside-down Leguminosae, but on *Canavalia lineata,* DC. only, and this only at Pangkalan Balak upon the coast west of Malacca.

It pollinates other Leguminosae, notably:—

Crotalaria striata, DC., all through the Territory of Malacca, freely.

Derris thyrsiflora, Benth., in Singapore, freely.

Phaseolus lunatus, Linn., in Singapore, freely.

Pachyrrhizus angulatus, Rich., in Singapore, freely.

Peltophorum ferrugineum, Benth., in Singapore, freely.

Pterocarpus indica, Willd., in Singapore.

It has already been recorded as a visitor to *Crotalaria striata*, in the *Journal of the Asiatic Society of Bengal*, N. S. xii, 1916, p. 247.

It visits also the following bilaterally symmetrical flowers:—

Xanthophyllum Curtisii, King, in Singapore, freely.
Hiptage Madhablota, Gaertn., in Singapore, freely.
Melastoma malabathricum, Linn., in Singapore.
Stachytarpheta jamaicensis, Schau., in Singapore, rather freely.
Coleus Blumei, Benth., in Singapore.
Grammatophyllum speciosum, Blume, in Singapore.

The rate at which it works upon the flowers of *Xanthophyllum Curtisii* is 20 to 25 flowers per minute. 'On *Asystasia coromadeliana* it was observed in Malacca to go to 25 flowers per minute sometimes biting, sometimes using old holes.' On *Antigonon leptopus* different individuals have been seen to visit, one 20 flowers per minute, another 34, another 40, another 46, one 50 flowers per minute (2. viii. 1915) and one 52 flowers per minute (8. viii. 1919).

X. aestuans is not at home upon the flowers of *Grammatophyllum speciosum*; but every now and then it may be seen seeking their honey and generally standing on the back of the column where its visit is useless to the flower, pushing its tongue over the shoulder of the column. Mr. Ridley had not seen it to remove the pollinia (*Journal of the Straits Branch of the Royal Asiatic Society*, No. 44, 1905, p. 228), nor has the writer.

It has been seen to go in considerable numbers to the downwardly directed flowers of:—

Adinandra dumosa, Jack, in Singapore.
Mimusops Elengi, Linn., in Singapore.
Ardisia humilis, Vahl., in Singapore.

and also to the following:—

Cleome heptaphylla, Linn., in Singapore.
Hibiscus schizopetalus, Hook. f., at Tampin, collecting pollen.
Connarus semidecandrus, Jack, in Singapore.
Mimosa pudica, Linn., in Singapore and at Tebong, Malacca, collecting pollen.
Eugenia lineata, Duthie, in Singapore.
Eugenia zeylanica, Wight, in Singapore.
Passiflora foetida, Linn., in Singapore.
Passiflora raddiana, DC., in Malacca and in Tampin.
Turnera ulmifolia, Linn., in Singapore.
Turnera odorata, Rich., in Jasin, freely.
Cosmos sulphureus, Cav., in Malacca.
Morinda citrifolia, Linn., in Jasin.
Fagraea racemosa, Jack, in Penang.
Petrea volubilis, Linn., in Penang, freely.
Buckinghamia celsissima, F. v. Muell., in Singapore, frequently.
Antigonon leptopus, Hook., in Malacca, frequently.
Antigonon guatemalense, Meissn., in Malacca.

It is unsuited for pollinating Passifloras, passing under the anthers in making a circuit of the flower. It has been seen seeking honey in vain upon the flowers of *Solanum indicum*, Linn.

Xylocopa coerulea is a much rarer insect than *X. latipes* or *X. aestuans*. It seems to show a preference for flowers which face earthwards, and in Singapore has been seen chiefly upon *Adinandra dumosa*, Jack, from which it appears just able to extract the honey. The angry buzz which it often gives in the attempt would appear likely to cause loose pollen to fall upon it. It visits in Singapore also *Mimusops Elengi*, Linn. On Government Hill, Penang, it has been seen at 2000 feet upon *Adinandra dumosa*. It has been seen near Ipoh upon the very differently disposed flowers of *Lantana Camara*, Linn.

An undetermined *Xylocopa* has been seen on *Vitex trifolia*, Linn. f., near Tampin, sucking honey (27. vii. 1915).

Anthophora.

Anthophora zonata, Linn., which is a bee smaller than the above named species of *Xylocopa*, but larger than the species of *Apis*, has been seen upon the flowers of:—

Derris thyrsiflora, Benth., in Singapore.
Mimosa pudica, Linn., collecting pollen at Ipoh.
Ardisia humilis, Vahl, in Singapore.
Stachytarpheta jamaicensis, Schau., in Ipoh.
Stachytarpheta mutabilis, Vahl, on Government Hill, Penang.

Melipona.

The little bees of the genus *Melipona* are excessively common in the Malay Peninsula, perhaps in greater numbers than *Apis*. They get their food off flowers, making nests in holes with a resinous lining; they may be seen at coagulating latex sometimes trying to carry it off for their homes.

