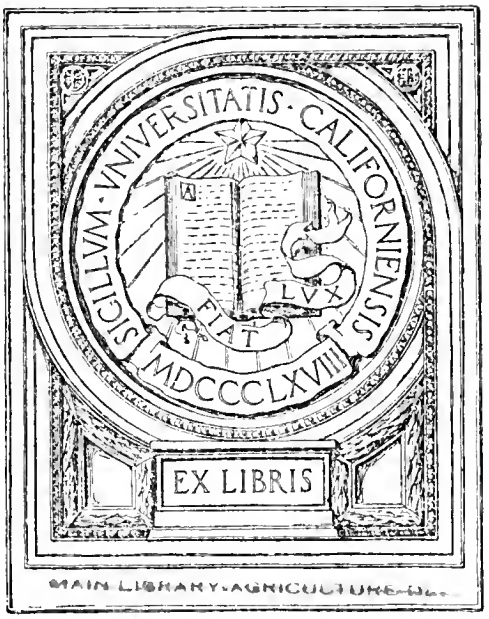

MINISTRY OF AGRICULTURE, EGYPT.

Technical and Scientific Service.

Bulletin No. 22.

OBSERVATIONS ON THE COCCIDÆ OF EGYPT,

By W. J. HALL, A.R.C.S., F.E.S.,

Entomologist, Ministry of Agriculture.

(Edited by the Publication Committee of the Ministry of Agriculture.)

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INTRODUCTION.

The literature on the COCCIDÆ of Egypt is confined to a series of isolated records, and in view of the economic importance of this family I propose in the present paper to put on record the species which we have in the collections of the Ministry of Agriculture. In all fifty-six species are recorded, and it is hoped that in subsequent papers this list will be greatly augmented; it is probable that over a hundred described species exist in the country and doubtless some new to science will be collected, especially when time permits of a careful examination of the desert flora.

Existing records show that a number of species have been described originally from Egyptian material, for the most part by Newstead in the Bulletin of Entomological Research. With one or two exceptions all of the recorded species—and many hitherto unrecorded species—are found in the collections of the Ministry and are here recorded; the remaining will be found sooner or later and included in a subsequent paper.

It is fully realized that the present paper is very incomplete, but it is thought that our present records, incomplete though they may be, will be of some value until such time as a more complete collection can be worked up.

Throughout I have followed the nomenclature as given in Fernald's "Catalogue of the COCCIDÆ." I should have preferred to give a complete description of the characters of each species recorded, but such descriptions are useless without illustrations, and it would be difficult to get the plates required executed in this country. I have therefore confined myself to a brief description of the external characters, pointing out any peculiarities, and I have only referred to the microscopic characters where my preparations show any divergence from type. Under the bibliography of each species I have given one or two references where complete descriptions with figures may be found. Many of these references are to Green's "COCCIDÆ of Ceylon," Newstead's "Monograph of the British COCCIDÆ" and to Newstead's excellent descriptions in the "Bulletin of Entomological Research" from which I have occasionally taken the liberty of freely quoting.

A complete list of the host plants is given, and in the case of species which have proved definite pests I have made some remarks

on the outbreak and the control measures adopted. The list of COCCIDÆ given as affecting different plant genera is on the lines of Green's very useful list published in the "Annals of Applied Biology" 1919. The appendix gives a list of species collected in the Jaffa District and Jerusalem during a short visit to Palestine at the end of last year.

I am much indebted to Mr. Laing, of the British Museum (Natural History), for very kindly identifying many species for me and for checking many doubtful identifications of my own. My thanks are also due to Mr. E. E. Green and Mr. Willcocks (Sultanic Agricultural Society of Egypt) who have been good enough to give me many specimens.

MINISTRY OF AGRICULTURE, EGYPT.

Bulletin No. 22.

OBSERVATIONS ON THE COCCIDÆ OF EGYPT.

Subfamily MONOPHLEBINÆ.

1. Icerya ægyptiaca Douglas. (The Egyptian Mealy Bug.)

Bibliography: Dougl., Ent. Mon. Mag., xxvi, p. 79 (1890).

The adult female is orange in colour, this colour being obscured by the waxy secretions covering the body. From the margin of the body projects a fringe of opaque, snow-white, stout, tapering processes which tend to become curved towards their extremities. The cottony ovisac has a smooth white felted surface faintly striated longitudinally: it is found under the abdomen and extends beneath the posterior processes almost to their extremities.

Length of adult female 5–7 millimetres. Breadth 4–5 millimetres.
Length of processes 3–5 millimetres.

Host Plants.

Anacardiaceæ	*Schinus terebenthifolius*, *Mangifera indica* (Mango).
Anonaceæ	*Anona squamosa* (Sweet sop).
Euphorbiaceæ	*Acalypha* spp.
Leguminosæ	*Poinciana regia*, **Parkinsonia aculeata*.
Lythraceæ	*Lawsonia alba*.
Malvaceæ	*Hibiscus* spp.
Meliaceæ	**Melia azederach*.
Moraceæ	**Ficus benghalensis* (Banyan tree), **F. elastica*, **F. infectoria*, **F. nitida*, *F. platyphylla*, *F. sycomorus*, *Morus* spp.
Myrtaceæ	**Psidium guajava* (Guava).
Palmaceæ	*Phœnix dactylifera* (Date-palm), *Latania* sp.
Rhamnaceæ	*Zizyphus* sp.
Rosaceæ	*Pyrus communis* (Pear), *Rosa* sp. (Rose).
Rutaceæ	*Citrus* spp. (Orange, Mandarine, etc.)
Sapotaceæ	*Sapota acra*.
Verbenaceæ	*Lantana* sp.
Vitaceæ	*Vitis Vinifera* (Vine).

* Most susceptible host plants are indicated by an asterisk.

Part of Plant attacked.

Leaves, young stems, or fruits.

Remarks.

This species was originally described by Douglas from material collected at Alexandria (*loc. cit.*). It is very widely distributed in Egypt, and in Cairo, Alexandria, and Suez, it is a decided pest. The street trees of Cairo, many of which are species of *Ficus*, suffer every year and in particular *F. nitida* and *F. infectoria*. Fortunately the *Ficus* spp. are hardy trees, or the damage would be very much greater than at present. Periodically the Cairo street trees are sprayed with a jet of water, and this has a beneficial effect by washing away many of the insects and thus keeping the attack within reasonable limits.

2. Icerya purchasi Mask. (The Australian Fluted Scale).

Bibliography: Mask., N.Z. Trans., xi, p. 221 (1878).

The adult female is ovoid and dark reddish, the colour being somewhat obscured by white secretionary matter. The ovisac is very characteristic, having a surface of closely matted fibres fluted longitudinally; it extends underneath the body of the insect, tilting it forward on to its anterior margin, and beyond the posterior extremity of the abdomen to a distance of about 4–5 millimetres.

Length of adult female 5–6 millimetres. Breadth 3·5–4·5 millimetres.

Host Plants.

Bignoniaceæ	**Jacaranda mimosæfolia.*
Euphorbiaceæ	**Acalypha* sp., *Phyllanthus* sp.
Labiatæ	*Salvia* sp.
Leguminosæ	*Acacia arabica* (Sunt), *Acacia* spp., *Bauhinia* spp., *Cæsalpinia sepiaria*, *Cæsalpinia* sp., *Cajanus indicus* (Pigeon Pea).
Malvaceæ	*Althæa rosea* (Hollyhock).
Moraceæ	*Ficus* spp.
Pittosporaceæ	**Pittosporum* sp.
Punicaceæ	*Punica granatum* (Pomegranate).
Rosaceæ	**Rosa* sp. (Rose).
Rutaceæ	**Citrus medica* (Lemon), *Citrus nobilis* (Mandarine).

Part of Plant attacked.

Leaves, young stems, and fruits.

Remarks.

This species is very generally distributed in Egypt, but can hardly be regarded as a pest. It is largely kept under control by certain Coccinellidæ. Lemon trees in Upper Egypt occasionally get a heavy infestation.

Subfamily **ORTHEZIINÆ.**

3. **Orthezia insignis** Douglas.

BIBLIOGRAPHY: Newstead, Mon. Brit. Cocc., Vol. ii, p. 236.

The adult female is broadly ovoid, dark green and has a fringe of white secretionary plates round the margin. Two very thin lines of white secretionary matter set fairly close together run longitudinally on the dorsum. The ovisac is white, elongated longitudinally, striated, and has parallel sides being the same width as the insect itself. The posterior half of the ovisac is usually curved slightly upwards, *i.e.* away from the host plant, and the parent can move about quite readily with her ovisac.

Length 1–5 millimetres. Length of adult female and ovisac 4–5 millimetres.

HOST PLANTS.

Verbenaceæ ... ... *Clerodendron* sp. (Chinese Jasmine).

PART OF PLANT ATTACKED.

Leaves and branches.

REMARKS.

This species, which in other countries is a decided pest and occurs on many host plants, has only been found at Alexandria in four or five gardens and on one host plant—Chinese Jasmine. I have seen a hedge of this plant at Alexandria completely killed by the insect, but I was unable to find it on any of the other plants in the immediate vicinity.

Subfamily **DACTYLOPIINÆ.**

4. **Asterolecanium bambusæ** Boisd. (THE BAMBOO SCALE).

BIBLIOGRAPHY: Newstead, Mon. Brit. Cocc., Vol. ii, p. 151 (1903).
Green, Cocc. of Ceylon, Part iv, p. 328.

Test of the adult female oval, convex, smooth, glassy and transparent; generally tinged with pale green, grey, or yellow. The outline of the sublying insect and eggs is apparent. The test bears a continual marginal fringe of glassy filaments of equal length. Old adult females have usually a darkened area anteriorly due to the darkened colour of the adult female late in life.

Specimens collected in this country exhibit a considerable variation in size.

Length 1–3 millimetres. Breadth 0·5–2 millimetres.

Host Plants.

Gramineæ ... ... *Bambusa* sp. (Bamboo).

Part of Plant attacked.

Leaves and stems.

Remarks.

This species is found on Bamboos all over Egypt.

5. **Asterolecanium pustulans** var. **sambuci** Ckll.

(The Fig Scale or Cup Scale.)

Bibliography: Cockerell, Journal Inst. Jam., i, p. 143 (1892).
Cockerell, Entomologist, Vol. xxxvi, 1903, p. 112.
Debski, Mem. Ent. Soc. d'Egypte, 1918, pp. 11, 18.

The test of the adult female is almost round, from yellow to green in colour, semi-transparent and glassy in texture. The margin bears a continuous fringe of glassy filaments and similar filaments arise from the dorsum somewhat sparsely but sometimes giving quite a hairy appearance.

This insect causes local irritation in the case of Fig trees, Oleanders, and a few other host plants, inducing a ring of local growth just outside the margin of the insect. The old adult female is found quite deep down in the cup thus formed. This is most marked in the case of Fig trees and Oleanders.

Some variation exists in the colour of specimens collected in this country, but the size is fairly constant.

Diameter 1·5–2 millimetres.

This species has hitherto gone under the name of *A. pustulans* Ckll., but I think there is no doubt that it is really *A. pustulans* var. *sambuci* Ckll. Debski, in his excellent Memoir on the "Galls of Egypt" (*loc. cit.*), points out that the Egyptian species is not *Ast. fimbriatum* (Boyer de Fonsc.) as has been suggested by Lindinger and Marcell. *A. fimbriatum* has two rows of double marginal glands, whereas our species only has a single row. The question to decide is whether it is *A. pustulans* or the variety *sambuci*. I have Cockerell's description of the latter, but unfortunately not of the former. Debski (p. 18 *loc. cit.*) says " Le Coccide diffère de *A. fimbriatum* (Boyer) par la couleur distinctement rougeâtre de ses filaments qui, avec la couleur

jaune de l'insecte, forment une teinte orangée assez prononcée ; par ses glandes marginales circulaires beaucoup plus petites que les dorsales (6 μ de diamètre), disposées en paires, presque contigues dans chaque paire, les paires étant séparées par des intervalles de 2 μ ; les filaments marginaux produits par ces glandes, séparés, non connés, longs de 200 μ environ, beaucoup plus courts que les filaments dorsaux ; par le dos couvert en entier par des paires très nombreuses de glandes semi-elliptiques, chaque paire formant ensemble une ellipse de 12×9 μ et émettant des filaments étroitement soudés qui atteignent jusqu'à 500 μ de longueur." My specimens agree with the above description except that I find the interval separating the paired marginal glands is not invariably 2 μ. In the majority of specimens they are very close together, approximately 2 μ, but in a few it is as much as 6 μ and even 9 μ. In these cases the interval is not uniform round the margin and varies from 2 μ or 4 μ at one place to 6 μ or 9 μ in another.

Cockerell states in his description of var. *sambuci* " Mouth parts brownish, diameter about 60 μ ; scattered large figure of eight (double) glands in the skin, diameter of a gland 12 μ ; margin with two rows of simple glands and one row of double, the single glands at intervals of about 9 μ, the double glands about 9 μ diameter and 3 (rarely 6) μ apart."

This description agrees closely with my preparations in which I find a pair of the dorsal double glands form an ellipse 12×9 μ and a pair of the marginal double glands one of 9×6 μ, the intervals between the latter being usually 2 (rarely 9) μ. There are two rows of single glands, the glands of the row nearest that of the double glands being 8 μ apart and those of the outer row being 17 μ apart.

The only description of *A. pustulans* Ckll. that I have is that of Brain (Bull. Ent. Res. 1920, p. 111) in which he states that there is only a single row of single glands and that the double glands on the body surface are of two sizes. Cockerell, in his description of the var. *sambuci*—the original material incidentally coming from Egypt—states that the double glands of the margin are larger and very much closer together than in *A. pustulans*, and I think therefore there can be no doubt that our specimens are referable to this variety.

Debski (*loc. cit.*) records *Caryota* sp. (Palmæ) as an additional host plant.

Host Plants.

Anonaceæ	*Anona squamosa* (Sweet sop).
Apocynaceæ	**Nerium oleander.*
Bignoniaceæ	*Jacaranda mimosæfolia.*
Caprifoliaceæ	*Viburnum tinus.*
Flacourtiaceæ	*Flacourtia catafracta.*

Geraniaceæ	**Pelargonium* sp. (Geranium).
Leguminosæ	*Acacia decurrens* (Wattle), *Cassia fistula*, *Cassia* sp., *Bauhinia* spp., *Ceratonia siliqua*, *Erythrina* spp.
Malvaceæ	*Hibiscus esculentus* (Bahmia), *H. rosæ*, *H. rosa-sinensis*, *H.* sp.
Moraceæ	**Ficus carica* (Fig), *F. nitida*, *F. sycomorus*, *Morus* spp.
Nyctagineæ	**Bougainvillea* sp.
Oleaceæ	*Jasminum* sp.
Passifloraceæ	*Passiflora quadrangularis* (Passion Vine).
Pittosporaceæ	*Pittosporum* sp.
Proteaceæ	**Grevillea* spp.
Rhamnaceæ	*Zizyphus* spp.
Rosaceæ	*Prunus persica* (Peach), *Prunus armeniaca* (Apricot), *Pyrus malus* (Apple).
Salicaceæ	*Salix* sp. (Willow).
Sapotaceæ	*Sapota acra*.
Solanaceæ	*Solanum* sp.
Sterculiaceæ	*Guazuma tomentosa*, *Sterculia* sp.
Vitaceæ	*Vitis vinifera* (Vine).

