

III. Pests of crops in warm climates : beverages : coffee, cocoa, tea, kola-nut

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BEVERAGES

Coffee

Cocoa

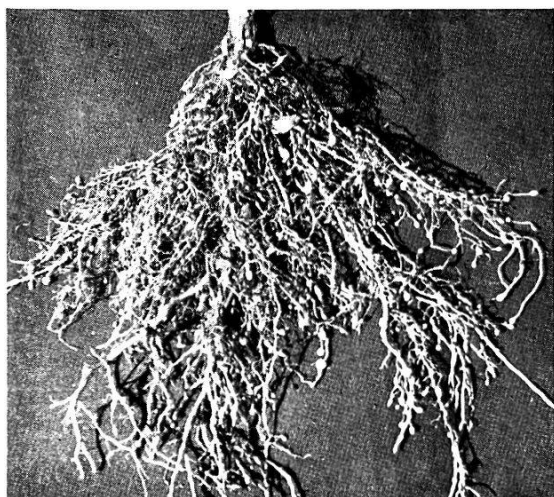
Tea

Kola-nut

Coffee

(*Coffea* sp. = various species and varieties)

Most important pests: 9, 10, 11, 20, 25, 26, 31, 33, 38, 41, 43, 46, 48, 49



Foliage dull pale green. Constant leaf-shedding, especially of young plants in nurseries. Formation of many secondary roots. Roots beset with round knots, 1-2 mm in size.

Meloidogyne sp.
Root knot nematode.

NEMATODA

root

1

The root knots harbour endoparasitic, pear-shaped female nematodes. Arabica coffee is preferred.

Distribution: widespread

Roots with dark, mottled, often granular lesions. Plant growth severely impaired. Light, but constant leaf-shedding.

Radopholus similis Cobb.
Burrowing nematode.

NEMATODA

2

353, 382, 403
466, 625, 731
746

Endoparasitic nematode, 0.5-0.7 mm long.

Distribution: widespread throughout the Tropics

Roots with dark, mottled lesions and forming fibrous bunches. Young trees chlorotic, growing reluctantly. Leaf-shedding.

Pratylenchus coffeae Z. (*loosi*)
Coffee nematode.

NEMATODA

3

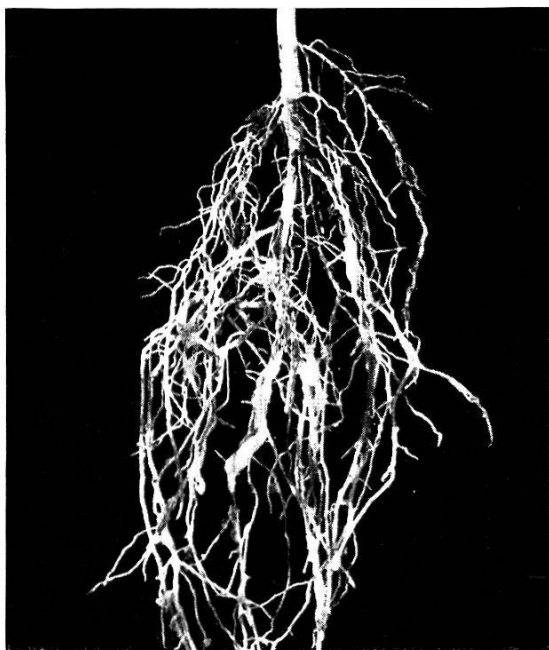
53, 103, 404
543, 772

Nematode, about 0.5 mm long, with an obtuse abdominal end. It lives endoparasitically in the root tissue and prefers "arabica" and "robusta" coffee.

Distribution: Africa, Indonesia, Indochina, Australia

root

4



Roots with elongate, irregular, sausage-shaped swellings. Young trees preferred.

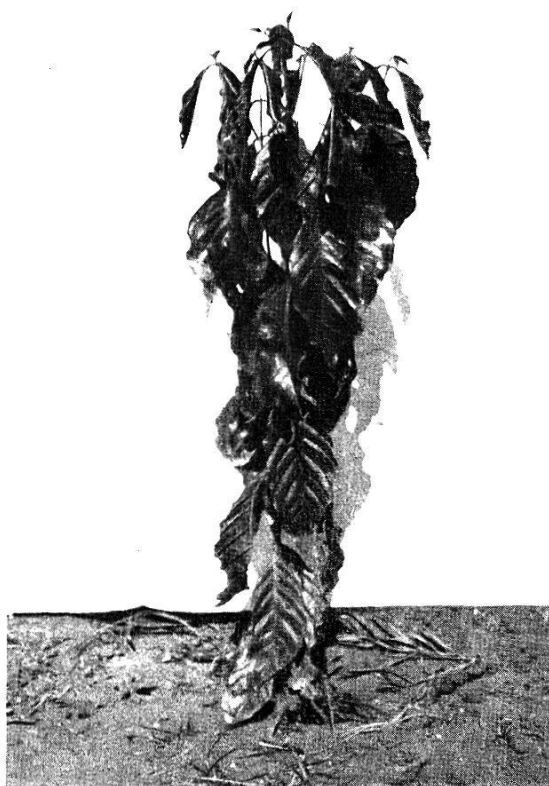
Xiphinema insigne Loos
Dagger nematode.

NEMATODA

Relatively large ectoparasitic nematode, 2.5-3 mm long, which attacks the roots.

Distribution: numerous species widespread

5



Leaves of young trees droop. Roots devoured by white grubs.

Colasposoma coffeae Kolbe

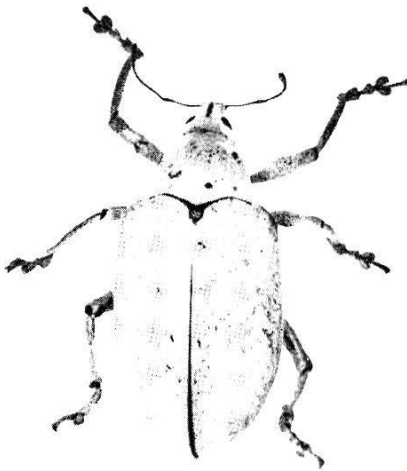
COLEOPTERA; *Chrysomelidae*

Dark brown to reddish-brown cockchafer, 12-15 mm long, which deposits its eggs in the ground. The larvae feed on roots. One generation a year.

Distribution: East Africa

Leaves droop and fall off. Development of berries often severely impaired. Sometimes only partial injury. Thicker roots peeled to the central cylinder (stele).

root



Pachnaeus azureus Gyll.

COLEOPTERA; Curculionidae

6

Weevil with a short, stout snout and pale azure, convex elytra. The prothorax is narrow. The eggs are laid underground, where the white to creamy-white, footless larvae feed on roots. 1-2 generations a year.

Distribution: Cuba

Leaves of newly planted trees or of those in nurseries wilted; roots gnawed off.

Gryllotalpa africana Pal.
African mole-cricket.

ORTHOPTERA; Gryllotalpidae

7

422, 680

Light and dark brown mole-cricket, about 30 mm long (see Fig. 10), which builds its nests in the earth and digs large underground galleries, gnawing plant roots off on its way. Damage is caused only occasionally in nurseries.

Distribution: widespread in Africa

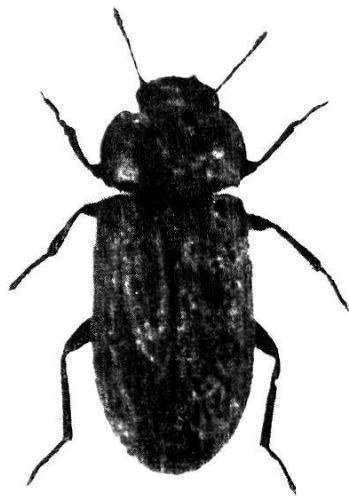
trunk

Young trees in nurseries or newly planted ones stunted. Trunk base ring-barked.