Meliponas have been seen upon the following flowers:—

Dillenia indica, Linn., in Singapore, collecting pollen.
Impatiens Ridleyi, Hook. f., in Kuala Lumpur.
Heritiera macrophylla, Wall., in Singapore, at honey and collecting pollen.
Derris thyrsiflora, Benth., in Singapore.
Cassia fistula, Linn., in Singapore, collecting pollen.
Mimosa pudica, Linn., in Penang, collecting pollen.
Melastoma malabathricum, Linn., in Singapore and in Penang, collecting pollen.
Melastoma decemfidum, Jack, in Penang, collecting pollen.
Baeckia frutescens, Linn., on Government Hill, Penang.
Ardisia humilis, Vahl, in Singapore.
Lantana Camara, Linn., at Tanjong Malim.
Thottea grandiflora, Rottb., on Gunong Tampin, collecting pollen once only.

Antigonon leptopus, Hook., in Malacca.

Dictyosperma album, W. & D., in Singapore.

Oreodoxa regia, H. B. K., in Singapore

Nipa fructicans, Thunb., at Port Swettenham, collecting pollen.

Cocos nucifera, Linn., in Singapore.

Homalonema coerulescens, Jungh., in the Selandar forest, Malacca, imprisoned in closed spathes.

Upon the flowers of such plants as *Cassia* and *Melastoma,* as it visits the stamens only, it does no good in the way of pollinating them.

Small undetermined Apiids have been seen upon:—

Melastoma malabathricum, Linn., in Singapore.

Petrea rugosa, H. B. & K., in Singapore.

Asystasia travancorica, Bedd., in Singapore.

Asystasia coromandeliana, Nees, in Singapore and Malacca.

Ipomoea pes-caprae, Sweet, on Pulau Tiuman.

Mimosa pudica, Linn., at Batang Malaka, Malacca.

Antigonon leptopus, Hook., in Malacca and Klang.

Vespidae.

Wasps often eat as much animal food as vegetable food, and therefore are less useful to flowers than the bees. The big *Vespa cincta,* Fabr., to which Mr. Ridley ascribes the pollination of *Grammatophyllum speciosum* (*Journal of the Straits Branch of the Royal Asiatic Society,* No. 44, 1905, p. 228) goes to flowers at times for honey, and at times to prey on bees. The writer has never seen it pollinating any orchids, but has seen it sucking honey upon the flowers of *Vitis* in Penang and of *Antigonon leptopus* in Malacca.

Other wasps have been seen upon the flowers of *Morinda citrifolia,* Linn., near Tampin, and *Scyphiphora hydrophyllacea,* Gaertn., at Port Swettenham, on *Baeckia frutescens,* Linn., at Penang, and on *Embelia dasythyrsa,* Miq., near Alor Gajah.

Butterflies and Moths.

Flowers particularly suited for fertilisation by butterflies have not come under observation to any great degree. Among the following, only *Ixora* and *Scyphiphora* are really suited.

Eugenia lineata, Duthie, many butterflies in Singapore.

Mussaenda erythrophylla, Sch., a Papilio, in Singapore.

Ixora macrothyrsa, B. & T., a Papilio, in Penang.

Veronia cinerea, Less., Lycaenids, in Singapore.

Roupellia grata, Wall., a Hesperid, in Penang.

Lantana Camara, Linn., two or three species of butterflies at Tanjong Malim.

Stachytarpheta jamaicenis, Schau., three butterflies in Penang and Malacca.

Asystasia coromandeliana, Nees, a Lycaenid, in Singapore.

Scyphiphora hydrophyllacea, Gaertn., a butterfly, at Port Swettenham.

Dracaena fragrans, Ker-Gawl., a Hesperid, in Singapore.

The observation of a Hesperid trapped in a flower of *Dipladenia Harrisii* recorded in this *Bulletin,* I, No. 10 p. 355, was made again upon April 4th 1917, the species of Hesperid being the same.

Flies such as Syrphids and Muscids are at times quite common on open flowers.

Sun-Birds.

Bird fertilisation is much less common in the topics of the Old World than in the tropics of the New. However there is one little sun-bird, which visits flowers in the Peninsula commonly, namely *Cyrtostomus pectoralis,* Horsf.

In the Botanic Gardens, Singapore it has been seen upon the following flowers:—

Hibiscus Rosa-sinensis, Linn., and its garden hybrids, commonly.

Saraca thaipingensis, Cantley.

Dipladenia Harrisii, Hook., taking advantage of holes made by squirrels in the swollen base of the corolla-tube.

Russelia juncea, Zucc.

Russelia sarmentosa, Jacq.

Clerodendron Thomsonae, Balf.

Dendrobium secundum, Wall.

Canna, garden hybrids.

Dictyosperma album, W. & D., possibly eating small insects.

Elsewhere it has been seen upon *Erythrina lithosperma,* Blume, (Batang Malaka, 30. i. 1916) and on *Stachytarpheta mutabilis* (Government Hill, Penang, 31. vii. 1917).

Bird-visits to the flowers of *Hibiscus* are well known, and they appear effectively to pollinate the flowers. Birds are recorded as visitors in Zanzibar, India and Java to them. *Russelia juncea* has been recorded as bird-visited in India, and *Canna* as bird-visited in South America and South Africa.

The common Malayan squirrel, sometimes goes to flowers that offer plenty of sweetness such as *Erythrina* or *Durio,* where the destruction done is out of all proportion to the good.

I. H. Burkill.