Part of Plant attacked.

Almost invariably the branches, but ocasionally found on the fig itself and on the midrib of the leaf.

Remarks.

The "Cup Scale" is very common in Egypt and is a decided pest of Figs, particularly in the Faiyûm—the big fig-growing district. The usual remedy advocated is a winter wash of lime, salt, and sulphur. Experiments were carried out with this spray in the Faiyûm 1914–1917 (Gibson, Agric. Journal of Egypt, Vol. x, 1920, p. 40) with apparently beneficial results.

6. Eriococcus araucariæ Mask.

Bibliography: Maskell, N.Z. Trans., xi, p. 218 (1878).

The adult female is greenish yellow, elongated, oval with two prominent anal lobes, each bearing a long hair. The ovisac is elongated, oblong, highly convex, white, closely felted, forming a complete shell over the female within which the eggs are laid.

Length of adult female 1 millimetre. Length of ovisac 2–3 millimetres.

Host Plants.

Coniferæ	*Araucaria* sp.

Part of Plant attacked.

The leaves and young stems.

Remarks.

Up to the present this species has only been found at Alexandria where it is quite common on the Araucarias.

7. **Lecaniodiaspis africana** Newst.

Bibliography : Newstead. Bull. Ent. Res., 1911, p. 100.

Young adult female dusky red-brown, brown, or smoky brown, generally protected by a thin coating of grey or ochreous and somewhat granular secretion. Rather elongated and shaped somewhat like a *lecanium*; dorsum with a very pronounced keel, at the base of which is a regular series of short transverse ridges, interrupted in the centre by a deep longitudinal groove.

The female ovisac is very closely felted and straw-coloured. Form short ovate and very highly convex; posterior half with a faint trace of a short median ridge, but this is, in old examples, more or less broken up into a series of faint tubercular projections; on either side of the central ridge are a number of transverse ridges, varying in intensity according to the age of the individual, but in all cases they are interrupted centrally, and in old examples they are often represented merely by minute tubercular projections.

The above is part of the original description given by Newstead (*loc. cit.*).

Male puparium white or cream coloured elongated oval. Length of adult female 3·5–4 millimetres. Length of ovisac 5 millimetres. Length of male puparium 1·5–2 millimetres.

Host Plants.

Leguminosæ	*Acacia arabica* (Sunt).
Moraceæ	*Ficus* spp.

Part of Plant attacked.

The stems.

Remarks.

This species is not very common, but is widely distributed in Egypt. It was originally described by Mr. Newstead from material collected by Mr. Willcocks in Egypt.

8. **Phenacoccus hirsutus** Green. (The Hibiscus Mealy Bug).

Bibliography: Green, Memoirs. Dept. Agric. India, 1908, p. 25.

Adult female reddish slightly elongated and ovate and sparsely covered with white mealy wax, the colour of the body showing through especially at the articulation of the abdominal segments. Marginal appendages absent, but frequently a little cottony secretion at the posterior extremity; this is hardly referable to appendages. Ovisac white, surface of closely matted fibres parallel-sided and highly convex. Eggs pinkish with a well marked zone of deeper pink at one extremity. Young female active.

Length of adult female 2–3·5 millimetres. Breadth 0·9–2 millimetres. Length of ovisac 4–5 millimetres.

Host Plants.

The host plants of this mealy bug are so numerous that I give only the genera of plants attacked. A complete list of the species will be found in Bulletin No. 17 published by the Ministry of Agriculture ("*Phenacoccus hirsutus* Green. The Hibiscus Mealy Bug," by W. J. Hall).

Anacardiaceæ	*Mangifera. Schinus.*
Anonaceæ	**Anona.*
Apocynaceæ	*Carissa, Nerium.*
Araliaceæ	*Sciadophyllum.*
Bignoniaceæ	*Bignonia, Jacaranda, Kigelia, Tecoma.*
Caricaceæ	*Carica.*
Combretaceæ	*Terminalia.*
Ebenaceæ	**Diospyros.*
Elæagnaceæ	*Elæagnus.*
Euphorbiaceæ	*Acalypha, Croton, Poinsettia, Ricinus.*
Flacourtiaceæ	*Aberia.*
Leguminosæ	**Acacia, *Albizzia,* Bauhinia, Cæsalpinia, *Cajanus, Cassia, *Ceratonia, Dalbergia, *Erythrina, Inga, *Parkinsonia, Phascolus, Poinciana, *Robinia, Sesbania, Templetonia.*
Lythraceæ	*Lawsonia.*
Malvaceæ	*Abutilon, Althæa, *Gossypium, *Hibiscus, Malvaviscus, Paritium, Pavonia.*
Meliaceæ	*Melia.*
Moraceæ	*Ficus, *Morus.*
Musaceæ	*Musa.*
Myrtaceæ	*Eugenia, Myrtus, *Psidium.*
Nyctagineæ	*Bougainvillea.*
Oleaceæ	*Jasminum.*
Palmaceæ	*Phœnix.*
Passifloraceæ	*Passiflora.*

Plumbaginaceæ	*Plumbago.*
Proteaceæ	**Grevillea.*
Punicaceæ	*Punica.*
Rhamnaceæ	**Zizyphus.*
Rosaceæ	*Cratægus, Eriobotrya, Prunus, Pyrus, Rosa.*
Rubiaceæ	*Adina.*
Rutaceæ	*Citrus.*
Salicaceæ	*Salix.*
Solanaceæ	*Solanum.*
Tiliaceæ	*Corchorus.*
Verbenaceæ	*Duranta, Lantana.*
Vitaceæ	*Vitis.*

N.B.—From the above it will be seen that the families containing the genera most heavily attacked are LEGUMINOSÆ, MALVACEÆ, MORACEÆ, PROTEACEÆ, and RHAMNACEÆ.

PART OF THE PLANT ATTACKED.

This pest has been found on all the aerial parts of a plant and in one or two isolated cases on the roots. It shows a marked preference for the growing points and young shoots to which it gives a gnarled appearance. In winter the ovisacs can be found in large numbers on the barks of trees that have been heavily infected the previous summer, and it is not uncommon to see a Lebbekh or a Mulberry tree with a white bole due to the accumulation of ovisacs.

REMARKS.

This species, which is commonly known in Egypt as the "Hibiscus Mealy Bug," has been a very serious pest in Cairo for the last four years. This outbreak has been fully dealt with in the paper referred to above. At present this pest only occurs in Cairo and certain towns in Upper Egypt and every precaution has been taken to prevent the enlargement of the infected area. Legislation has been enacted regulating the transport of plants and fruit from the infected area, the nursery gardens are kept as far as possible clean and the replacement of heavily attacked trees by less susceptible varieties is urged. The attack in the summer of 1921 was very much less in Cairo as a result of these measures, except in the areas where the advice was disregarded. The gradual replacement of the worst host plants should relegate this species in time to the position of a minor pest.

Considerable uneasiness has been felt as to the possible danger to the cotton crop. Cotton is a host plant which is particularly congenial to *Phenacoccus hirsutus* Green, but as it is an annual and the number of permanent trees and shrubs in the fields is very small I think the danger of a serious outbreak on cotton is remote. In places where cotton has been grown in the immediate vicinity of heavy infection, generally close to a village or town, considerable

damage has been done, but this has only occurred in a few isolated instances.

Incidentally it is almost impossible to spray against the Hibiscus Mealy Bug with a full measure of success. A paraffin emulsion is quite efficacious, but there is no spray or pump devised that will penetrate into the gnarled shoots and kill the insects and eggs within. Spraying is only of any value when accompanied by pruning, and with the infection as general as it is in Cairo this is not of great value for as soon as the young and tender shoots are put forth they become infected from neighbouring infection and the last state of that tree is worst than the first. Gradual replacement of the worst host plants is, I am convinced, the only way to control this pest successfully in a town such as Cairo.

Note.—Since the above was written infection has been found in the Faiyûm, and as certain other towns in Upper Egypt are infected the legislation has been extended to the Provinces of Gîza, Beni Suef, and Faiyûm. An attempt is now being made to control the pest in these three provinces, and the transport of fruit and plants from the infected areas is being strictly regulated.

9. **Pollinia pollini** Costa.

Bibliography : Targ., Bull. Soc. Ent. Ital., i, p. 264 (1869).

The adult female is yellowish brown and globose : it is completely enclosed in a mass of white secretionary matter which is firmly adherent to the plant tissues. The insect itself lies free within this secretionary matter which is generally more nearly black than white. These masses are rarely isolated and generally a number are found together forming an excoriated blackish excrescence resembling a black gummy exudation from the plant. The surface of this excrescence is hard, and on breaking it away a colony of the insects is found within.

Lengths 1–1·5 millimetres.

Host Plants.

Oleaceæ ... ... *Olea* sp. (Olive).

Part of Plant attacked.

The young twigs and stems, particular preference being shown for the axils of the leaves and the junction of small twigs or branches.

Remarks.

This species has been collected in Cairo and Upper Egypt only so far : it is widely distributed in Upper Egypt.

10. Pseudococcus citri Risso.

BIBLIOGRAPHY : Newstead, Mon. Brit. Cocc., Vol. ii, p. 164.

Adult female slightly elongate, ovate, covered with white mealy wax except at the articulation of the segments where the yellow colour of the body shows through. The margin bears a series of white appendages equal in length, short, and equidistant. The caudal extremity carries a pair of appendages about ten times as long as those of the margin. The female is active up to the time of oviposition.

Length 2–2·5 millimetres.

HOST PLANTS.

Marantaceae	*Canna* sp.
Solanaceæ	*Solanum tuberosum* (Potato).
	S. melongena (Egg-plant).

PART OF PLANT ATTACKED.

On the Canna it was found low down between the leaf stalks, whereas in the other two cases it was both on the aerial and subterranean parts of the plant.

REMARKS.

This species has only been collected on three or four occasions, but I think it will be found to be of much wider distribution than our records show at present. It is not a pest in this country.

11. Pseudococcus longispinus Targ.

BIBLIOGRAPHY : Newstead, Mon. Brit. Cocc., Vol. ii, p. 167.

Adult female elongate, ovate, covered with white mealy wax, except at the articulation of the segments, where the yellow colour of the body is apparent. The margin bears numerous white waxy appendages which gradually increase in length towards the posterior extremity ; the pair at the caudal extremity are very long, being about equal in length to the entire length of the insect. Ovisac elongated and cylindrical composed of loose fibres.

Length 3–4 millimetres.

HOST PLANTS.

Anacardiaceæ	*Mangifera indica* (Mango).
Oleaceæ	*Jasminum* spp. (Foll etc.).
Vitaceæ	*Vitis vinifera* (Vine).

Part of Plant attacked.

Leaves, fruits, and young stems.

Remarks.

This species is not very commonly found, but is fairly widely distributed.

12. Pseudococcus perniciosus Newst. (The Lebbekh Mealy Bug).

Bibliography : Newstead, Bull. Ent. Res., 1910, p. 138.
Willcocks, Bull. Ent. Res., 1910, p. 121.

The ovisac of the female is white, composed of loose flocculent material and more or less hemispherical. Even when there is a large mass of ovisacs the rounded form of the individual ovisac is usually apparent. The surface of the ovisac has well marked transverse flutings and sometimes faint longitudinal striæ.

The adult female is ovate and covered with a thick layer of white secretion ; the segmentation is clear in the early adult. When denuded of wax the adult female is black or very dark greenish purple. The female is active up to the time of oviposition.

Length 3–4 millimetres. Breadth 2–3·5 millimetres.

Host Plants.

Leguminosæ	**Albizzia lebbekh*, *Acacia arabica* (Sunt), *Cajanus indicus* (Pigeon Pea).
Malvaceæ	*Gossypium* sp. (Cotton).
Rhamnaceæ	*Zizyphus spina-christi*.
Rutaceæ	**Citrus medica* (Lime), *C. nobilis* (Mandarine).

Part of Plant attacked.

The leaves, young stems, and branches. In a bad attack great masses of ovisacs are seen all over the smaller branches and shoots and in winter the boles of Lebbekhs that have been heavily attacked the preceding summer are white with ovisacs, the adult females selecting crevices in the bark in which to lay their eggs, thus shielding them to some extent from the more rigorous climatic conditions of the winter months.

Remarks.

This species was originally described by Newstead (*loc. cit.*) from material collected in Cairo by Mr. Willcocks. There was a very bad outbreak of this mealy bug in Cairo in 1909–1910, the magnificent Lebbekh shade trees of the Cairo streets suffering badly. These

trees suffered far worse than any other host plant and a large percentage were killed, this being no doubt due in no small measure to the fact that many of the trees were old and considerably enfeebled by the ravages of a longicorn beetle—*Xystrocera globosa* Oliv. The dead trees and many whose health was precarious were replaced by trees not susceptible to the attack of *P. perniciosus* Newst., and since then the attack has got less and less until now it is only a minor pest. Recently it has been completely overshadowed by the ravages of another mealy bug, *Phenacoccus hirsutus* Green.

Owing to the fact that *Pseudococcus perniciosus* Newst. and *Phenacoccus hirsutus* Green often occur together on the same host plant and are frequently confused it may be as well here to mention one or two characters by which they can readily be distinguished.

Pseudococcus perniciosus Newst.	*Phenacoccus hirsutus* Green.
Adult female dark green, almost black.	Adult female reddish.
Ovisac round, almost globular.	Ovisac elongated.
Fibres of ovisac capable of stretching out into long viscous elastic threads.	Fibres of ovisac not capable of stretching appreciably.
Arrangement of ovisacs on a tree tending to some sort of apparent regularity.	Arrangement of ovisacs on a tree in irregular masses.

13. Pseudococcus sacchari Ckll. (The Sugar Cane Mealy Bug).

Bibliography: Ckll., Jn. Trin. Nat. Club, ii, p. 195 (1895).

The adult female is large, elongated, ovate, decidedly plump, delicate pink in colour; it is only very sparsely mealy and the segmentation is distinct. It is ovoviviparous and gives rise to a very loose mass of white fibrous secretion and much "honey dew." The young female is not very active unless disturbed.

Length 6–10 millimetres. Breadth 3–5 millimetres.

Host Plants.

Gramineæ ... ... *Saccharum* sp. (Sugar Cane).

Part of Plant attacked.

Between the leaf sheath and parent cane.

Remarks.