Gonocephalum simplex F.
Dusty brown beetle.

COLEOPTERA; *Tenebrionidae*

8

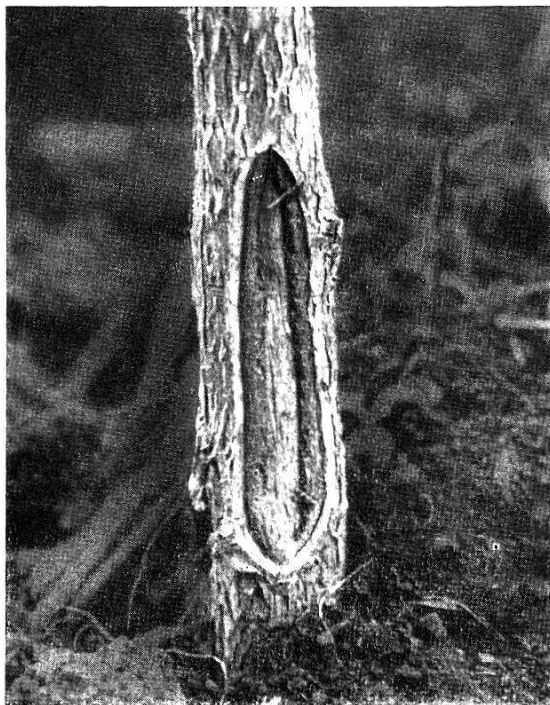


Dark brown, fairly straight-sided beetle, measuring about 10 mm by 4 mm, which lays its eggs in rotting and decaying vegetable matter. The larvae live underground on roots of many weeds. The adults feed on the trunk base of young trees. One generation a year.

Distribution: Africa

9

108, 684



Young trees stunted. Leaf-shedding. Bark at trunk base injured, scars forming long, deep cracks.

Scotia (Agrotis) segetum Schiff.

LEPIDOPTERA; *Noctuidae*

Moth with a wing span of 40 mm. The forewings are greyish-brown with dark brown spots and fine bands; the hindwings are uniform pale. The eggs are laid on

the young trunks between earth particles or on weeds. The caterpillars are grey and hairless; they feed at night on the trunk base, hiding in daytime in the soil. They are very active during the rainy season. Pupation takes place underground. Several generations.

trunk

Distribution: Europe, Africa, India, Ceylon, Indonesia



Trees grow reluctantly. Leaves wilt; fruits and buds shrivel and fall. Trunk base mined with external galleries, the latter covered with wood chips.

Anthores leuconotus Pasc.
White coffee borer.

COLEOPTERA; *Cerambycidae*

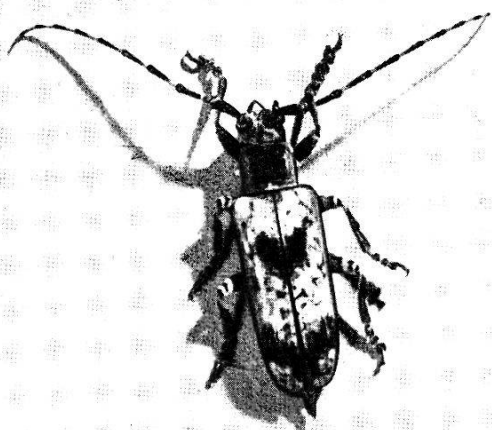
10

Longicorn beetle, 25-30 mm long, with a dark brown head and prothorax. The latter is armed on both sides with a short, sharp thorn. The lower segments of the antennae and legs are also brown, except those of the tibiae, the lower halves of which are grey. The elytra are brown at the base, the remainder covered with greyish, felty hairs and a brown band across the last third. The antennae are much longer than the body. The insect is on the wing from November to March. The females lay their eggs on the trunk, where the yellowish-white larvae tunnel under the bark and into the wood. Development period of one generation: 1-2 years.

Distribution: Kenya, Tanganyika, Uganda, Zanzibar, Rhodesia, Congo, Angola

trunk

11



Leaves turn yellow and wilt. Fruits and buds shrivel, wither and fall. Presence of frass at the trunk base. Trees liable to fall, owing to galleries riddling the roots.

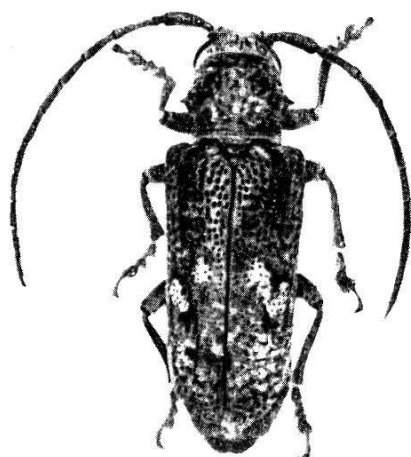
Bixadus sierricola White
Coffee stemborer.

COLEOPTERA; *Cerambycidae*

Longicorn beetle, 25-30 mm long. The head and prothorax are covered laterally with felty hairs, the latter is also armed with a sharp spine on both sides. The antennae have brown and grey rings; they are longer than the body. The elytra are also covered with greyish-brown felt, decorated in the centre with a V-shaped design and a dark band across the last third near the tip. The legs are brown, the tip of the femora clothed with grey hairs. Flight period: September to January. The female lays its eggs on the lower portion of the trunk, where the yellowish-white larvae tunnel under the bark and into the wood, eventually penetrating into the roots. One tree may be attacked by several larvae. Development period of one generation: 6-9 months.

Distribution: West Africa, Congo

12



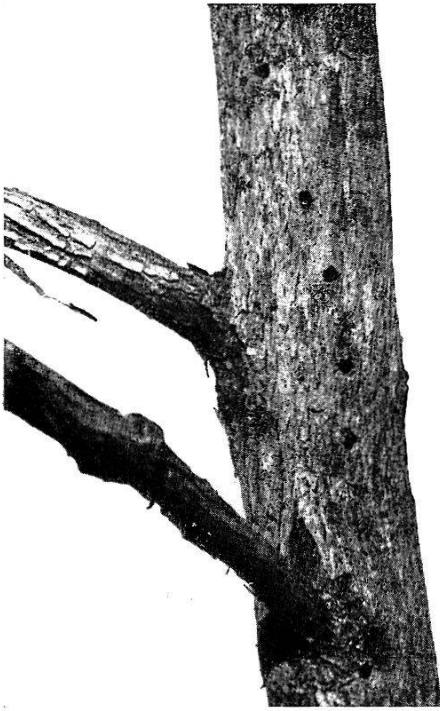
Trees stunted and wilted. Fine white frass at the trunk base. Rootstock and trunk base traversed by large galleries.

Chreostes obesus Westw.

COLEOPTERA; *Cerambycidae*

Dark brown Longicorn beetle, 20-30 mm long. The anterior portion of the elytra is shiny brown, while the posterior portion is marked with greyish-beige. The prothorax is armed on both sides with two fine, sharp spines. The antennae are shorter than the body. The female lays its eggs in slits of the bark, whence the larvae tunnel into the trunk, mining upwards and downwards. Peak in November to February.