This species of Mealy Bug gave rise to a very serious outbreak in the big sugar growing areas in Upper Egypt early in 1921. The

adult female secretes "honey dew" profusely, and that together with the exudations from the cane caused by the irritation of the sucking tubes forms a sticky mass between the leaf sheaths and the parent cane. When such infected canes were crushed at the factory the resulting fluid gave a much lower sugar content, and if the sticky exudations in the fluid extracted from the canes exceeded a certain percentage (as it did on one or two occasions) crystallization could not be effected at all. The lowered sugar content of attacked canes was most marked and the Sugar Company estimated that the loss for the season would exceed L.E. 100,000.

Nothing could be done with the growing crop, and it seemed to me that the only possible way to gain control of this pest was to ensure that clean "sets" were planted out. The growers were advised to strip the sets completely of all leaf sheaths and to immerse in a dilute paraffin emulsion in the field before planting. A dilute paraffin emulsion (1 in 30) was found to be quite effective if the " sets " were immersed for two minutes. They were also advised not to ratoon the canes more than once and to burn over the land very carefully after removing the crop each year. It is early yet to state the results of these measures, as it was too late in the season to put them into effect except in one or two very small areas.

An inspection carried out at the very end of last year revealed the fact that the insect attack was about the same but that a fungus had made its appearance and was actually assisting very materially in the control. As many as fifty per cent of the insects on a cane were frequently found dead as a result of this fungoid activity.

It was also observed that some animal, almost certainly the rat, was eating the insect, a hole or " window " being made in the leaf sheath immediately below the node where the insects always congregate. The leaf sheaths of uninfected canes were not touched, but on a heavily infected cane as many as ten " windows " were frequently seen always in the same relative position as regards the node, *i.e.* just below it.

A further paper is in course of preparation on the ravages of *Pseudococcus sacchari* Ckll. on the sugar cane crop of Egypt which will deal fully with the whole outbreak.

14. Sphærococcus marlatti Ckll.

BIBLIOGRAPHY: "Injurious and Beneficial Insects of California," p. 123.
Debski., Mém. Soc. Ent. d'Egypte, 1918, p. 11.

The adult female is generally round, but sometimes oval, dark waxy brown with a fringe of white waxy secretion round the margin,

and in some specimens the secretion partially covering the insect. The female is incapable of locomotion, except at the earliest stages, and is ovoviviparous.

Diameter of adult female 1–1·5 millimetres.

Host Plants.

Palmaceæ ... ... *Phœnix dactylifera* (Date Palm).

Part of Plant attacked.

Particularly at the base of the unfolding leaves, giving a concertina effect to the frond. Also on the fronds and low down on the leaf stalks.

Remarks.

All the specimens so far received or collected have come from Cairo; but I have little doubt that it is a fairly common species in Egypt and will be found to be widely distributed.

Subfamily **COCCINÆ.**

15. **Ceroplastes actiniformis** Green.

Bibliography: Green, Cocc. of Ceylon, Part iv, p. 275.

Adult female with a thick, broadly oval, hemispherical waxy test; the central area domed; the marginal area thickened by a series of eight tumescent quadrate plaques each with a depressed centre and separated by marginal indentations; the apex of the dorsal area with a small depressed oval spot containing a medium elongate raised pad of opaque white wax. Colour very pale pink, deepening to red at the junction of the marginal area, and with numerous fine radiating pinkish streaks; the depressed median spot darker than the surrounding area; the depressed spots on the marginal area each with one or more small opaque white points and a fan shaped band of opaque white wax covering the four stigmatic areas (after Green *loc. cit.*).

Length with waxy test 2·5–4·5 millimetres. Breadth 2–3·75 millimetres. Height 1·25–2·50 millimetres.

Host Plants.

Palmaceæ ... ... *Phœnix dactylifera* (Date Palm).

Remarks.

This species has only been collected once in this country.

16. **Ceroplastes africanus** Green (The Sunt Wax Scale).

Bibliography : Green, Ann. Mag. N.H. (7), iv, p. 188 (1899).

The old adult female very highly convex, almost spherical, except where it is in contact with the host plant ; opaque waxy white with sometimes, but by no means always, a nipple-shaped prominence either centrally or subcentrally. Stigmatic areas marked by slight indentations bearing opaque white points and generally faintly tinged with pink ; they are very inconspicuous and only just extend beyond the margin.

The insects are usually found crowded on the stems of the plant and the waxy covering of adjacent individuals becomes confluent, rendering it difficult to ascertain the real form.

In the young adult females the nipple is always present and is quite marked whilst in very young specimens the test is almost pyramidical and suffused with pink.

Denuded of wax the female is shining dark brown or reddish brown.

At Nag' Hamâdi, Upper Egypt, where this species was found in great abundance on the sunt trees last year, the specimens were all of a pinkish maroon colour, but other specimens collected from all over Egypt have been universally opaque waxy white.

Diameter of test 6–10 millimetres. Height 5–8 millimetres.

Host Plants.

Leguminosæ ... ... **Acacia arabica* (Sunt), **Albizzia lebbekh.*
Tamaricaceæ ... ... *Tamarix* sp.

Part of Plant attacked.

The stems.

Remarks.

This species is very common in Egypt and is widely distributed. It is highly probable that *C. africanus* Green and *C. mimosæ* Sign. are synonymous. Signoret, in the Ann. Ent. Soc. Fr. 1872, refers to *Ceroplastes mimosæ* Boisd. mss. as coming from Egypt and attacking Sunt, but his description is insufficient to be able to state definitely that it is synonymous with *C. africanus* Green. I have examined a considerable number of specimens of this species, and the characters agree with a few minor exceptions almost exactly with Green's description of *C. africanus*. I find that the nipple-like prominence is more often than not absent in the old adult female, and I have not seen specimens in which " a series of impressed arches on the sides of

the test marks the position of marginal plates." The features of the female denuded of wax also agree with the exception of the stigmatic spines: in all my preparations these are longer and have pointed ends, not rounded ends. This refers only to those on the extreme margin, the remainder being of the small conical type figured. The antennæ, with one exception, are all eight-jointed and agree exactly with Green's figure.

I have found *Scutellista cyanea* Motsch (CHALCIDIDÆ) to be a common parasite of *C. africanus* Green.

17. **Ceroplastes floridensis** Comst. (THE FLORIDA WAX SCALE).

BIBLIOGRAPHY : C. rusci Ashm. (non Linn), Can. Ent. xii, p. 252 (1880).
Green, Cocc. of Ceylon, Part iv, p. 277.

Adult female highly convex, broadly ellipsoidal, with a dense covering of opaque wax greatly thickened and recurved on the margins. The waxy test is usually subdivided by shallow depressed lines which are also continued over the thickened margin. In living examples the dorsal area of the test has a pinkish tinge, the marginal area being creamy white. The usual opaque white stigmatic bands are broad and conspicuous and there is a series of eight depressed spots on the margin, giving rise to small opaque white points. The apical pad is occasionally eccentric.

Length of mature test 2·75–3·75 millimetres. (Part of description by Green *loc. cit.*).

HOST PLANTS.

Anacardiaceæ	*Schinus* sp.
Euphorbiaceæ	*Phyllanthus* sp.
Moraceæ	*Morus* sp.
Myrtaceæ	*Psidium guajava* (Guava).
Rosaceæ	*Eriobotrya japonica* (Loquat).
Rutaceæ	**Citrus* spp.

PART OF PLANT ATTACKED.

Leaves and petioles, rarely young stems

REMARKS.

Common in Lower Egypt, particularly at Alexandria and in the coastal area. It is occasionally a pest in this country.

18. **Ceroplastes rusci** Linn. (THE FIG WAX SCALE).

BIBLIOGRAPHY : Newstead, Tr. Ent. Soc. Lond., p. 101 (1897).

The test of the adult female is very highly convex, waxy white in colour, becoming almost globular late in life. The test is divided

into a dome shaped central portion and eight quadrate plaques occupying the marginal area. In the centre of the dome there is a slightly depressed area reddish brown, broadly oval, in the centre of which is a small elongated raised white pad. The shallow depressed lines which subdivide the test are also of a reddish brown colour and in the centre of each plaque there is a more or less circular depression similarly coloured with one or more opaque raised white points. The stigmatic bands of opaque white wax are well marked.

In old adult females the test becomes globular, with a smooth surface and almost devoid of all signs of the characteristic plaques and pads of the earlier stages.

In dead specimens the colour tends to diffuse and the whole test to become a uniform brown.

Length 3–4·5 millimetres. Breadth 2–3 millimetres.

Host Plants.

Anacardiaceæ	*Schinus* sp. (Pepper).
Cyperaceæ	*Cyperus* sp.
Moraceæ	*Ficus benghalensis* (Banyan), **F. carica* (Fig), *F. infectoria*, *F. pseudosycomorus*, *F.* spp.
Musaceæ	*Musa sapientum* (Banana).
Myrtaceæ	*Psidium guajava* (Guava).
Rosaceæ	*Cratægus* sp.
Rutaceæ	*Citrus* spp.

Part of Plant attacked.

Fruit, leaves, and young stems.

Remarks.

This is not a very common species except possibly in the Faiyûm —the big fig-growing area—but it is widely distributed. It is a pest of figs in Palestine.

19. Coccus (Lecanium) hesperidum Linn. (The Soft Scale).

Bibliography : Newstead, Mon. Brit. Cocc., Vol. ii, p. 78.
Green, Cocc. of Ceylon, Part iii, p. 188.

Adult female elongate oval, more or less flat and soft skinned ; pale yellow to brownish in colour, spotted irregularly with brownish red spots tending sometimes by agglomeration to form an irregular meshwork.

The female is ovoviviparous and living larvæ are usually to be found beneath the body of the adult female.

Length 2–3·5 millimetres. Breadth 1·25–2·50 millimetres.

Host Plants.

Anonaceæ	*Anona* sp.
Apocynaceæ	**Nerium oleander* (Oleander).
Araliaceæ	**Sciadophyllum* sp.
Leguminosæ	*Acacia* sp., *Bauhinia* sp.
Moraceæ	*Ficus benghalensis* (Banyan Tree), *F.* spp.
Musaceæ	*Musa* sp.
Oleaceæ	*Olea* sp. (Olive).
Rutaceæ	*Citrus aurantium* (Orange), *Citrus medica* (Lime).

Part of Plant attacked.

Leaves and petioles, rarely young stems.

Remarks.

This species is fairly common all over Egypt, but has not been responsible for any damage.

20. Coccus (Lecanium) longulus Douglas.

Bibliography : Newstead, Mon. Brit. Cocc., Vol. ii, p. 86.
Green, Cocc. of Ceylon, Part iii, p. 221.

Specimens of the adult female collected in this country yellow to brown, long, moderately narrow, somewhat arched, with ends broadly rounded. Surface smooth with in some cases faint dark reticulations on the dorsum running into faint dark radiations towards the margin. The adult female is ovoviviparous and the young living larvæ can be found beneath the body of the parent.

Length 4–8–millimetres. Breadth 2·5–4 millimetres.

Host Plants.

Leguminosæ	**Acacia arabica* (Sunt), *Acacia* sp., *Cajanus* indicus (Pigeon Pea).

Part of Plant attacked.

In nearly every case it is the young stems that are attacked, the females ranging themselves longitudinally along the stems.

Remarks.

This species is found on Sunt all over Egypt. It is not so common on Pigeon Pea.

21. Lichtensia ephedræ Newst.

Bibliography : Newstead, Ent. Mon. Mag., xxxvii, p. 83 (1901).

Female ovisac pure white and very closely felted ; very elongate, transversely and longitudinally convex or boat shaped.

Length 8–10 millimetres. Breadth 3 millimetres. Greatest height 2·50–3·50 millimetres (after Newstead *loc. cit.*).

Host Plants.

Gnetaceæ ... ... *Ephedra alte.*

Remarks.

This species was described by Newstead (*loc. cit.*) from material collected in Wâdi Gerrâwi, near Helwân, by Admiral Blomfield in 1900. I have only three specimens collected near Helwân by Dr. Debski in 1918.

22. Pulvinaria floccifera Westw.

Bibliography : Newstead, Mon. Brit. Cocc., Vol. ii, p. 71.

Adult female somewhat heart-shaped, yellow to brown and mottled. Ovisac white and very long, about eight times the length of the body and with a surface like a banana from which the skin has been removed.

Length 2–3 millimetres. Length of ovisac 5–10 millimetres. Breadth 2 millimetres.

Host Plants.

Myrtaceæ ... ... **Psidium guajava* (Guava).
Rosaceæ ... ... *Rosa* sp. (Rose).
Solanaceæ ... ... *Solanum melongena* (Egg-plant).

Part of Plant attacked.

The leaves in the case of Guava but the young stems of Rose and Egg-plant.

Remarks.

Specimens have only been received from four localities, Tel el Kebîr, Faqûs, Cairo, and Minya, but these are widely separated so that it is probably distributed throughout the country though not very common.

23. Pulvinaria mesembrianthemi Vall.

BIBLIOGRAPHY : Newstead, Mon. Brit. Cocc., Vol. ii, p. 69.

The young female is a pale green turning to yellowish brown as it nears the adult stage. The adult is ovate, brown or yellowish brown, slightly convex with three or four well marked corrugations set close together running across the middle. The ovisac is white with a very smooth surface and arises from beneath the body and projects posteriorly.

Length of adult female 3–4 millimetres. Breadth 2–3 millimetres. Length of ovisac 5–8 millimetres.

HOST PLANT.

Aizoaceæ ... ... *Mesembryanthemum* sp.

PART OF PLANT ATTACKED.

The fleshy triangular-in-cross section leaves.

REMARKS.

Very common at Alexandria, but so far it has not been collected elsewhere.

24. Saissetia (Lecanium) hemisphærica Targ. (THE HEMISPHERICAL SCALE).

BIBLIOGRAPHY : Newstead, Mon. Brit. Cocc., Vol. ii, p. 113.
Green, Cocc. of Ceylon, Part iii, p. 232.

Adult female varying from light brown to dark brown, more or less hemispherical and ovate ; very highly convex, dorsum smooth and shining. The young females have three carinæ forming the letter H; this has almost entirely disappeared in the adult female. The eggs, which are pale pink, are laid beneath the body of the parent female.

Length 2–3 millimetres. Breadth 1·5–2 millimetres.

HOST PLANTS.

Acanthaceæ ... ... **Justicia alba, Thunbergia* sp.
Cycadaceæ ... ... *Cycas revoluta.*
Filices ... ... Unknown species of fern.
Leguminosæ ... ... *Bauhinia* sp.
Pittosporaceæ ... ... *Pittosporum* sp.
Solanaceæ ... ... *Solanum* sp.

PART OF PLANT ATTACKED.

Leaves and young stems.

REMARKS.

Widely distributed but not very common.

25. Saissetia (Lecanium) nigra Nietn.

BIBLIOGRAPHY: Newstead, Mon. Brit. Cocc., Vol. ii, p. 124.
Green, Cocc. of Ceylon, Part iii, p. 229.

Adult female dark brown to black, somewhat oval, and highly convex, often with a distinct hump in the centre of the dorsum, the surface of which is smooth but not highly polished. The adult female is oviparous and the reddish purple eggs and young larvæ are found beneath the shell of the parent.