Distribution: Angola



Partial dieback of trees. Attacked shoots and branches with distinct bore-holes close to each other. Presence of frass on the ground. Trees stunted; fruit setting impaired.

trunk

Dirphya usambica Kolbe

COLEOPTERA; *Cerambycidae*

13

Slender Longicorn beetle, 25-30 mm long. The elytra are black, the base reddish-yellow. The abdomen, antennae, and legs are also black. The eggs are laid on shoots and branches which the yellow larvae mine, penetrating through the pith to the base of branches and trunks. Frass is evacuated through holes made at short intervals along their way. Full grown the larvae may reach 40 mm in length. *D. usambica* occurs at high altitudes.

Distribution: East Africa



Trees or branches with wilting leaves and oval, slightly downward opening bore-holes, 5-7 mm in diameter. Presence of frass on the ground.

Apate monachus F.

COLEOPTERA; *Bostrychidae*

14

61, 151, 476

Dark brown, cylindrical beetle, 15-20 mm long, the elytra of which are marked with dotted longitudinal lines. The prothorax is rounded off in front and bears distinct humps. The beetle tunnels into the young trunk, often several beetles, i.e., galleries being found in one trunk. The eggs are deposited on dying wood, where the larvae develop. *A. monachus* may attack young as well as older trees.

Distribution: Africa, the Antilles, Cuba

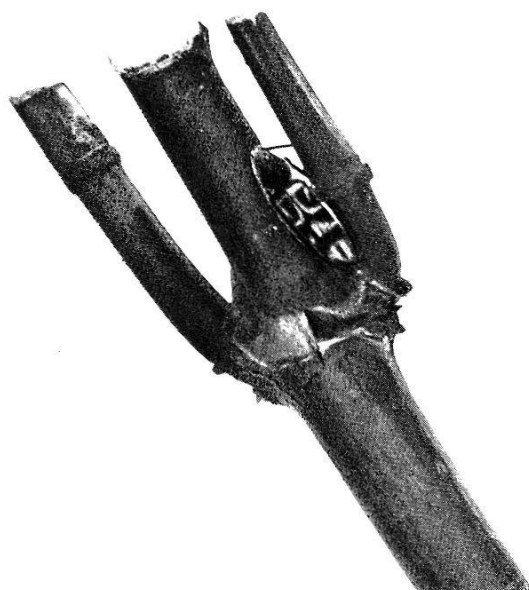
trunk

Leaves above the mined plant parts wilt. According to site of attack either whole trees or only some of the branches die.

Xylotrechus quadripes Chevr.
Indian borer.

COLEOPTERA; *Cerambycidae*

15



Black Longicorn beetle, about 8-10 mm long. The elytra are crossed by 3 pale stripes. The females insert their eggs in cracks in the bark. The white to yellowish larvae, slightly broadened anteriorly, gnaw galleries in the wood. After about 6 months they pupate in the trunk. Flight period: June/July. Arabica coffee is preferred.

Distribution: India, Ceylon, Indonesia, Tonkin, Philippine Islands

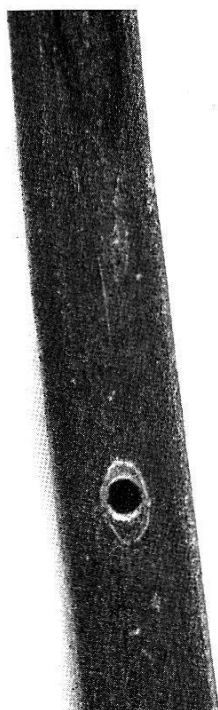
twigs

Twigs die, their leaves droop or wither. Small bore-holes in twigs.

Xyleborus coffeae Wurth.
Takken boeboek.

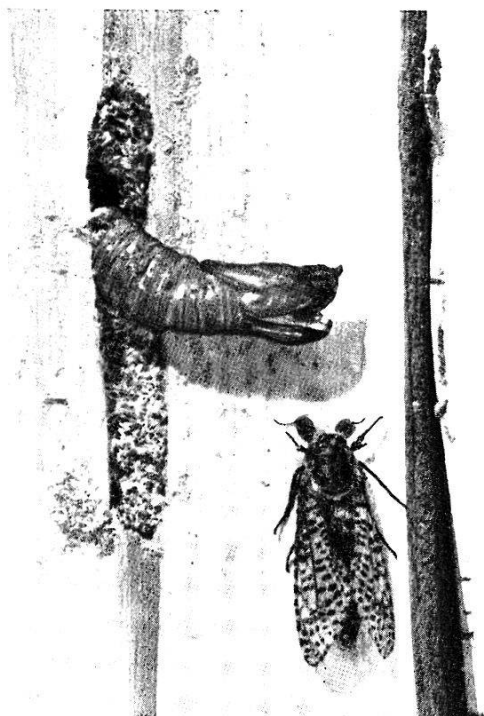
COLEOPTERA; *Scolytidae*

16



Dark brown bark beetle, about 1.5 mm long. The female tunnels into the twigs where it deposits its eggs. The hatching white larvae are about 2 mm long when full grown. Development period of one generation: about 6 weeks. Several generations. The beetle attacks mainly weak trees. Heaviest attacks occur during the dormant stage of the plants.

Distribution: East Africa, Madagascar, Indonesia, Tonkin



Twigs die, their leaves droop and wilt.

twigs

Zeuzera coffeae Nietn.
Red coffee borer.

LEPIDOPTERA; *Cossidae*

17

69

Moth with dirty-white wings, flecked with steel blue to black, expanding to 40-50 mm. The eggs are inserted in clusters in cracks of the bark. The caterpillars are orange-red to purple, with black head, prothorax and anal shield. They tunnel into trunks and branches, evacuating reddish-brown to yellow excrement through the bore holes. Several generations.

Distribution: Indonesia



Leaves, leaf stalks and young shoots with necrotic patches, surrounded by callus. Often severe malformation of attacked shoots.

shoots

Lawana candida F.
Coffee cicada.

HOMOPTERA; *Flatidae*

18

778

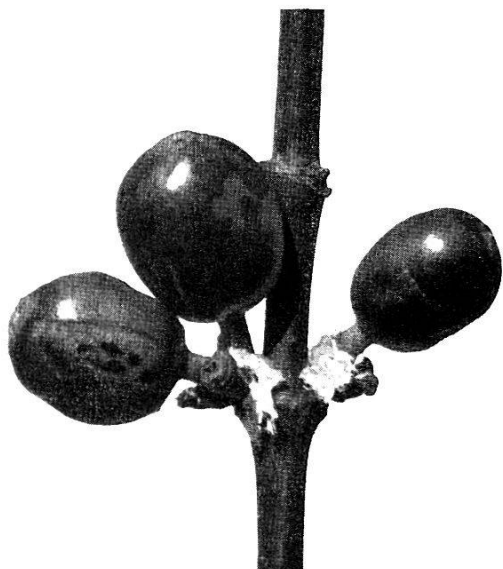
Large, white leafhopper with a wing span of 30-35 mm. The forewings are dirty white, with 2 yellowish-red stripes at the base, while the hindwings are silvery-white. The wings, when at rest, are held erect one against the other. The eggs are inserted in the leaf veins and tender shoots.

The nymphs are white and covered with wax. The abdominal end bears long, white, waxy filaments. *L. candida* attacks also sugar-cane.

Distribution: Indonesia, Indochina

shoots

19



White fluffy bodies on shoots, leaves and between berries, the latter often mottled and underdeveloped. Heavy infestation with sooty mould.

Planococcus kenyae Le P.
Kenya mealybug.

HOMOPTERA; *Pseudococcidae*

Obovate, reddish-yellow mealybug, 2-3 mm long, covered with white wax. Short white waxy appendages arise from the outer margin of the body. The eggs are wrapped in felt-like waxy balls. The larvae moult 4-5 times before they become adult after 3-4 weeks. They attack bark, green wood, cherry clusters and suckers. Several generations a year.

Distribution: East Africa

20

75, 115, 456
756, 781



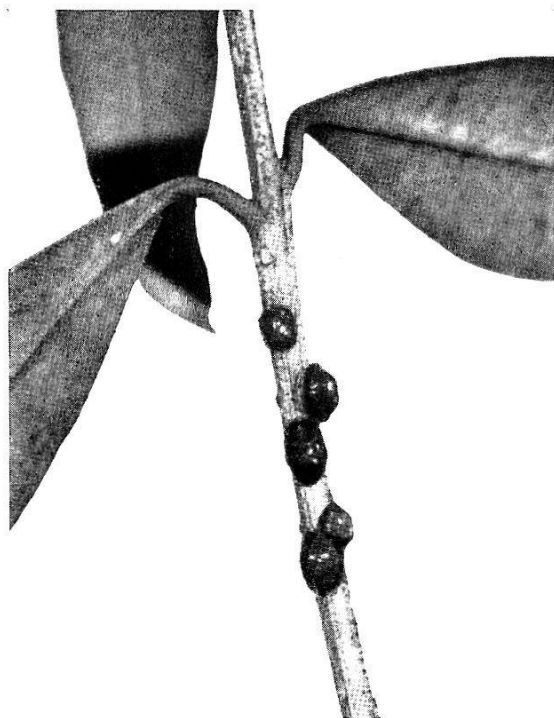
Shoots and leaves blackened with sooty mould, distorted, their growth checked, owing to infestation with scales.

Coccus viridis Green
Green coffee scale.

HOMOPTERA; *Lecaniidae*

Green to yellowish, flat, ovate, slightly convex scales, about 3 mm long. Both adults and nymphs attack young shoots and leaves and are visited by ants. Parthenogenetic reproduction. Development period of one generation: about 6 weeks. Several generations.

Distribution: widespread



Leaves slightly curled downwards and with discoloured patches along the leaf veins. Heavy infestation with sooty mould. Shoots covered with scales. Growth inhibited.

shoots

Saissetia coffeae Walk.
Hemisphaerical scale.

HOMOPTERA; *Lecaniidae*

21

350, 455, 734

Oval, convex, dark brown scales, measuring 2-4 mm by 1-3 mm, which occur along the leaf veins or on young shoots. They oviposit under the scale and reproduce parthenogenetically.

Distribution: widespread

Young shoots with swellings and distortions and especially buds infested with scales.

Asterolecanium coffeae Newst.
Fringed scale of coffee.

HOMOPTERA; *Asterolecaniidae*

22

Greenish to brownish, convex, ovate to almost globular scales, measuring about 1.5 mm. Several generations a year.

Distribution: East Africa, Congo

Branches, shoots and leaf stalks beset with pale scales. Growth of shoots impaired, internodes shortened.

Diaspis boisduvalii Sign.

HOMOPTERA; *Diaspididae*

23

598

Greyish-white to yellowish scales measuring about 2 mm.

Distribution: Tropics and Subtropics

leaves

Leaf margin irregularly eaten away.

Sympiezomias frater M.

COLEOPTERA;
Curculionidae

24



Slender, dark grey to greyish-green weevil, 7-9 mm long, with a short, thick snout. The femora are thick and clubbed. The eggs are laid in the ground, where the larvae feed on various plant roots, while the adults eat the leaves. Two generations.

Distribution: India, Ceylon

Leaves with numerous dark reddish-brown, small mines, occupied by one small caterpillar each. Often leaf-shedding of young trees.

Leucoptera coffeella Guer.
Coffee leaf-miner.

LEPIDOPTERA; *Lyonetiidae*

25

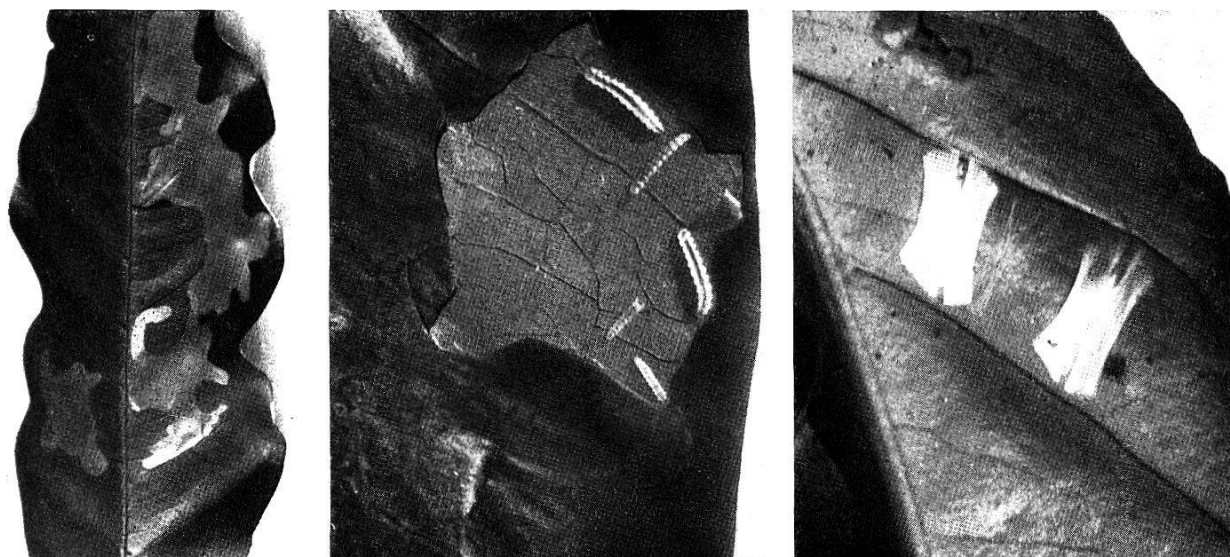


White moth, the forewings of which have a dark tip and a grey spot, while the hindwings are grey. The female lays its eggs singly at night over the upper

surface of the leaves, into which the caterpillars, hatching after 3-4 days, penetrate, feeding on palisade tissue. The mines thus produced are small, round to elongate and at first only occupied by one caterpillar each. After 2-3 weeks the caterpillars pupate inside a flat, shiny white cocoon, fixed to the underside of the leaf. The pupal stage lasts for 6-8 days. *L. coffeella* prefers unshaded coffee trees. Several generations a year.

Distribution: Africa, Madagascar, Ceylon, Central and South America, the West Indies

leaves



Young and older leaves with large, irregular, brownish-red mines, containing several flat caterpillars. Heavy attacks lead to leaf-shedding.

26

Leucoptera coffeina Washb.
Coffee leaf miner.

LEPIDOPTERA; *Lyonetiidae*

Small, insignificant moth, only 6-7 mm long, with a wing span of 10-12 mm. The forewings are white, marked with indistinct beige lines and a grey dot. The wing tips are dark, while the underside is yellowish to shiny golden. The hindwings are greyish-white. The eggs are deposited along the leaf veins on the upper surface. After 3-4 days the caterpillars hatch and penetrate into the leaf, mining from the midrib towards the leaf margin. One mine usually harbours several caterpillars, until, after a fortnight, these crawl to the underside of the leaves where they pupate in a flat, silvery-white cocoon. After another 6-8 days the adult moth emerges from the cocoon. Several generations a year. *L. coffeina* prefers shaded coffee trees.

Distribution: Africa

leaves

Leaves spun together and eaten away. Flowers also wrapped in webbing, their centre destroyed. Fruit setting inhibited.

Homona coffearia Nietn.

Tea tortrix.