Length 3–4 millimetres. Breadth 2–3 millimetres.

HOST PLANTS.

Passifloraceæ	... ...	*Passiflora quadrangularis* (Passion Vine).
Pittosporaceæ	... ...	*Pittosporum* sp.

PART OF PLANT ATTACKED.

Young stems.

REMARKS.

This species has only been collected twice, once at Alexandria and once in Zoological Gardens at Cairo. It is rare.

26. Saissetia (Lecanium) oleæ Bern.

BIBLIOGRAPHY: Newstead, Mon. Brit. Cocc., Vol. ii, p. 126.
Green, Cocc. of Ceylon, Part iii, p. 227.

Adult female dark brown to brownish-black, nearly circular, being slightly longer than broad. Highly convex with a distinct dorsal and two lateral carinæ forming the letter H. Surface somewhat shiny and irregular and faintly ridged towards the margin. Eggs and larvæ found beneath the body of the parent.

In some examples the carinæ are very faint and the dorsum assumes a nearly hemispherical shape.

Length 2·50–4 millimetres. Breadth 2–3·5 millimetres.

HOST PLANTS.

Apocynaceæ	**Nerium oleander.*
Leguminosæ	*Bauhinia* sp.
Myrtaceæ	*Psidium guajava* (Guava).
Rosaceæ	*Prunus domestica* (Plum).

PART OF PLANT ATTACKED.

Young stems.

REMARKS.

This species is not very common in Egypt but is apparently widely distributed.

Subfamily **DIASPINÆ.**

27. **Adiscodiaspis tamaricicola** Malenotti.

BIBLIOGRAPHY: Rediaxi, 1915–1916, pp. 313–315.

The puparium of the adult female is very strongly convex, ovate, highest convexity being in the cephalic area; colour greyish white. The pellicles are eccentric, but within the margin; the first pellicle is generally obliquely placed, sometimes transversely placed, on the second pellicle. The pellicles are straw coloured, but are not very apparent, being covered with a coating of greyish white secretionary matter giving them the same appearance as the rest of the puparium.

The adult female is oval and brownish yellow.

Length of female puparium 1·5 millimetres.

This is a species of a very interesting genus. The usual pygidial characters of the DIASPINÆ are entirely absent. There are no squames, hairs, or lobes, unless the slight corrugations of the pygidium can be called lobes, and if so they are very broad and flat. Circumgenital glands are also wanting. The genital aperture is very well developed.

HOST PLANTS.

Tamaricaceæ	*Tamarix* sp.

PART OF PLANT ATTACKED.

The small branches.

REMARKS.

This is a comparatively rare species. It was first described by Malenotti (*loc. cit.*) from specimens on *Tamarix* sp. collected at Matarîya (Egypt) and given to Prof. Paoli by Mr. Willcocks.

28. *Aonidia glandulosa Newst.

Bibliography : Newstead, Bull. Ent. Res. 1911, p. 103.

The adult female is completely enclosed in the second larval pellicle which forms the puparium. The puparium is convex, circular, straw-coloured to orange yellow and completely covered with white secretionary matter. The ventral scale is white ; thin centrally and thick marginally. The first pellicle is yellow but almost invariably obscured by the white secretion.

Diameter of female puparium 1–1·5 millimetres.

The nymphal or second stage females are much more easily prepared for microscopic examination than the adults and the species can readily be identified from preparations of second stage females.

Host Plants.

Leguminosæ ... ... *Acacia arabica* (Sunt).

Part of Plant attacked.

Young stems and branches.

Remarks.

Common in Cairo and Upper Egypt, but it has not yet been collected in Lower Egypt.

This species was originally described by Newstead (*loc. cit.*) from material collected in Egypt.

29. Aspidiotus cyanophylli Sign.

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 124.
Green, Cocc. of Ceylon, Part i, p. 51.

The puparium of the adult female ovate or elongate ovate ; where one side rests against a vein of the leaf on the midrib that side is straight. The puparium is convex and semi-transparent, the yellow colour of the sublying female and eggs being apparent. The pellicles are central or very nearly so and are pale yellow or colourless ; the secretionary coverings are transparent. The puparium of the young female is usually more or less circular.

Length 1–2 millimetres.

Host Plants.

Euphorbiaceæ ... ... *Phyllanthus* sp.
Leguminosæ ... ... *Ceratonia siliqua.*
Myrtaceæ ... ... **Psidium guajava* (Guava).

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* Since going to press Mr. Green has examined some of my material of this species and he states that he would refer it to the genus *Pseudaonidia.*

PART OF PLANT ATTACKED.

The leaves.

REMARKS.

Not very common, but has been collected in widely separate localities. There was quite a heavy infestation on the Guava trees at Gezîret Debsha (Markaz El 'Aiyât) in 1920.

30. **Aspidiotus cydoniæ** Comst. = **lataniæ** Sign.

BIBLIOGRAPHY: Green, Cocc. of Ceylon, Part i, p. 62.

Specimens of this species vary considerably in size, colour, and general appearance. The puparium of the adult female is very strongly convex, circular to ovate, highest convexity in the cephalic area; colour varying from white to grey or grey brown. The pellicles are brown, yellowish brown, to straw-coloured, and are situated centrally in the early stages and later nearer the anterior extremity. In some specimens the pellicles are much more apparent than others, due partly to the absence of the white secretionary covering: this refers in particular to specimens on Guava in which the pellicles are sometimes quite a dark brown the remainder of the scale being grey. The adult female is bright yellow.

Diameter 1–1·5 millimetres.

HOST PLANTS.

Anonaceæ	*Anona squamosa* (Sweet Sop).
Apocynaceæ	*Nerium oleander.*
Euphorbiaceæ	*Phyllanthus* sp.
Gramineæ	*Saccharum* sp. (Sugar Cane).
Leguminosæ	*Acacia arabica* (Sunt), *A. decurrens* (Wattle), *Bauhinia* sp., *Cæsalpinia sepiaria, Ceratonia siliqua, Dalbergia sissoo, Dolichos lablab.*
Moraceæ	*Ficus* spp., *Morus* sp.
Myrtaceæ	*Psidium guajava* (Guava).
Oleaceæ	*Jasminum humile.*
Rhamnaceæ	*Zizyphus* sp.
Rosaceæ	**Eriobotrya japonica* (Loquat), **Prunus domestica* (Plum), **Pyrus cydonia* (Quince), **Rosa* sp. (Rose).
Vitaceæ	*Vitis vinifera* (Vine).

PART OF PLANT ATTACKED.

Leaves, petioles, and stems. Old stems are often found completely covered with this scale.

Remarks.

This species is extremely common in Lower Egypt, but is not recorded as doing any serious damage. It is not so common in Upper Egypt.

31. Aspidiotus destructor Sign.

Bibliography : Sign., Ann. Soc. Ent. Fr. (4), ix, p. 120 (1869).
Newstead, Ent. Mon. Mag., xxix, p. 186 (1893).

The puparium of the adult female round to broadly pear-shaped, flattish and a transparent white, the sublying yellow female being easily discernible. The pellicles are eccentric, near the margin but within it, yellowish white and transparent.

I have only two specimens of this scale, and the above description which refers to them, differs from Signoret's description in the shape of the puparium and the position of the pellicles. The microscopic preparations, however, have been identified by Mr. Laing as being typical of *Aspidiotus destructor* Sign.

Host Plants.

On a plant unknown.

Remarks.

The specimen which originally comprised four scales was found by me amongst a number of unidentified species in the collections of the Ministry. It was collected in 1917 in one of the biggest nursery gardens in Cairo on a plant not stated.

I have visited the nursery in question on three or four occasions, but have not found any further specimens of this destructive species.

32. Aspidiotus hederæ Vall. (The Oleander Scale).

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 120.

The puparium of the old adult female flattish, circular or nearly so, greyish yellow with central yellow pellicles which are usually naked. The puparium of the young adult female is circular and opaque white and the male puparium is also opaque white but ovate in form. The adult female is pyriform, narrowed posteriorly, and light yellow in colour.

Diameter 1–2 millimetres.

HOST PLANTS.

Apocynaceæ	**Nerium oleander.*
Cycadaceæ	**Cycas revoluta.*
Labiatæ	*Salvia* sp.
Leguminosæ	*Acacia decurrens* (Wattle), *Cassia* sp.
Liliaceæ	*Asparagus* sp.
Malvaceæ	*Urena lobata.*
Magnoliaceæ	*Magnolia* sp.
Meliaceæ	**Melia azederach.*
Moraceæ	*Morus* sp.
Oleaceæ	*Jasminum* sp.
Solanaceæ	*Datura alba.*

PART OF PLANT ATTACKED.

Leaves and young stems.

REMARKS.

This species is fairly common and widely distributed. It is most often found on Oleander, but curiously enough is not found on any species of *Citrus*. This may be because the lemon—the species that it favours most—is very little grown in this country. It is very frequently found on lemons imported from Cyprus and other Mediterranean countries.

33. Aulacaspis (Diaspis) pentagona Targ. (WEST INDIAN PEACH SCALE).

BIBLIOGRAPHY : Green, Cocc. of Ceylon, Part i, p. 87.

Puparium of the adult female approximately circular, convex opaque white. The pellicles generally eccentric but within the margin and bright orange or orange yellow in colour. Male puparium, snowy white uncarinated or very feebly so. Pellicle pale straw colour. The male puparia are often thickly clustered, each being attached anteriorly and somewhat raised posteriorly.

Diameter of female puparium 2–2·50 millimetres.

HOST PLANTS.

Rosaceæ	*Prunus armeniaca* (Apricot), *Rosa* sp. (Rose).

PART OF PLANT ATTACKED.

Young stems.

REMARKS.

This species has only been collected at Alexandria. Microscopic preparation of my specimens agree with Green's description of *Diaspis amygdali* Tryon (*loc. cit.*) rather than with Newstead's *Diaspis pentagona* T.T., but according to Fernald *D. amygdali* Tryon is a synonym of *D. pentagona* T.T. and so I have adopted the latter name.

34. **Chionaspis bilobis** Newst.

Bibliography : Newstead, Ent. Mon. Mag., xxxi, p. 233 (1895).

Puparium of adult female, opaque white, somewhat polished, very convex and broadly pyriform, widening considerably immediately behind the second pellicle. Pellicles, pale yellow, usually covered by a thin layer of white secretionary material.

Length 1·5 millimetres. Breadth 0·75 millimetre.

Host Plants.

Umbelliferæ ... ... *Pithyranthus tortuosus.*

Remarks.

Our only specimen of this species was kindly given to the collection by Dr. Debski who collected it in 1918 at Helwân on the stems of the above-named plant.

35. *Chionaspis graminis var. divergens Green.

Bibliography : Green, Cocc. of Ceylon, Part ii, p. 123.

Female puparium snowy white : elongate, moderately dilated behind ; ventral scale well developed, and often coming away unbroken with the dorsal parts. First pellicle very pale transparent fulvous ; anterior margin rather deeply notched ; antennal sheaths usually bent back and lying close along the margin. Second pellicle reddish or fulvous covered by a very delicate layer of secretion appearing as fine white transverse lines ; sometimes, upon very fresh examples, three or more longitudinal white lines are noticeable, more especially in the second stage of the insect.

Length 2–3·50 millimetres. Breadth 0·75–1·75 millimetres.

Male puparium snowy white ; elongate, narrow, sides nearly parallel ; rather indistinctly carinate ; at first thickly dusted with powdery secretion which in older examples becomes rubbed off, leaving the puparium quite smooth. Pellicle very pale fulvous, often tinged with brown. Length averaging 1 millimetre (after Green *loc. cit*).

My specimens only differ from the above description of Mr. Green in the distinct tricarination of the male puparium in many cases.

Host Plants.

Gramineæ ... ... *Agrostis alba.*

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* Mr. Green has since examined some of my material and points out that it is not quite typical of *Chionaspis graminis* var. *divergens*. He suggests that it might be described as a new variety of *Chionaspis graminis*. The external features agree with var. *divergens* Green. This description will appear in due course.

Part of Plant attacked.

The blades of the grass.

Remarks.

This species was collected beside the Cairo-Helwân road and at Ma'âdi. It will probably prove to be of wide distribution.

36. **Chionaspis striata** Newst. (The Snow Scale).

(Figs. 1, 1*a*, 1*b*, 1*c*)

Bibliography: Newstead, Trans. Ent. Soc. Lond., p. 96 (1897).

The female puparium is highly convex and usually widely pyriform. It is either a shining satiny-white or a dull opaque white and often faintly striated transversely, but this is not always the case. The pellicles are pale yellow to ochreous. The adult female is pale yellow.

The male puparium is white, of typical form, often transversely striated and faintly tricarinate. Pellicle pale yellow.

Length of female puparium 1–2 millimetres. Male puparium 1 millimetre.

My microscopic preparations of this species show constant pygidial features and differ considerably from those figured by Newstead in his original description (*loc. cit.*). The following is the description of the microscopic characters of the adult female as it occurs in this country.

Adult female elongate, ovate; rostral filaments short; anterior spiracles with two parastigmatic glands. Abdominal segments without squames but with minute pores on the ventral surface and a group containing from two to five comparatively large drawn out tubercles. Pygidium broadly rounded with median and first lateral lobes only. Other lobes wanting. The median lobes are small, somewhat elongate, free, bluntly rounded, but in some specimens the extremities of the lobes are more pointed. The lateral lobes are stout and slightly shorter than the median lobes. There is a squame situated between the median and lateral lobes close to the median lobe and one just beyond and close to the lateral lobes. Marginal pores large, seven or eight in number on either side of the median lobes. Conspicuous series of dorsal pores arranged in three broken arches. There is a certain amount of variation in the number of pores in these series. Circumgenital glands in five groups showing considerable variation: median 2–8, anterior laterals 6–13, posterior laterals 7–18.

Host Plants.

Coniferæ ... ... *Cupressus* sp., *Thuja* sp.

Remarks.

This is a very common species and is found on almost every Thuja tree in Egypt.

37. **Chrysomphalus aonidum** Linn.=**Aspidiotus ficus** Riley. (The Black Scale of Citrus Trees). (Fig. 2.)

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 104.
Green, Cocc. of Ceylon, Part i, p. 43.

The female puparium is circular convex, brownish black with central pellicles. Pellicles reddish yellow always partially obscured by a layer of secretion which is reddish brown above the first and pale olivaceous above the second pellicle. In the centre a circular raised disc is usually exposed, the secretionary covering being here worn off. In young specimens the centre is covered by a raised patch of opaque white secretion.

The male puparium is dark brown to black oval in shape, with sides parallel and ends broadly rounded, the posterior extension grey to blue grey.

In some specimens the female puparia are distinctly paler, the margin being a light grey and sometimes almost white. This is particularly the case with specimens on olives. Other specimens on olives under a lens exhibit a somewhat irregular surface mottled black and grey.