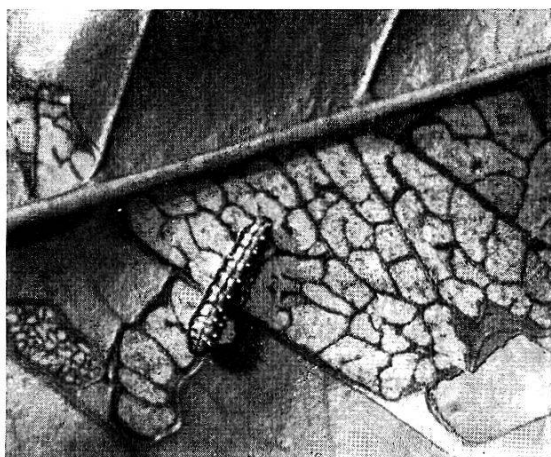
27

123

LEPIDOPTERA; *Tortricidae*

see page 113 (Tea)

Distribution: India, Ceylon, Indonesia



28

Leaves skeletonized. Upper epidermis left intact.

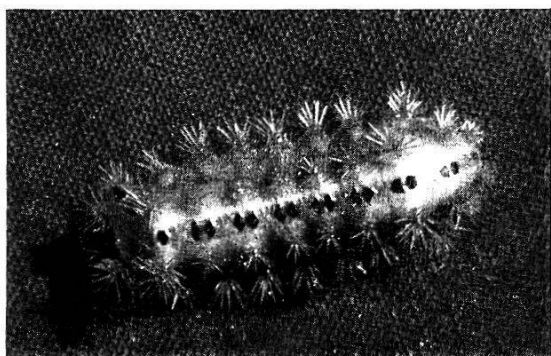
Leucopplema dohertyi Warr.

Leaf-skeletonizer.

LEPIDOPTERA; *Epipleminae*

Moth with a wing span of 12-15 mm. The forewings are dirty white with a large, brown spot in the centre of the costal margin and at the tip. The hindwings are also dirty white, marked with indistinct brown lines and dots. The eggs are fixed to the underside of the leaves. The caterpillars are greyish-white and light-brown with pale pimples. They feed on leaf tissue from the lower surface, leaving the upper epidermis intact. Several generations.

Distribution: Africa



29

626

Leaves eaten away from the margin inward. Contact with caterpillars causes severe and painful skin irritation, which impedes coffee harvesting.

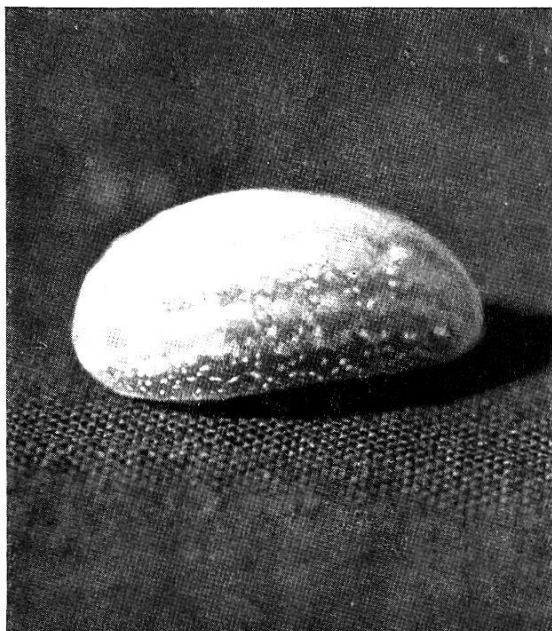
Parasa vivida Walk.

Stinging caterpillar.

LEPIDOPTERA; *Limacodidae*

Moth with green and brown decorations on the wings which expand to about 30 mm. The eggs are fixed in clusters to the underside of the leaves. The yellow to green caterpillars are marked dorsally with a central blue stripe and yellow dots and covered with tufts of stinging hairs. They pupate on the coffee trees.

Distribution: Africa, India, Ceylon

**Leaves with holes of various sizes.**

leaves

*Niphadolepis sp.**Gelatine grub.*LEPIDOPTERA; *Limacodidae*

30

Moth, the forewings of which are pale with whitish and dark brown markings, while the hindwings as well as the body are plain white. The wings expand to 20 mm. Oviposition takes place on the leaves. The caterpillars are hairless, slug-like, yellowish to greenish. They pupate on the trees among the leaves. 2 generations.

Distribution: East Africa



Lamina of leaves irregularly eaten away. Often leaves spun together, the tents thus produced harbouring small caterpillars. Robusta coffee preferred.

*Dichocrocis
crocodora* Meyr.
Pyrale du caféier.

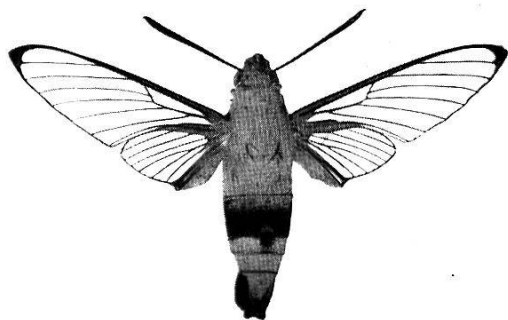
31

LEPIDOPTERA;
Pyralididae

Moth with a wing span of about 25 mm. The forewings are ochrous and brown. The female fixes its eggs close together to the underside of the leaves. The caterpillars are first dirty white, turning greyish-green later on. Full grown they are about 25 mm long. They feed on leaves which they spin together before pupating either under the webbing or underground. The moth is on the wing at dusk. Development period of one generation: about 8 weeks.

Distribution: Congo and other coffee-growing areas of Africa

leaves



Leaves heavily attacked. Trees often stripped bare.

Cephonodes hylas L.

LEPIDOPTERA; *Sphingidae*

32

Hawk moth with colourless, transparent, dark-veined wings. The head, thorax and abdomen are clothed with olive-green hairs. The 5th abdominal segment is dark red, and the caudal end furnished with a black tuft of bristles. The hairless caterpillars are green-headed, the first prothoracic segment is yellow, while the remainder of the body is green with a pale dorsal and lateral line. The last segment is yellowish with a bluish-green horn, about 10 mm long. Full grown, the caterpillars are 50-70 mm long. Development period of one generation: 6 weeks. Several generations. *C. hylas* is most frequent at the beginning of the dry season.

Distribution: East Africa, Madagascar, India, Indonesia, Australia

Leaves heavily attacked, stripped to the midrib. Often complete defoliation of large areas. Robusta coffee preferred.

Epicampoptera marantica Tams.

33

LEPIDOPTERA; *Drepanidae*

Butterfly, the forewings of which are intense brown to reddish-brown with dark spots. The central part of the outer margin extends into a lobe. The hindwings are brown, dotted dark. They expand to 30-40 mm. The eggs are deposited in clusters on the leaves. The hairless caterpillars may be any shade between brown and dark brown. The head is small, bearing two sharp humps. The last abdominal segment is furnished with a caudal process, about 10 mm long. Full grown the caterpillars are about 40 mm long.

Distribution: Africa

Leaves with numerous holes or sometimes stripped to the midrib.

Orgyia postica Walk.

Small tussock moth.

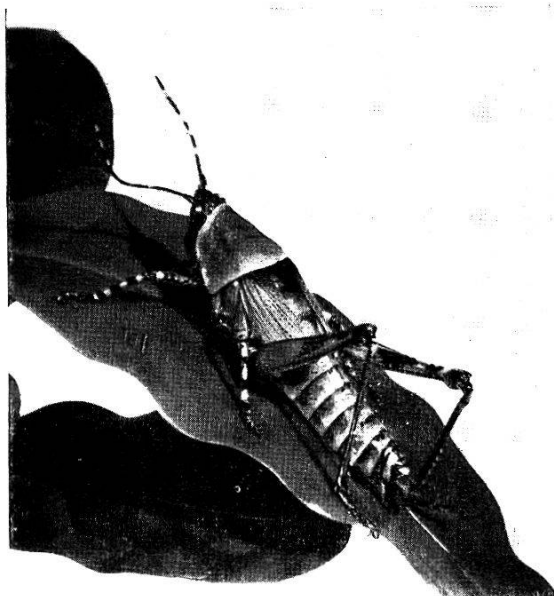
34

LEPIDOPTERA; *Lymantriidae*

134, 783

Small moth with a wing span of 25-30 mm. The forewings of the male are brown to reddish-brown, crossed with dark, fine bands and flecked. The hindwings are dark brown. The female is wingless, its body obovate, hirsute and greyish-brown. The caterpillars are ochrous to yellow with dark dorsal and lateral stripes and yellow dorsal hair tufts, while the head bears lateral bristles directed forward. Development period of one generation: 4-5 weeks. Several generations.

Distribution: India, China, Indonesia, Australia, Philippine Islands



Feeding injuries on leaves, flowers and fruits. Young trees preferred.

leaves

Zonocerus elegans Thunb.
Elegant grasshopper.

ORTHOPTERA; *Acridiidae*

35

344, 705, 808

Grasshopper, 40-50 mm long, with greyish-green wings and thorax. The forehead is black, the antennae are ringed black and red, while the legs are speckled black and yellow. Hoppers and adults feed on leaves, buds and fruits. *Z. elegans* is of importance only when occurring in great numbers. Peak in February to April.

Distribution: Africa

Spherical or pear-shaped nests, 20-30 cm in size, on trees.

Oecophylla smaragdina F.

36

HYMENOPTERA; *Formicidae*

497

Very agile, reddish-brown ant, 10-12 mm long, which builds its nests on coffee trees, spinning the leaves together.

Distribution: Africa, Queensland, S. E. Asia

Foliage dull leaden to silvery-grey. Underside of leaves with lustrous silvery and minute black spots. Leaf-shedding. Development of berries checked.

Diarthrothrips coffeae Williams
Coffee thrips.

37

THYSANOPTERA; *Terebrantia*

Small thrips, 1-1.5 mm long. The female lays its eggs in small hollows on the lower surface of the leaves. The larvae infest the upper surface, while the pre-pupae and pupae develop in the ground. The pest lives on the trees all the year round, but it damages the host plants only during the hot period of the dry season (rapid, intense reproduction). Both adults and larvae feed on leaf tissue.

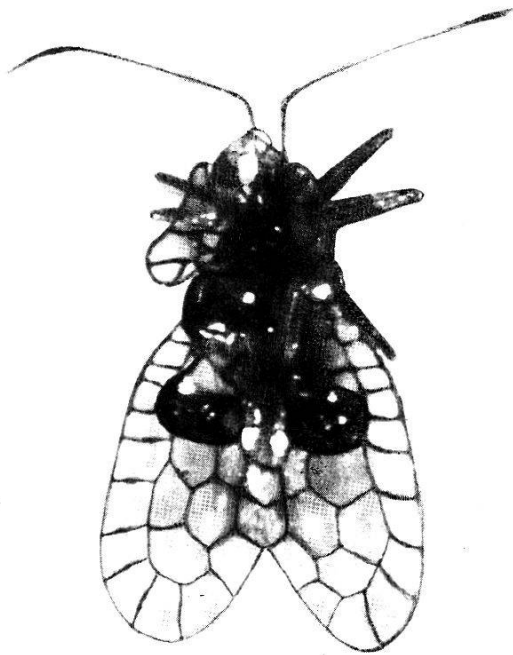
Distribution: Africa

leaves

Leaves stained yellow to reddish from the margin inward. Lower surface of leaves beset with small plant bugs.

Habrochila placida Horv.
Lace wing bug.

HETEROPTERA; *Tingidae*



38

Small, insignificant, light brown to yellowish plant bug, about 3 mm long. Its wings are much longer than the body, broad and with reticulate venation. The pronotum extends on both sides to a lobe. The eggs are fixed along the midribs on the underside of the leaves. The larvae moult 5 times within about 3 weeks before they become adult. Both larvae and adults feed on cell sap of the leaves. The attacks begin at the end of the dry season, the peak occurring in January/February. Several generations.

Distribution: East Africa

Leaves with transparent patches, edged with brown.

Lycidocoris mimeticus R. + P.
Mimic bug.

HETEROPTERA; *Miridae*

Light brown plant bug, 8-10 mm long, the wings of which are also light brown, edged dark. Both nymphs and adults feed on leaves.

Distribution: East Africa

Leaves and young, tender shoots covered with white wax, concealing many larvae. Leaves undulating, infested with sooty mould. Shoots underdeveloped and often distorted.

Ormenis sp.

HOMOPTERA; *Flatidae*

Moth-like Fulgorid, 10-12 mm long, with broad, opaque wings, covered with waxy fluff and folded over the back like a tent. Clusters of eggs are laid on the leaves. The larvae are also coated with waxy fluff.

Distribution: the West Indies

40



Leaves curled and wrinkled. Tips of shoots distorted; growth impaired. leaves

Toxoptera aurantii B. d. F.
Black citrus aphid.

HOMOPTERA; *Aphididae*

41

141, 159, 504

Dark reddish-brown to black aphid, about 2 mm long, with short cornicles and distinct caudal processes. Parthenogenetic reproduction. Development period of one generation: 6-8 days. Several generations each season. *T. aurantii* transmits various virus diseases of Citrus such as little leaf-virus; lemon ribbing virus.

Distribution: tropico- and subtropico-political

Leaves infested with numerous scales, mottled with discoloured patches and curled downwards. Shoots also attacked, their growth inhibited.

Ischnaspis longirostris Sign.
Black lime scale.

HOMOPTERA; *Diaspididae*

42

599

Dark brown, elongated and narrow scales, slightly broader towards the posterior end. Length 3-4 mm. The females under the scales are yellowish, elongated and narrow.

Distribution: Africa, Seychelles, Indonesia, Central and South America

Leaves dull greyish-brown or reddish-brown, often misshapen. Leaf-shedding. Fruit setting reduced. Often only partial signs of attack.

Oligonychus coffeae Nietn.
Red spider mite.

ACARINA; *Trombidiformes*

43

146

Small, ovate, dark red mites, 0.5 mm in size, which live mainly on the upper surface of the leaves. The eggs are light red, about 0.15 mm in size. Development period of one generation: 18-21 days. Several generations each season.

Distribution: East-Africa, India, Indonesia, Indochina, Ceylon

buds



Flower buds wither, remaining on the plant as black "caps". Often considerable loss of flowers, especially in areas of long flowering time.

Lygus coffeae China
Coffee capsid bug.

HETEROPTERA; *Miridae*

44

Slender, greenish plant bug, about 5 mm long. The female lays its eggs in the flower buds. Both adults and nymphs feed on flower buds and flowers. Several generations.

Distribution: East Africa, Congo

Flower buds turn black, wither and fall off.

Volumnus obscurus Popp.