Some specimens collected on *Myrtus communis* had bright yellow pellicles quite different from the usual reddish yellow. Referring to the microscopic preparations of these specimens Mr. Laing remarks that " they differ from typical *ficus* (of Newstead and Leonardi) in having fewer dorsal pores " and he suggests that it may be Malenotti's redently described species (*Chrysomphalus calami* Mal. which is very near to *C. ficus*.

It is certainly very close to *C. ficus* and Figure 2 shows the pygidial features. The dorsal pores are very much fewer than in typical *ficus* and the tubular spinnerets are not so numerous. The club shaped glands are very short and it is difficult to make them out with any degree of certainty which is very different from typical *ficus* in which these glands are obvious. The thoracic spine is also absent. The other pygidial characters are normal. In one example two of the circumgenital glands of the anterior group were displaced centrally.

Host Plants.

Anacardiaceæ	**Mangifera indica* (Mango).
Anonaceæ	*Anona squamosa* (Sweet Sop).
Apocynaceæ	*Nerium oleander.*

Ebenaceæ	*Diospyros kaki.*
Euphorbiaceæ	*Phyllanthus* sp.
Lauraceæ	**Persea gratissima* (Avocado Pear).
Leguminosæ	**Acacia decurrens* (Wattle), **Bauhinia* spp., *Ceratonia siliqua.*
Liliaceæ	*Aloe* sp.
Lythraceæ	*Lawsonia alba* (Henna).
Malvaceæ	*Gossypium* sp. (Cotton).
Moraceæ	**Ficus nitida, F. sycomorus, Ficus* spp.
Musaceæ	*Musa sapientum* (Banana).
Myrtaceæ	**Eucalyptus* sp., *Eugenia jambusa, Myrtus communis.*
Oleaceæ	*Jasminum* sp., **Olea* sp. (Olive).
Palmaceæ	*Latania* sp., *Phœnix dactylifera* (Date Palm).
Punicaceæ	*Punica granatum* (Pomegranate).
Rosaceæ	*Eriobotrya japonica* (Loquat), *Prunus domestica* (Plum), *Pyrus malus* (Apple), *Rosa* sp. (Rose).
Rubiaceæ	*Adina cordifolia.*
Rutaceæ	**Citrus* spp.
Vitaceæ	*Vitis vinifera* (Vine).

PART OF PLANT ATTACKED.

The leaves and fruits; young stems are only found attacked very rarely.

REMARKS.

All species of *Citrus* grown in Egypt have been found to be attacked to a greater or lesser degree by the Black Scale; oranges, bitter oranges, and mandarines heavily attacked, limes and lemons less so. *Ficus nitida* and *Bauhinia* sp. are heavily attacked. This scale has proved a very serious pest in Egypt and caused a severe setback to citrus growing. A garden in which the attack is slight becomes moderately infected in one year and heavily infected in two years, the value of the crop being reduced to thirty per cent or even less of its original value.

In Egypt large areas of gardens which otherwise would have borne good crops have become unprofitable owing to the attack of this scale and have been cut down. Unfortunately no figures are available to show the exact areas, but it is probable that during the last ten years in the one Province of Qalyûbîya not less than 1,000 feddâns of orchards have been cut down as the result of the ravages of this pest.

Apart from this capital loss the black scale has probably caused an average annual loss during the same period of about L.E. 100,000 in the gardens left standing.

Very shortly after the formation of a Department of Agriculture in Egypt in 1911, Dr. L. H. Gough, the first Entomologist to be

appointed, introduced the process of fumigation with hydrocyanic acid gas previously employed in America and elsewhere. This has proved to be the only really satisfactory method of dealing with the Black Scale and the fumigation campaign has increased in size yearly from the time of its initiation up to the present. Last year L.E. 34,000 was expended on the fumigation campaign, the greater part of which was recovered by the fees charged.

As Upper Egypt is almost entirely free from this pest a law was introduced controlling the transport of nursery stock into this clean area and making fumigation compulsory in all gardens within the area which were found to be infected. As a result of this measure the Black Scale in not only being prevented from spreading in Upper Egypt but is actually being reduced and it is hoped that in time it will be stamped out altogether.

In Egypt it is to be feared that artificial methods of control will always have to be employed as the climate is much too dry to permit of a parasitic fungus meeting with any success as in the British West Indies and the natural enemies which occur, namely, *Chilocorus bipustulatus* and one or more members of the family *Chalcididæ*, are not very effective.

38. **Chrysomphalus (Aspidiotus) aurantii** Mask. (The Red Scale).

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 88.
Green, Cocc. of Ceylon, Part i, p. 58.

Female puparium circular ; median area convex. Colour pale yellowish grey, semi-transparent, showing the form and colour of the insect beneath it. Pellicles central, reddish, obscured by a layer of secretion ; a small prominent spot and concentric ring of whitish secretion in the centre of the first pellicle. Ventral scale well developed adhering to the insect, as does the dorsal scale also, making the extraction of the insect difficult except by dissolving the puparium in caustic potash. Adult female dull orange (after Green *loc. cit.*).

Diameter of female puparium 2 millimetres.

Host Plants.

Euphorbiaceæ	*Phyllanthus* sp., **Ricinus communis* (Castor Oil tree).
Leguminosæ	*Bauhinia* sp., *Ceratonia siliqua*.
Moraceæ	*Morus* sp.
Oleaceæ	*Olea* sp.
Palmaceæ	*Phœnix dactylifera* (Date Palm).
Rosaceæ	**Prunus domestica* (Plum), **Pyrus cydonia* (Quince), **Pyrus malus* (Apple), **Rosa* sp. (Rose).
Rutaceæ	**Citrus* spp.

Part of Plant attacked.

Leaves, fruits, and stems. The stems of roses are often covered with this scale and in most cases seem to be preferred to the leaves.

Remarks.

This scale is found all over Egypt, but fortunately does very little damage. It attacks most species of *Citrus* but lemons, bitter oranges, and pomelos, for which it shows preference, are species of *Citrus* which it happens are not much grown. Certain species of Rosaceæ get heavily attacked.

Owing to the extensive fumigation campaign against the Black Scale in this country the Red Scale does very little damage to the *Citrus* trees. Roses, however, get heavily attacked and the best remedy for such attacks is an application of paraffin emulsion.

39. **Diaspis boisduvalii** Sign.

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 153.

Puparium of adult female approximately circular or ovate, low convex, semi-transparent, revealing the sublying female and eggs. This gives it a dull yellow colour and a wax-like appearance. Exuviæ towards the centre are pale yellow (after Newstead *loc. cit.*).

Diameter 1·25–2·25 millimetres.

Mr. Laing remarks with reference to my material of this species that " this material seems referable to this species in spite of the absence of the thoracic tubercle ; this is not always present."

Host Plants.

Palmaceæ	On an unknown species of ornamental palm.

Remarks.

This species has only been collected twice, on each occasion in Cairo on the same host plant.

40. **Diaspis carueli** Targ.

Bibliography : Newstead, Mon. Brit. Cocc., Vol i, p. 162.

Female puparium approximately circular but more usually somewhat elongated, convex, white, but always dusted over, giving it a greyish appearance. Pellicles pale translucent yellow and within the margin.

Male puparium tricarinate : median carina well marked, lateral carinæ indistinct. Pellicle pale yellow.

Diameter of female puparium about 1 millimetre.

Host Plants.

Coniferæ ... ... *Cupressus* sp. (Cypress), *Thuja* sp.

Remarks.

This species is fairly common and occurs in both Lower and Upper Egypt. It is found on the fruits as well as the leaves.

41. **Diaspis cinnamoni** var. **mangiferæ** Newst.

Bibliography : Newstead, Bull. Ent. Res. 1911–1912, p. 86.

Female puparium circular, whitish, rather like frosted glass in appearance, semi-transparent and translucent. Pellicles slightly eccentric but within the margin, pale yellow to colourless with usually a darkened median portion.

Male puparia white and strongly tricarinate, very prolific.

Diameter of female puparium 2 millimetres.

Host Plants.

Anacardiaceæ ... ... *Mangifera indica* (Mango).

Part of Plant attacked.

Leaves.

Remarks.

This variety of *D. cinnamoni* was described by Newstead (*loc. cit.*) from material sent by Mr. Willcocks from Gîza, Cairo, in 1910, on small Mango trees imported from Ceylon. It has since been collected at Helwân on mangoes but has not been found elsewhere.

42. **Diaspis cacti** Comst.

Bibliography : Comstock, Rep, Agr. Exp. Stn. Ithaca. N.Y. 1916.

Female puparium circular, convex, white to sandy colour. The predominating colour of specimens from this country is a very pale grey brown sandy colour. Pellicles, central or eccentric but always within the margin, dark brown. Secretionary covering thin, the same colour as the rest of the puparium. In some specimens this secretionary covering is very much thinner than in others, making the pellicles appear much darker and giving a greater contrast. Microscopic preparations of dark and light pellicle specimens show no difference, with the exception of the parastigmatic glands which are fewer in the former 2–5 as compared with 5–11 in the latter. The circumgenital glands of the former tend to be fewer than in the latter, but this is not a constant feature.

Diameter of female puparium 2 millimetres.

Male puparium the same colour as the female puparium, flat. pellicle darkish brown, carination varies from distinct tricarination to entire absence of carinæ.

Host Plants.

Cactaceæ ... ... *Opuntia* sp. (Prickly Pear).

Part of Plant attacked.

Any part of the plant above ground.

Remarks.

A species very commonly found all over Egypt.

43. **Fiorinia africana** Newst.=**Aonidia parlatoroides** Newst.

Bibliography: Newstead, Bull. Ent. Res. 1911, p. 90.

As my specimens agree exactly with Mr. Newstead's description (*loc. cit.*) I take the liberty of reproducing his description of the external characters. "Female puparium somewhat ovate but suddenly narrowed posteriorly; widest and very highly convex in the region just behind the larval pellicle. Colour varying from pure white to smoky grey; the secretionary matter is pure white, but when the layer over the exuviæ of the second stage female (second pellicle) is thin, the dark colour of the underlying insect shows through, giving the puparium a smoky grey tinge. Overcrowded examples of the puparia become distorted and irregular in shape as in other Diaspinæ under similar conditions. Larval pellicle usually ochreous buff, often with a small bottle green spot at the caudal extremity. Second pellicle piceous or dark castaneous, sometimes with a dull crimson area in the centre; the colour is, however, very variable.

Length 1·75–2 millimetres.

Male puparium relatively large, sides more or less parallel, convex for the greater part, but with the posterior extremity flattened. Pellicle usually bottle green, but a few examples are dull greenish yellow; in some instances they occupy an almost oblique position; in others they are parallel with the secretionary portion. Normally they are straight, but in a very large percentage of cases they are curved or contorted owing chiefly to overcrowding or to the nature of the bark upon which they are fixed.

I have been successful in separating a number of the adult females from the enveloping skin of the second stage female and I find they have the following characters :—

Adult female oval to round, the abdominal segments much contracted after oviposition. In dead and dried specimens the pygidium stands out as a perfectly transparent zone with radiating lines like a fan. The rudimentary antennæ are situated close together and consist of small tubercles surmounted by four comparatively stout spines : these spines vary somewhat in length and stoutness. Parastigmatic glands confined to one solitary gland and in some specimens altogether absent. Abdominal segments without glands or tubercles but with a verrucose surface. Pygidium broadly triangular, margin with several somewhat irregularly arranged lobes situated slightly within the margin on the ventral surface, rarely projecting beyond it, and a number of short spines. The circumgenital glands 27–33 in number are arranged in a somewhat irregular arched group. Tubular spinnerets and other glands wanting.

My preparations are all from dried material, and it appears from them that there is no regular arrangement of the lobes and spines of the pygidium.

Host Plants.

Salicaceæ	... ...	*Populus* sp. (Poplar), *Salix* sp. (Willow).
Gnetaceæ	... ...	*Ephedra* sp.

Part of Plant attacked.

All my specimens are on the stems.

Remarks.

This species was first described by Newstead from specimens on Poplar collected in the garden of the Horticultural Society at Gîza, Cairo, and sent by Mr. Willcocks. It is not a common scale, but has been collected in three or four widely separated localities—Gîza, Beni Suef, Minya, and Aswân.

Some specimens of *Aonidia parlatoroides* Newst.? kindly given us by Mr. Willcocks I find to be synonymous with *F. africana* Newst. Mr. Willcocks has kindly given me some more of his original material of this species, as I thought the previous specimen might have been misnamed, but I find that it is undoubtedly *F. africana* Newst. Unfortunately I have been unable to trace Newstead's description. The specimens were on willow.

44. **Fiorinia fioriniæ** Targ.

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 134.
Green, Cocc. of Ceylon, Part i, p. 94.

Puparium of adult female convex, chitinous, with slightly curved sides narrowing towards the extremities ; dorsum with a well marked median carina : colour orange yellow to orange brown, the carina always being of a darker colour. The puparium consists of the pellicles ; the second pellicle completely enveloping the adult female.

Length 1 millimetre.

Host Plants.

On an unknown plant.

Remarks.

Collected only at Alexandria.

45. **Ischnaspis longirostris** Sign.=**filiformis** Douglas.

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 210.

Puparium of adult female very long and narrow, sides parallel, slightly wider towards the posterior extremity, convex and shining black. First pellicle yellow to orange, second pellicle covered with dense black secretionary matter like the rest of the puparium. The second pellicle occupies about one-third of the puparium.

Length 2–2·75 millimetres.

Host Plants.

Palmaceæ ... ... *Latania* sp.

Remarks.

This species has only been collected at Alexandria.

46. **Lepidosaphes (Mytilaspis) beckii** Newmann=**citricola** Pack. (The Citrus Mussel Scale).

Bibliography : Green, Cocc. of Ceylon, Part i, p. 78.

Female puparium elongate, mussel shell shaped, sometimes slightly curved, broadest towards the posterior extremity ; colour brown to dark brown, paler at the margins and often a large paler area at the posterior extremity. Numerous faint transverse striations. First pellicle pale yellow, second reddish. Pellicles occupy about one-third the length of the puparium.

Adult female creamy white.

Length 2–3 millimetres. Breadth 0·8–1 millimetre.

Male puparium smaller and narrower with sides nearly parallel, pellicle occupying about one-third of the length. A distinct hinge towards the posterior extremity. Colour dark brown.

Length 1·5 millimetres. Breadth 0·4 millimetre.

Host Plants.

Rutaceæ ... ... *Citrus* spp.

Part of Plant attacked.

Leaves, fruits, and stems.

Remarks.

This scale is very common on Citrus trees in the north of the Delta, but so far has not spread down to the big citrus-growing areas in Qalyûbîya and Minûfîya. By an *Arrêté* dated October 16, 1920, the Governorates of Alexandria, Rosetta, Damietta, and Port Said were declared infected areas and the transport of Citrus trees or their fruits if attacked by this pest was prohibited from the areas indicated to any place in Egyptian territory outside the said areas.

The fumigation campaign against the Black Scale should prevent this pest from becoming of any great economic importance.

47. Lepidosaphes (Mytilaspis) ficus Sign.

Bibliography : Newstead, Mon. Brit. Cocc., Vol. i, p. 202.

Puparium of adult female elongate, generally curved, narrower and less dilated at the posterior extremity than *L. beckii* Newm. Colour dark brown paling slightly towards the posterior extremity. First pellicle yellowish brown or orange brown, second pellicle orange brown generally obscured by the dark brown secretionary matter.

Average length of female puparium 2 millimetres.

Microscopic preparations of specimens collected so far in this country do not show the " four additional long slender tubular spinnerets on each side of the meson " described by Newstead (*loc. cit.*).

Host Plants.

Moraceæ ... ... *Ficus carica* (Edible Fig).

Part of Plant attacked.

The young branches.

Remarks.

This scale has only been collected in the vicinity of Cairo where it is fairly common, but I expect to find later that it is of much wider distribution.

48. Lepidosaphes (Mytilaspis) minima Newst.

Bibliography: Newstead, Trans. Ent. Soc. Lond., p. 95 (1897).

Puparium of adult female very convex, filiform, straight or curved, margins sometimes irregular; yellow brown to red brown; posterior extremity somewhat paler. First pellicle pale yellow to brownish, second pellicle the same colour as the rest of the puparium.

Length 0·5–1·25 millimetres.

Host Plants.

Moraceæ ... ... *Ficus carica* (Edible Fig).

Part of Plant attacked.

Leaves and fruit.

Remarks.

This minute species is fairly common and widely distributed.

49. Lepidosaphes (Mytilaspis) ulmi Linn.=L. pomorum Bouché (The Apple Mussel Scale).

Bibliography: Newstead, Mon. Brit. Cocc., Vol. i, p. 194.

Puparium of adult female convex, elongate, widened posteriorly, straight or curved, transversely striated showing lines of growth; pale to dark brown. Pellicles orange yellow to brown, the posterior extremity of each pellicle is usually lighter in colour than the rest of the pellicle.

Length 2–3 millimetres.

Male puparium convex, elongate, sides almost parallel but widening slightly posteriorly. Hinged about one quarter of the length of the puparium from the posterior extremity. Pellicle orange yellow.

Length 1 millimetre.

Specimens of this scale found on vine are of a pale brown colour as distinct from those found on *Sesbania* sp. which are dark brown.

Host Plants.

Geraniaceæ	*Pelargonium* sp. (Geranium).
Leguminosæ	**Cajanus indicus* (Pigeon Pea), **Sesbania* sp.
Rhamnaceæ	**Zizyphus* sp.
Rosaceæ	*Pyrus malus* (Apple).
Salicaceæ	**Populus* sp. (Poplar), **Salix* sp. (Willow).
Vitaceæ	**Vitis vinifera* (Vine).

Part of Plant attacked.

Stems and small branches, rarely the leaves.

Remarks.

This species is very common in Egypt and widely distributed. It is not recorded as being of any economic importance. Vines are frequently heavily attacked, but as they are cut back about February each year and the crop is removed by August the damage done is considerably minimized.

Zizyphus, *Sesbania*, Pigeon Pea, Poplar, and Willow are all heavily attacked, but without impairing the health of the tree to any extent.

50. **Leucaspis affinis** Leon (Fig. 3).

Female puparium elongated, narrow, and highly convex; colour light grey, slate grey, or brown grey. This applies to the second pellicle which encloses the adult female. It is covered by a thin layer of whitish grey transparent secretionary matter. The first pellicle is brown or yellowish brown and is slightly more than a quarter of the total length of the puparium.

Length 3 millimetres.

Male puparium almost as long as the female puparium but more narrowed, it is only dilated slightly posteriorly. Colour opaque white with a yellow or orange yellow pellicle.

Length 3 millimetres.

Host Plants.

Coniferæ	*Pinus* sp. (Pine).

Part of Plant attacked.

The pine needles.

Remarks.

This interesting species together with *L. pusilla* Low., were mistaken for some time as different forms of *Chionaspis pinifoliæ* Fitch as our specimens approximated very closely to the figures of that species

as given on page 162 of the "Injurious and Beneficial Insects of California" 1915. On examination, however, I found that there were two distinct species and that neither was a *Chionaspis*. Mr. Laing has kindly identified them for me as *L. affinis* Leon and *L. pusilla* Low. I give figures of the pygidia of both these species.

L. affinis Leon is common in Egypt wherever pines are found.

51. Leucaspis pusilla Low. (Fig. 4).

Bibliography: Loew., Wien. Ent. Zeit., ii, p. 3 (1883).

Female puparium white, convex, shaped like a spear head, widest about one-third of the total length from the posterior extremity. First pellicle yellow to brown, second pellicle forming the female puparium, greyish white, very highly chitinized and covered with white secretionary matter. Considerable difficulty was experienced in removing without damage the adult female from its chitinous puparium.

Length 1–1·5 millimetres. Breadth 0·5–0·75 millimetre.

Male puparium white, narrow, not dilated as the female puparium, being slightly wider only at the posterior extremity. Pellicle pale yellow.

Length 1 millimetre.

Host Plants.

Coniferæ ... ... *Pinus* sp. (Pine).

Part of Plant attacked.

The pine needles.

Remarks.

This species is common on pines in Egypt. (*See* the remarks on this species under *L. affinis* Leon.)

52. Leucaspis riccæ Targ.

Puparium of adult female elongate, usually straight, but crowded examples sometimes curved, sides approximately parallel. The second pellicle, constituting the puparium, is highly chitinized and shining brown red; it is covered by a thin layer of whitish secretionary matter, the resulting appearance of the puparium being grey to a slate grey. The first pellicle is pale yellowish green.

Length 1·5–2 millimetres.

Male puparium approximately the same size and shape as the female puparium but opaque white in colour. Pellicle grey brown.

Host Plants.

Oleaceæ ... ... *Olea* sp. (Olive).

Part of Plant attacked.

The leaves.

Remarks.

Fairly common and widely distributed throughout the country.

53. **Parlatoria blanchardii** Targ.

Bibliography : Ckll., The Entom., xxix, p. 52 (1896).

Puparium of adult female elongate, ovate, very slightly convex, dull white. First pellicle overlapping the margin and pale bottle green ; second pellicle large, occupying about two-thirds of the puparium, dark green bordered with pale yellow brown. This covering of white semi-transparent secretionary matter is absent in some specimens.

Adult female nearly colourless or palish yellow.

Length of female puparium 1·5 millimetres.

Male puparium small, elongate, parallel sided, white with a pale yellow or greenish pellicle.

Length 1 millimetre.

Host Plants.

Palmaceæ ... ... *Latania* sp., *Phœnix dactylifera* (Date Palm).

Part of Plant attacked.

The leaves.

Remarks.

This species is very common on date palms throughout Egypt. Prof. Cockerell in describing this species under the name of *P. victrix* (*loc. cit.*) from material on leaves of date palm sent from Tucson, Arizona, states that the palms in question were originally imported from Cairo.

54. **Parlatoria calianthina** Berl e Leon.

Bibliography : Berl e Leon, Riv. Pat. Veg., iii, p. 346 (1895).

Puparium of adult female approximately circular, convex, dusky white tinged with grey or brown. Pellicles eccentric pale yellow to brown or green brown with a thin transparent secretionary covering.

Adult female dark green.

Diameter of female puparium 1·5–2·5 millimetres.

Male puparium small, narrow, elongated with parallel sides, opaque white and non-carinated. Pellicle yellow brown.

Length 0·75–1 millimetre.

Host Plants.

Anacardiaceæ	*Schinus terebenthifolius.*
Apocynaceæ	**Nerium oleander.*
Cactaceæ	*Cactus* sp.
Moraceæ	*Ficus* sp.
Oleaceæ	*Olea* sp. (Olive).
Orchidaceæ	*Orchis* sp.
Rosaceæ	**Prunus armenica* (Apricot), **P. domestica* (Plum), **P. persica* (Peach) **Pyrus malus* (Apple), **Rosa* sp. (Rose).

Part of Plant attacked.

Leaves and stems.

Remarks.

This species is very common all over Egypt and until recently always went under the name of *P. proteus* Curtis. I found, however, that all our specimens were referable to *P. calianthina* Berl e Leon. I have since found *Parlatoria proteus* Curtis, but on quite a different host plant, and it is comparatively rare.

55. **Parlatoria chinensis** Marlatt.=**Chionaspis longispina** Newst. (Fig. 5).

Bibliography : Marlatt., New Species of Diaspine Scale Insects, 1908. U.S. Dept. Agric. Tech. Series No. 16, Part ii.

Puparium of adult female usually ovate, but some specimens circular, slightly convex, white or dirty white and semi-transparent. Pellicles extending beyond the margin and yellow to straw-coloured. The puparium bears a number of comparatively long and stout hairs of a semi-transparent white nature. The puparia are usually concealed beneath the superficial layer of the bark, but on very young twigs the naked puparia can often be seen.

Adult female dark purplish green.

Length of female puparium 0·5–1·25 millimetres.

Male puparium narrow elongate with parallel sides opaque white. Pellicle dark green.

Length 0·5–0·75 millimetre.

Host Plants.

Acanthaceæ ... ... *Justicia alba.*
Leguminosæ ... ... *Albizzia lebbekh, Bauhinia* sp.

Part of Plant attacked.

The young stems.

Remarks.

I have only collected this species at Luxor and Beni Suef in Upper Egypt. Marlatt, in describing it (*loc. cit.*), states that he collected it in Cairo in 1902 on an unknown plant in conjunction with *P. affinis* Newst.=*P. calianthina* Berl e Leon. Mr. Marlatt remarks that "the Egyptian variety differs slightly in the exterior serration of the median lobes, these serrations or notches being reduced to two or three instead of four or more, and the central lobular projection is somewhat larger. The paragenitals also are less abundant, ranging as follows: 0, 0–3, and 1–2." Preparations from my material confirm the above remarks.

Newstead has described a species, *Chionaspis longispina* (Bull. Ent. Res. 1911, p. 88), from material sent by Mr. Willcocks from Cairo. This species is most certainly synonymous with *Parlatoria chinensis* Marlatt, and the name should be sunk. The diagram which I give of *P. chinensis* is drawn from a large number of preparations from specimens on Lebbekh. It will be seen that it agrees almost identically with Newstead's figure (*loc. cit.*). Mr. Willcocks has also given me some of the material from which Newstead originally described *C. longispina*, and there can be no doubt that it is *Parlatoria chinensis* Marlatt. The description as given by Newstead fits perfectly except that there are usually two or three parastigmatic glands.

It may be that this synonymy has already been pointed out. but I have not been able to trace any reference to it in the literature.

56. **Parlatoria proteus** Curtis.

Bibliography: Newstead, Mon. Brit. Cocc., Vol. i, p. 140.

Puparium of adult female elongate, ovate, only very slightly convex and usually narrowing towards the posterior extremity;

colour transparent white. First pellicle projects slightly beyond the margin and is yellow, second pellicle large, almost circular, yellow to brown, and occupies rather more than one-third of the entire puparium. Adult female dark green, the sub-lying female being apparent through the puparium.

Length of puparium 1–1·5 millimetres. Breadth 0·5–1 millimetre.

Male puparium very elongate, sides parallel, white to straw coloured. Pellicle pale yellow to dark green.

Length 0·9 millimetre.

Host Plants.

Palmaceæ	On an unknown species of ornamental palm.

Remarks.

Collected twice in Cairo only up to the time of writing. *See* remarks under *P. calianthina* Berl e Leon.

I have not included in the above list *Tachardia lacca* Kerr. which was introduced from India by Dr. Gough in 1913. Sunt and Pigeon Pea trees were infected in two or three gardens in Cairo, but unfortunately it did not take very well. Trees in Egypt are remarkably scarce and are chiefly confined to the vicinity of towns and villages and the Sunt is the only indigenous tree that occurs in any numbers in the provinces. As the insect in question did not take very well on Sunt, if it was decided to initiate the Lac industry, it would mean planting the host plants, and the expense of this makes it extremely improbable that it would be economically sound.

It might be as well here to mention the species originating from other countries which have been detected at the Customs at the port of entry. Two species of *Parlatoria* are frequently found on *Citrus* fruits from other Mediterranean countries: *P. pergandii* Comst. and *P. zizyphus* Lucas. *Icerya seychellarum* Westw. has been found on bananas coming from Madagascar. A number of species occurring in this country have also been detected as follows :—

Chrysomphalus aonidum Linn. ...	Banana	Madagascar.
	Mango	India.
	Lemon	Cyprus, Greece, and Jaffa.
	Orange	Turkey.
Chrysomphalus aurantii Mask. ...	Lemon	Australia, Italy, Palestine, Greece, Cyprus.

	Banana	Madagascar.
	Orange	Jaffa, Cyprus.
	Plum	Syria, Palestine.
Aspidiotus destructor Sign.	Banana	Canary Islands.
Aspidiotus hederæ Vall.	Banana	Madagascar, Zanzibar.
	Lemon	Italy, Cyprus, Syria, Palestine.
	Orange	Cyprus, Italy. Syria.
	Plum	Cyprus.
	Vine...	Cyprus.
Lepidosaphes beckii Newmann ...	Lemon	Italy, Malta, Cyprus, Palestine, Syria, Greece.
	Orange	Italy, Australia.
	Mandarine ...	Cyprus, Rhodes.
Parlatoria calianthina B. e L. ...	Apple	Syria, Jaffa.
	Banana	Madagascar.
	Peach	Italy.
	Pear	Syria, Cyprus.
	Plum	Greece, Cyprus, Turkey.
	Pomegranate ...	Cyprus.
	Vine cuttings...	Cyprus.
Parlatoria pergandii Comst. ...	Lemon	Italy, Syria, Palestine.
	Orange	Malta, Syria, Palestine.
Parlatoria zizyphus Lucas	Lemon	Italy.
	Orange	Cyprus.
Coccus hesperidum Linn.	Banana	Zanzibar.
Pseudococcus citri Risso	Banana	Canary Islands.
Aspidiotus cydoniæ Comst.	Orange	Cyprus, Italy.
	Lemon.	Cyprus, Italy.

Legislation concerning Coccidæ in Egypt.

Legislation in respect of Insect Pests is based on two Laws :—

(1) Law No. 1 of 1916 dealing with insect pests from abroad.

(2) Law No. 16 of 1916 dealing with insect pests within the country.

These two laws are general and give the power to issue *Arrêtés* based on them in respect of any insect pest in particular and the measures to be taken against that pest.

An *arrêté* based on Law No. 1 of 1916 declares :—

(*a*) Italy, Greece, and the territory of Syria infected by *Parlatoria zizyphus* Lucas.

(*b*) The country of Turkey, the Islands of Crete and Rhodes infected by *Mytilaspis beckii* Newmann.

(*c*) Italy, Cyprus, and the territory of Syria by *Aspidiotus hederæ* Vall.