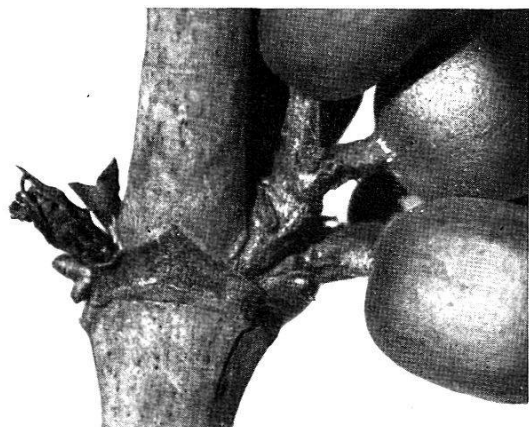
45

HETEROPTERA; *Miridae*

Slender, light brown plant bug, 6-8 mm long, with a small head and protuberant eyes. Both adults and nymphs pierce flower buds as well as open flowers. *V. obscurus* occurs mainly at the beginning of the dry season.

Distribution: Congo, Gabun, Cameroons

berries



Berries partially stained dark brown. Beans in immature berries also darkened. Buds turn brown, wither and die. Often formation of matted secondary and tertiary branches and of distorted, mottled shoots.

Antestia (Antestiopsis) lineaticollis
Stål.

HETEROPTERA; *Pentatomidae*

46

Dark greyish-brown, broad, oval plant bug, about 8 mm long. The pronotum is marked with 2 orange spots; the tip is also orange. The upper side of the pro-

notum is decorated with orange-yellow and creamy-white. The eggs are fixed in clusters to the lower surface of the leaves. After about 8 days the nymphs hatch and moult 5 times before reaching the adult stage. Both nymphs and adults pierce flower buds and coffee berries. They transmit a fungus disease, *Nematospora coryli*. Development cycle of one generation: 8-10 weeks. Several generations. Peak in March/April.

Distribution: East Africa

berries

Leaves, young shoots, flower buds and young, newly-set berries destroyed.

Lachnopus coffeae Marsh.

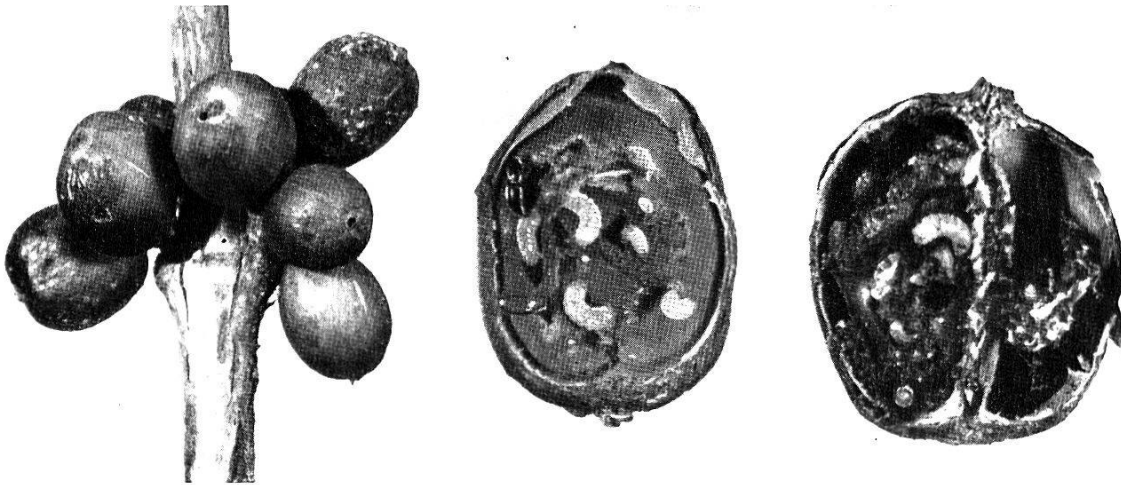
Coffee leaf weevil.

COLEOPTERA; *Curculionidae*

Small weevil, 5-6 mm long, with a black or dark brown body, clothed with grey scales. The insect emerges in April/May and arranges its eggs in clusters between leaf fragments. After 2 weeks the larvae hatch and move to the ground where they feed on roots of various plants. Development period from larva to pupa: several months.

Distribution: the West Indies

47



48

Berries perforated by small, round bore-holes near the tip. Dark, withered berries, filled with masses of excrement, eggs, larvae, pupae and beetles, fall off. Beans partially or totally destroyed.

Stephanoderes hampei Werr (coffeae Hag.)

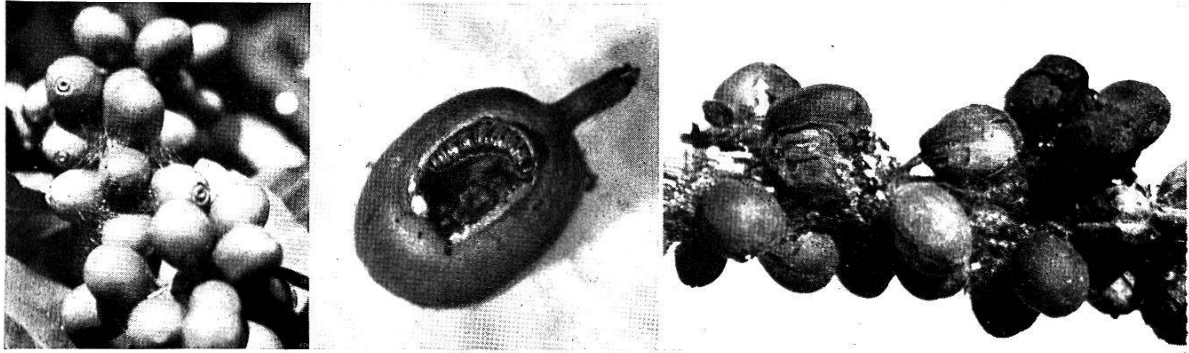
Berry borer.

COLEOPTERA; *Scolytidae*

Small, dark brown to black beetle, 1.5-2 mm long. The female mines into the tip of the berry, inserting several eggs in each. The embryonic development requires 6-8 days. The white, footless larvae eat the already firm berries and pupate inside them. Development period of one generation: 3-4 weeks. Several generations each season.

Distribution: Africa, Indonesia, South America

berries



Often whole bunches of berries of one internode blackened and covered with webbing. Although hollowed out and occupied by reddish caterpillars the berries remain on the tree. Before flowering shoots and buds are also injured with galleries.

49

Thliptoceras octoguttale Feld.
Coffee berry moth.

LEPIDOPTERA; *Pyralididae*

Pale brown to ochrous moth, the forewings of which are marked with 3 pale, hyaline spots. The wings expand to 15-20 mm. The abdomen is long and thin. The female lays its eggs singly on buds and berries. The caterpillars hatch after 4-6 days and tunnel into shoots or berries, one caterpillar being able to attack several berries during its development; they spin a web when changing from one berry to another. The caterpillars are creamy-white to reddish, with a dark head capsule and prothorax and dark dorsal dots; they pupate underground. Development period of one generation: 5-6 weeks. The adults emerge soon after flowering time and lay their eggs during the whole season. After the coffee harvest the eggs are laid on the buds.

Distribution: Africa, Indonesia

Berries brown and dead, occupied by a broad, fairly flat, greenish caterpillar.

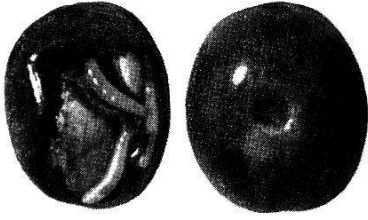
Virachola bimaculata Hew.

LEPIDOPTERA; *Lycaenidae*

50

Moth with iridescent blue forewings. The hindwings have a small, tail-like process (see No. 391). The female lays its eggs singly on the berries, into which the hatching caterpillars bore, destroying them. Development period of caterpillars: 3-4 weeks. The adults are on the wing in August/September. Several generations.