(*d*) The Canary Islands, Zanzibar, and Madagascar infected by *Icerya seychellarum* Westw., *Aspidiotus destructor* Sign., *Pseudococcus citri* Risso, and *Pseudococcus aonidum*.

(*a*), (*b*), and (*c*) refer to pests of *Citrus* trees and (*d*) to bananas and the *arrêté* provides that consignments of the above, coming from the abovementioned countries or countries unknown may, if infected, be either fumigated at the port of entry at the expense of the consignee or reshipped to the port of origin.

With reference to Law No. 16 of 1916, dealing with insect pests within the country, there are a number of *arrêtés*. These *arrêtés* refer to :—

(i) The Black Scale: *Chrysomphalus aonidum* Linn.
(ii) The Hibiscus Mealy Bug: *Phenacoccus hirsutus* Green.
(iii) The Citrus Mussel Scale: *Lepidosaphes beckii* Newmann.

(i) There are five *arrêtés* in connection with the Black Scale declaring the measures to be taken and regulating the transport of infected trees and fruits.

(ii) Four *arrêtés* have been issued to meet the outbreak of the Hibiscus Mealy Bug. This pest originally broke out in Cairo and the *arrêtés* have been mainly directed towards preventing its spreading, cleaning up the infected areas, dealing with any infected gardens outside the infected areas, and regulating the transport of plants and plant produce from the infected into the non-infected areas.

(iii) *Lepidosaphes beckii* Newmann has become established in the orange gardens in the North of the Delta and an *arrêté* was issued declaring the Governorates of Alexandria, Rosetta, Damietta, and Port Said infected and prohibiting the transport of fruits from those areas into the areas non-infected unless treated according to the specifications of the Ministry of Agriculture, *i.e.* fumigation. This *arrêté* was enacted to prevent the scale in question spreading down to the great citrus growing districts of Qalyûbîya and Minûfîya.

List of Coccidæ according to Various Genera of Plants.

The species in the following list are arranged roughly in the order of their importance under each plant genus.

Aberia (*Flacourtiaceæ*).
Phenacoccus hirsutus.
Abutilon (*Malvaceæ*).
Phenacoccus hirsutus.
Acacia (*Leguminosæ*).
Phenacoccus hirsutus.
Coccus longulus.
Aonidia glandulosa.
Pseudococcus perniciosus.
Ceroplastes africanus.
Asterolecanium pustulans var. sambuci.
Icerya purchasi.
Aspidiotus hederæ.
Aspidiotus cydoniæ.
Coccus hesperidum.
Chrysomphalus aonidum.
Lecaniodiaspis africana.
Acalypha (*Euphorbiaceæ*).
Icerya purchasi.
Phenacoccus hirsutus.
Icerya ægyptiaca.
Adina (*Rubiaceæ*).
Phenacoccus hirsutus.
Chrysomphalus aonidum.
Agrostis (*Gramineæ*).
Chionaspis graminis var.
Albizzia (*Leguminosæ*).
Phenacoccus hirsutus.
Pseudococcus perniciosus.
Ceroplastes africanus.
Parlatoria chinensis.
Aloe (*Liliaceæ*).
Chrysomphalus aonidum.
Althæa (*Malvaceæ*).
Phenacoccus hirsutus.
Icerya purchasi.
Anona (*Anonaceæ*).
Phenacoccus hirsutus.
Icerya ægyptiaca.
Asterolecanium pustulans var. sambuci.
Aspidiotus cydoniæ.
Chrysomphalus aonidum.
Coccus hesperidum.

Araucaria (*Coniferæ*).
Eriococcus araucariæ.
Asparagus (*Liliaceæ*).
Aspidiotus hederæ.

Bambusa (*Gramineæ*).
Asterolecanium bambusæ.
Bauhinia (*Leguminosæ*).
Phenacoccus hirsutus.
Chrysomphalus aonidum.
Asterolecanium pustulans var. sambuci.
Aspidiotus cydoniæ.
Icerya purchasi.
Saissetia oleæ.
Saissetia hemisphærica.
Coccus hesperidum.
Parlatoria chinensis.
Bignonia (*Bignoniaceæ*).
Phenacoccus hirsutus.
Bougainvillea (*Nyctagineæ*).
Asterolecanium pustulans var. sambuci.
Phenacoccus hirsutus.

Cactus (*Cactaceæ*).
Parlatoria calianthina.
Cæsalpinia (*Leguminosæ*).
Aspidiotus cydoniæ.
Icerya purchasi.
Cajanus (*Leguminosæ*).
Lepidosaphes ulmi.
Phenacoccus hirsutus.
Pseudococcus perniciosus.
Icerya purchasi.
Coccus longulus.
Canna (*Marantaceæ*).
Pseudococcus citri.
Carica (*Caricaceæ*).
Phenacoccus hirsutus.
Carissa (Apocynaceæ).
Phenacoccus hirsutus.
Cassia (*Leguminosæ*).).
Asterolecanium pustulans var. sambuci.

Phenacoccus hirsutus.
Aspidiotus hederæ.

CERATONIA (*Leguminosæ*).
Phenacoccus hirsutus.
Asterolecanium pustulans var. sambuci.
Aspidiotus cydoniæ.
Chrysomphalus aurantii.
Aspidiotus cyanophylli.
Chrysomphalus aonidum.

CITRUS (*Rutaceæ*).
Chrysomphalus aonidum.
Chrysomphalus aurantii.
Lepidosaphes beckii.
Phenacoccus hirsutus.
Pseudococcus perniciosus.
Icerya purchasi.
Ceroplastes floridensis.
Coccus hesperidum.
Icerya ægyptiaca.
Aspidiotus cydoniæ.
Ceroplastes rusci.

CORCHORUS (*Tiliaceæ*).
Phenacoccus hirsutus.

CLERODENDRON (*Verbenaceæ*).
Orthezia insignis.

CRATÆGUS (*Rosaceæ*).
Phenacoccus hirsutus.
Ceroplastes rusci.

CROTON (*Euphorbiaceæ*).
Phenacoccus hirsutus.

CUPRESSUS (*Coniferæ*).
Chionaspis striata.
Diaspis carueli.

CYCAS (*Cycadaceæ*).
Aspidiotus hederæ.
Saissetia hemisphærica.

CYPERUS (*Cyperaceæ*).
Ceroplastes rusci.

DALBERGIA (*Leguminosæ*).
Phenacoccus hirsutus.
Aspidiotus cydoniæ.

DATURA (*Solanaceæ*).
Aspidiotus hederæ.

DIOSPYROS (*Ebenaceæ*).
Phenacoccus hirsutus.
Chrysomphalus aonidum.

DOLICHOS (*Leguminosæ*).
Aspidiotus cydoniæ.

DURANTA (*Verbenaceæ*).
Phenacoccus hirsutus.

ELÆAGNUS (*Elæagnaceæ*).
Phenacoccus hirsutus.

EPHEDRA (*Gnetaceæ*).
Fiorinia africana.
Lichtensia ephedræ.

ERIOBOTRYA (*Rosaceæ*).
Phenacoccus hirsutus.
Chrysomphalus aonidum.
Aspidiotus cydoniæ.
Ceroplastes floridensis.

ERYTHRINA (*Leguminosæ*).
Phenacoccus hirsutus.
Asterolecanium pustulans var. sambuci.

EUCALYPTUS (*Myrtaceæ*).
Chrysomphalus aonidum.

EUGENIA (*Myrtaceæ*).
Phenacoccus hirsutus.
Chrysomphalus aonidum.

FICUS (*Moraceæ*).
Icerya ægyptiaca.
Asterolecanium pustulans var. sambuci.
Chrysomphalus aonidum.
Ceroplastes rusci.
Icerya purchasi.
Phenacoccus hirsutus.
Lepidosaphes ficus.
Aspidiotus cydoniæ.
Ceroplastes floridensis.
Coccus hesperidum.
Parlatoria calianthina.
Lepidosaphes minima.
Lecaniodiaspis africana.

FLACOURTIA (*Flacourtiaceæ*).
Asterolecanium pustulans var. sambuci.

GOSSYPIUM (*Malvaceæ*).
Phenacoccus hirsutus.
Pseudococcus perniciosus.
Chrysomphalus aonidum.

GREVILLEA (*Protoaceæ*).
Phenacoccus hirsutus.
Asterolecanium pustulans var sambuci.

GUAZUMA (*Sterculiaceæ*).
Asterolecanium pustulans var. sambuci.

Hibiscus (*Malvaceæ*).
Phenaccoccus hirsutus.
Asterolecanium pustulans var. sambuci.
Icerya ægyptiaca.

Inga (*Leguminosæ*).
Phenacoccus hirsutus.

Jacaranda (*Bignoniaceæ*).
Icerya purchasi.
Phenacoccus hirsutus.
Asterolecanium pustulans var. sambuci.
Jasminum (*Oleaceæ*).
Aspidiotus hederæ.
Asterolecanium pustulans var. sambuci.
Phenacoccus hirsutus.
Aspidiotus cydoniæ.
Chrysomphalus aonidum.
Pseudococcus longispinus.
Justicia (*Acanthaceæ*).
Saissetia hemisphærica.
Parlatoria chinensis.

Kigelia (*Bignoniaceæ*).
Phenacoccus hirsutus.

Lantana (*Verbenaceæ*).
Icerya ægyptiaca.
Phenacoccus hirsutus.
Latania (*Palmaceæ*).
Parlatoria blanchardii.
Chrysomphalus aonidum.
Icerya ægyptiaca.
Ischnaspis longirostris.
Lawsonia (*Lythraceæ*).
Phenacoccus hirsutus.
Icerya ægyptiaca.
Chrysomphalus aonidum.

Magnolia (*Magnoliaceæ*).
Aspidiotus hederæ.
Malvaviscus (*Malvaceæ*).
Phenacoccus hirsutus.
Mangifera (*Anacardiaceæ*).
Chrysomphalus aonidum.
Phenacoccus hirsutus.
Icerya ægyptiaca.
Pseudococcus longispinus.
Diaspis cinnamoni var. mangiferæ.

Melia (*Meliaceæ*).
Aspidiotus hederæ.
Icerya ægyptiaca.
Phenacoccus hirsutus.
Mesembryanthemum (*Aizoaceæ*).
Pulvinaria mesembryanthemi.
Morus (*Moraceæ*).
Phenacoccus hirsutus.
Icerya ægyptiaca.
Asterolecanium pustulans var. sambuci.
Aspidiotus cydoniæ.
Aspidiotus hederæ.
Chrysomphalus aurantii.
Ceroplastes floridensis.
Musa (*Musaceæ*).
Chrysomphalus aonidum.
Chrysomphalus aurantii.
Phenacoccus hirsutus.
Myrtus (*Myrtaceæ*).
Chrysomphalus aonidum.
Phenacoccus hirsutus.

Nerium (*Apocynaceæ*).
Aspidiotus hederæ.
Asterolecanium pustulans var. sambuci.
Parlatoria calianthina.
Coccus hesperidum.
Saissetia oleæ.
Phenacoccus hirsutus.
Aspidiotus cydoniæ.
Chrysomphalus aonidum.

Olea (*Oleaceæ*).
Pollinia pollini.
Parlatoria calianthina.
Leucaspis riccæ.
Chrysomphalus aonidum.
Coccus hesperidum.
Chrysomphalus aurantii.
Opuntia (*Cactaceæ*).
Diaspis cacti.
Orchis (*Orchidaceæ*).
Parlatoria calianthina.

Paritium (*Malvaceæ*).
Phenacoccus hirsutus.
Parkinsonia (*Leguminosæ*).
Icerya ægyptiaca.
Phenacoccus hirsutus.

PASSIFLORA (*Passifloraceæ*).
Asterolecanium pustulans var. sambuci.
Phenacoccus hirsutus.
Saissetia nigra.
PAVONIA (*Malvaceæ*).
Phenacoccus hirsutus.
PELARGONIUM (*Geraniaceæ*).
Asterolecanium pustulans var, sambuci.
Lepidosaphes ulmi.
PERSEA (*Lauraceæ*).
Chrysomphalus aonidum.
PHASEOLUS (*Leguminosæ*).
Phenacoccus hirsutus.
PHOENIX (*Palmaceæ*).
Parlatoria blanchardii.
Sphærococcus marlatti.
Chrysomphalus aonidum.
Icerya ægyptiaca.
Parlatoria proteus.
Chrysomphalus aurantii.
Phenacoccus hirsutus.
Diaspis boisduvalii.
Ceroplastes actiniformis.
PHYLLANTHUS (*Euphorbiaceæ*).
Icerya purchasi.
Aspidiotus cydoniæ.
Aspidiotus cyanophylli.
Chrysomphalus aonidum.
Ceroplastes floridensis.
Chrysomphalus aurantii.
PINUS (*Coniferæ*).
Leucaspis affinis.
Leucaspis pusilla.
PITHYRANTHUS (*Umbelliferæ*).
Chionaspis bilobis.
PITTOSPORUM (*Pittosporaceæ*).
Icerya purchasi.
Asterolecanium pustulans var. sambuci.
Saissetia hemisphærica.
Saissetia nigra.
PLUMBAGO (*Plumbaginaceæ*).
Phenacoccus hirsutus.
POINCIANA (*Leguminosæ*).
Icerya ægyptiaca.
Phenacoccus hirsutus.
POINSETTIA (*Euphorbiaceæ*).
Phenacoccus hirsutus.
POPULUS (*Salicaceæ*).
Lepidosaphes ulmi.
Fiorinia africana.

PRUNUS (*Rosaceæ*).
Parlatoria calianthina.
Aspidiotus cydoniæ.
Chrysomphalus aurantii.
Aulacaspis pentagona.
Asterolecanium pustulans var. sambuci.
Phenacoccus hirsutus.
Ceroplastes floridensis.
Saissetia oleæ.
Chrysomphalus aonidum.
PSIDIUM *Myrtaceæ*).
Phenacoccus hirsutus.
Icerya ægyptiaca.
Pulvinaria floccifera.
Aspidiotus cydoniæ.
Aspidiotus cyanophylli.
Ceroplastes floridensis.
Saissetia oleæ.
Ceroplastes rusci.
PUNICA (*Punicaceæ*).
Chrysomphalus aonidum.
Icerya purchasi.
Phenacoccus hirsutus.
PYRUS (*Rosaceæ*).
Parlatoria calianthina.
Aspidiotus cydoniæ.
Chrysomphalus aurantii.
Phenacoccus hirsutus.
Asterolecanium pustulans var. sambuci.
Lepidosaphes ulmi.
Chrysomphalus aonidum.

RICINUS (*Euphorbiaceæ*).
Chrysomphalus aurantii.
Phenacoccus hirsutus.
ROBINIA (*Leguminosæ*).
Phenacoccus hirsutus.
ROSA (*Rosaceæ*).
Chrysomphalus aurantii.
Parlatoria calianthina.
Aspidiotus cydoniæ.
Icerya ægyptiaca.
Icerya purchasi.
Pulvinaria floccifera.
Aulacaspis pentagona.
Phenacoccus hirsutus.
Chrysomphalus aonidum.

SACCHARUM (*Gramineæ*).
Pseudococcus sacchari.
Aspidiotus cydoniæ.

Salix (*Salicaceæ*).
Lepidosaphes ulmi.
Asterolecanium pustulans var. sambuci.
Fiorinia africana.
Phenacoccus hirsutus.
Salvia (*Labiatæ*).
Aspidiotus hederæ.
Icerya purchasi.
Sapota (*Sapotaceæ*).
Asterolecanium pustulans var. sambuci.
Icerya ægyptiaca.
Schinus (*Anacardiaceæ*).
Parlatoria calianthina.
Icerya ægyptiaca.
Phenacoccus hirsutus.
Ceroplastes floridensis.
Ceroplastes rusci.
Sciadophyllum (*Araliaceæ*).
Coccus hesperidum.
Phenacoccus hirsutus.
Sesbania (*Leguminosæ*).
Lepidosaphes ulmi.
Phenacoccus hirsutus.
Solanum (*Solanaceæ*).
Pseudococcus citri.
Phenacoccus hirsutus.
Asterolecanium pustulans var sambuci.
Pulvinaria floccifera.
Saissetia hemisphærica.

Tamarix (*Tamaricaceæ*).
Ceroplastes africanus.
Adiscodiaspis tamaricicola.

Tecoma (*Bignoniaceæ*).
Phenacoccus hirsutus.
Templetonia (*Leguminosæ*).
Phenacoccus hirsutus.
Terminalia (*Combretaceæ*).
Phenacoccus hirsutus.
Thunbergia (*Acanthaceæ*).
Saissetia hemisphærica.
Thuja (Coniferæ)
Chionaspis striata.
Diaspis carueli.

Urena (*Malvaceæ*).
Aspidiotus hederæ.

Viburnum (*Caprifoliaceæ*).
Asterolecanium pustulans var. sambuci.
Vitis (*Vitaceæ*).
Lepidosaphes ulmi.
Icerya ægyptiaca.
Phenacoccus hirsutus.
Aspidiotus cydoniæ.
Chrysomphalus aonidum.
Pseudococcus longispinus.
Chrysomphalus aurantii.

Zizyphus (*Rhamaceæ*).
Phenacoccus hirsutus.
Lepidosaphes ulmi.
Pseudococcus perniciosus.
Asterolecanium pustulans var. sambuci.
Aspidiotus cydoniæ.
Icerya ægyptiaca. .

APPENDIX.

Records of a few Coccidæ occurring in Palestine.

In the course of a recent mission to Palestine (November 20 to December 1, 1921) to inspect the orange groves of the Jaffa district, a number of specimens were collected, and it may be of some value to place these on record. Much of the material still remains unidentified owing to pressure of work, and doubtless an opportunity of placing it on record will occur at a later date.

I will give first of all a list of the species found on *Citrus* spp. in the Jaffa district.

1. *Chrysomphalus* (*Aspidiotus*) *aurantii* Mask. (Abundant.)
2. *Lepidosaphes* (*Mytilaspis*) *beckii* Newm.
3. *Parlatoria pergandii* Comst. (Abundant.)
4. *Ceroplastes floridensis* Comst. (Abundant.)
5. *Saissetia* (*Lecanium*) *oleæ* Bernard.
6. *Lecanium hesperidum* Linn.
7. *Pseudococcus citri* Risso. (Abundant in some gardens in Jaffa town.)
8. *Icerya purchasi* Mask.

Of the above list *Parlatoria pergandii* Comst. is the only one which does not occur in Egypt. *Chrysomphalus* (*Aspidiotus*) *aonidum* Linn. occurs on *Citrus* spp. in the Haifa district but was not found in the Jaffa district nor was *Parlatoria zizyphus* Lucas found. It is curious that although *Aspidiotus hederæ* Vall. was very prevalent it was not found on Lemons and in that respect the Jaffa district resembles Egypt and differs from Cyprus, Italy, and Syria, where lemons become heavily infested with this species.

Records of specimens collected on host plants other than *Citrus* spp. were as follows :—

1. *Aspidiotus cydoniæ* Comst. on Fig, Mulberry, and Futna.—Jaffa.
2. *Aspidiotus hederæ* Vall. on Oleander, *Melia azederach*, and Wild Asparagus.—Jerusalem and Jaffa.
3. *Chionaspis striata* Newst. on Cypress and Thuja.—Jerusalem and Jaffa.
4. *Chrysomphalus aurantii* Mask. on Mulberry, Rose, Banana, and *Melia azederach*.—Jaffa.
5. *Diaspis cacti* Comst. on *Opuntia* spp.—Jaffa.
6. *Parlatoria calianthina* Berl e Leon on Almond.—Jaffa.

Coccinæ.

7. *Ceroplastes floridensis* Comst. on Pomegranate, Chrysanthemum, Fig, Oleander, Banana, Loquat, *Melia azerderach*.—Jaffa.
8. *Ceroplastes rusci* Linn. on Fig.—Jaffa.

DACTYLOPIINÆ.

9. *Asterolecanium pustulans* var. *sambuci* Ckll. on Futna, Fig.—Jaffa.
10. *Pollinia pollini* Costa on Fig.—Jaffa.
11. *Pseudococcus citri* Risso on Cucurbitaceous fruit.—Jaffa.
12. *Pseudococcus sacchari* Ckll. on Sugar Cane.—Jaffa.

MONOPHLEBINÆ.

13. *Icerya purchasi* Mask. on Futna.—Jaffa.

Jaffa in the above list comprises the whole Jaffa district.

Oleanders were frequently seen very heavily attacked with *Aspidiotus hederæ* Vall. and *Ceroplastes floridensis* Comst. was extremely common, having apparently a wide range of food plants. *Pseudococcus sacchari* Ckll., which is proving such a serious pest of sugar cane in Egypt, was found in Jaffa, but there is only a very little sugar cane grown for local consumption, so it is not of any economic importance.

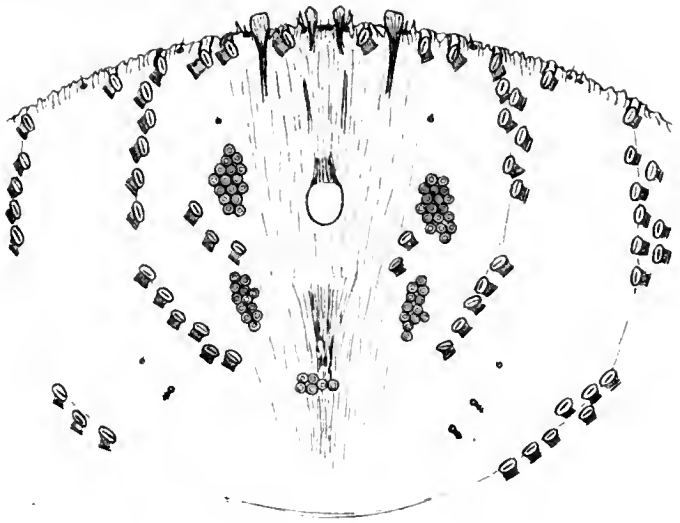


FIG. 1.

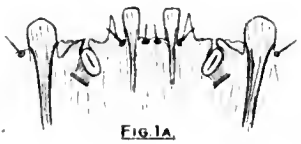


FIG. 1A.

FIG. 1B.

FIG. 1C.

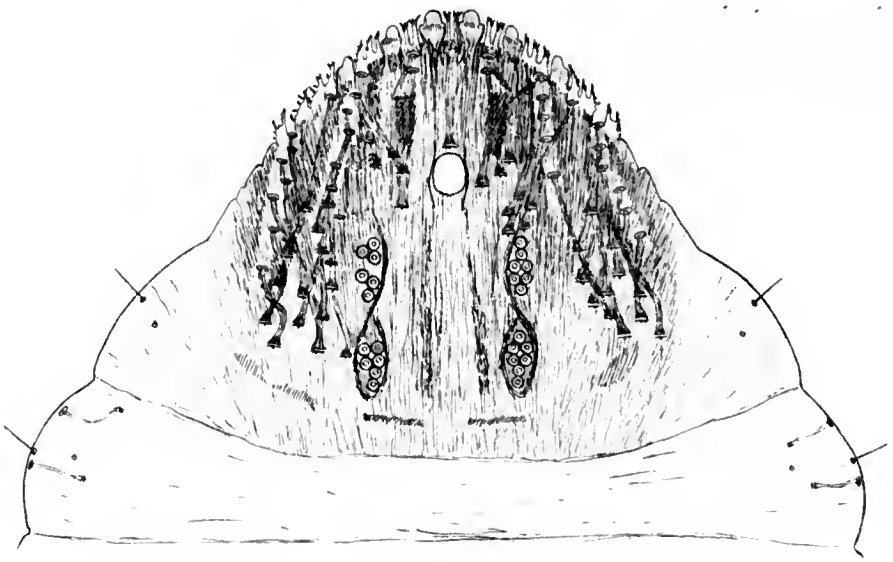
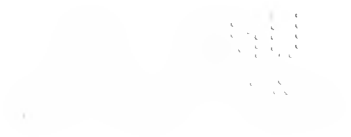


FIG. 2.

S. of E. 22/193

FIG. 1. — *Chionaspis striata*, Newst. Pygidium of adult female ×360.
,, 1*a*. ,, ,, Showing variation in shape of pygidial lobes ×500.
,, 1*b*. ,, ,, Abdominal tubercles ×600.
,, 1*c*. ,, ,, Abdominal glands × many times.
,, 2. — *Chrysomphalus aonidum* L. Pygidium of adult female from *Myrtus communis* ×230.



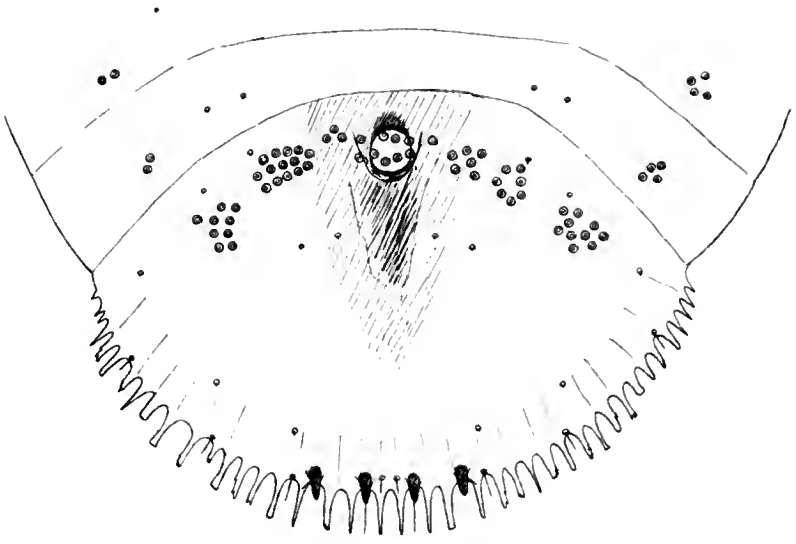


FIG. 3.

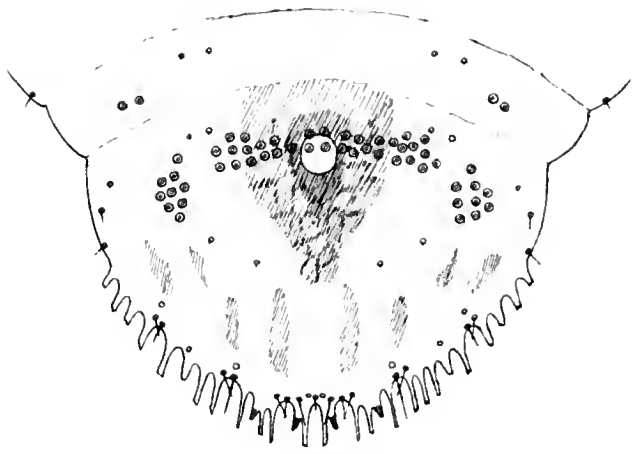


FIG. 4.

S.of E. 22/133

FIG. 3.—*Leucaspis affinis*, Leon. Pygidium of adult female ×270.
„ 4.—*Leucaspis pusilla*, Loew. Pygidium of adult female ×370.

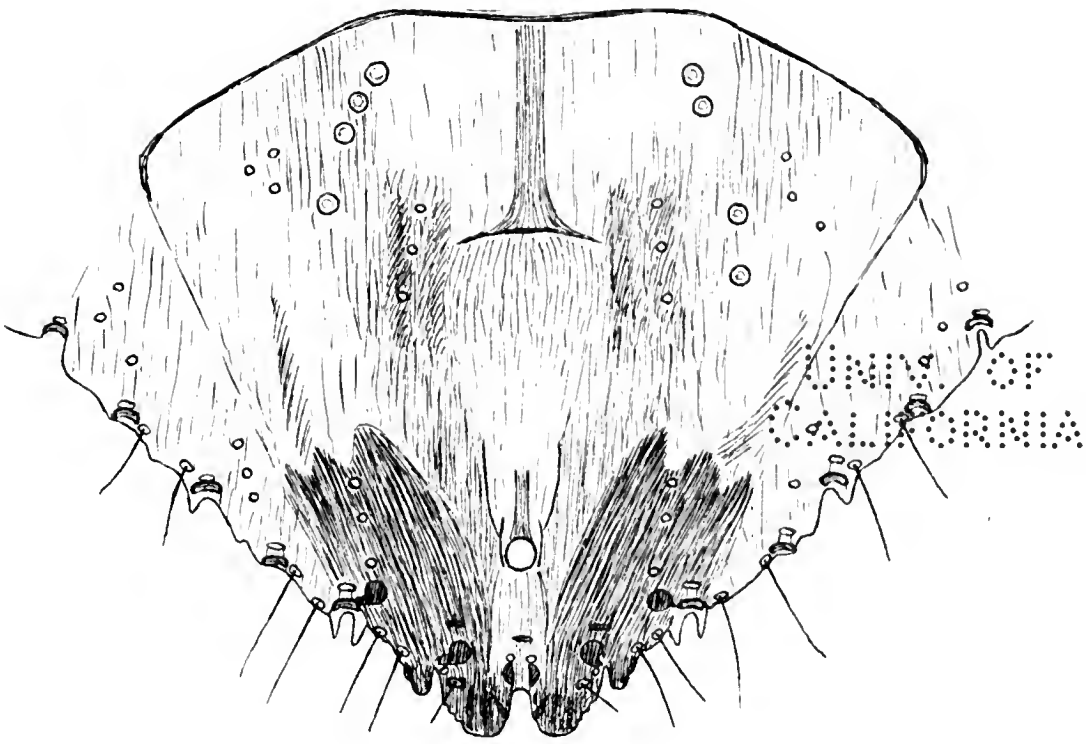


FIG. 5.

FIG. 5.—*Parlatoria chinensis*, Marlatt. Pygidium of adult female ×520.