Distribution: West Africa



Ripe berries pierced by small bore-holes, the surrounding tissue stained dark. Berries occupied by white maggots, up to 5 mm long. Flies, when puncturing the berries, transmit bacteria which cause "goût de pomme de terre".

berries

Trirhithrum inscripta Graham

DIPTERA; *Trypetidae*

51

Reddish-brown fly, about 5 mm long, with slightly outspread wings, the base and costal margin of which are brown. The female inserts its eggs in ripening berries, where the white, footless maggots hatch after a few days and feed on tissue of the husk, leaving the beans intact. Pupation takes place on the beans. Several generations.

Distribution: Congo, East Africa

Cocoa

(*Theobroma Cacao* L. = various varieties)

Most important pests: 58, 67, 73, 74, 75, 85, 87, 93, 94, 96, 98, 99, 100

Signs of growth disturbance among young plants in seedbeds. Plants dwarfed, forming many secondary roots which bear small, distinct knots. root

Meloidogyne sp.

Root knot nematode.

NEMATODA

52

Pear-shaped, endoparasitic female nematodes are harboured in the root knots (see page 37).

Distribution: widespread



First symptoms on saplings: some leaves fall, buds dry up, general reluctance to develop, roots with dark, scurfy lesions.

Pratylenchus coffeae Z.

Coffee nematode.

NEMATODA

53

3, 103, 404

543, 772

see page 63 (Coffee)

Distribution: widespread

Trees show signs of wilting, leaves droop, bearing of the trees unsteady. Roots injured. Seedbeds and newly planted areas particularly exposed to damage.

Adoretus hirtellus Ol.

Rose beetle.

COLEOPTERA; Scarabaeidae

54

Cockchafer, about 12 mm long, clothed with fine yellowish-grey hairs on its back, feeding on foliage. The eggs are deposited in the ground, where the newly hatched larvae (grubs) are found 2-8 cm below the surface. Development period: 1-2 years.

Distribution: Africa

Leaves of saplings turn yellow and wilt. Presence of grubs on the roots.

Camanta westermanni Har.

COLEOPTERA; Scarabaeidae

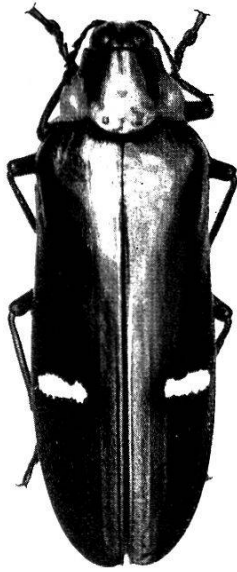
55

Glossy, brownish-red cockchafer, about 15 mm long which feeds on the leaves, and deposits its eggs in the ground. The larvae feed on secondary roots of saplings.

Distribution: Africa

trunk

56



Leaves droop. Unhealthy appearance of plant, similar to symptoms of starvation. Rapid dieback.

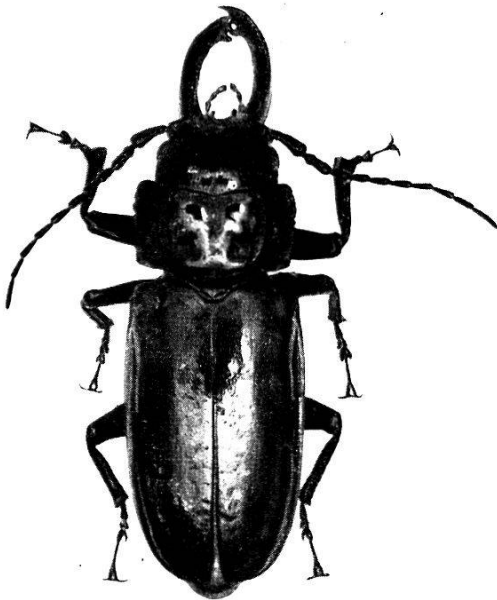
Chrysochroa bicolor Fabr.

COLEOPTERA; Buprestidae

Metallic green beetle, up to 70 mm in size, which deposits its eggs at the base of the trunk. The bore holes run towards the top. The larvae reach up to 100 mm in length.

Distribution: South Asia, Sunda Isles

57



Sudden signs of dieback. Tree of unsteady bearing, easily broken by wind, trunk channelled with large bore-holes.

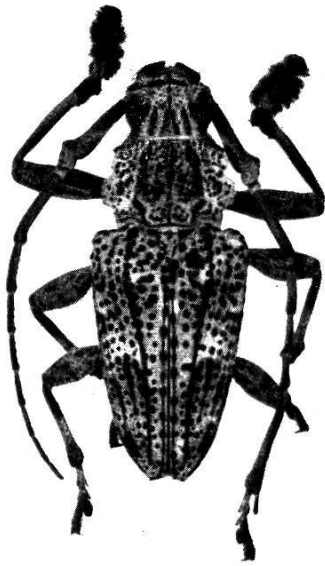
Mallodon downesi F.

Stem borer.

COLEOPTERA; Cerambycidae

Brilliant dark brown Longicorn beetle, 50-70 mm long. The female lays its eggs in cracks and slits of the trunk. The larvae first feed on dead wood, turning later to healthy wood, filling the bore-holes with wood chips. The larvae may reach up to 70 mm in length.

Distribution: Africa



Younger trees with tunnels round the base of the trunk or on thicker branches. Plant sap exuding from bore-holes. Weak trees or branches killed. Often new growth formed below the attacked parts: sometimes partial dieback only.

trunk

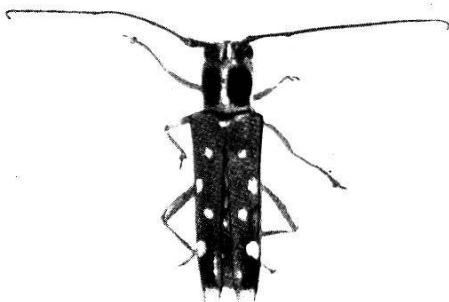
Steirastoma breve Guby
Cocoa beetle.

COLEOPTERA; *Cerambycidae*

58

Dark Longicorn beetle, 25 mm long, with unusually broad tarsi. The elytra have deep, well marked striations. The female bores small holes into the bark where it inserts its eggs. The larvae feed under the bark and tunnel into the sapwood. Their development requires about 3 months, somewhat less during the dry season.

Distribution: South America (Venezuela, Ecuador, Colombia, Surinam), the West Indies (Trinidad, Guadeloupe)



Trees with chlorotic leaves. Leaf-shedding. Signs of partial dieback. Presence of frass at the base of the trunk.

Glenea novemguttata Guér.
Cocoa borer.

COLEOPTERA; *Cerambycidae*

59

872

Longicorn beetle, 15-20 mm long. The eggs are laid singly on the lower part of the trunk. The creamy-white larvae first feed on bark and later make serpentine mines in the sapwood. Several larvae may be found in each tree. Larval development requires about 3 months. Flight period of adults: April.

Distribution: Indonesia

trunk **Leaf fall on older trees. Trunk and branches mined with bore-holes, from which frass is ejected. Partial dieback of tree.**

Monochamus ruspator F.

COLEOPTERA; *Cerambycidae*

60 Robust Longicorn beetle, 30 mm long. Its body is brown and grey underneath, the shoulders are furnished with yellowish-orange hairs. The elytra are marked with light coloured spots. The antennae are longer than the body. Full grown larvae may reach up to 70 mm in length.

Distribution: Cameroons, Sierra Leone, Senegal

Large bore-holes, about 4 mm in diameter at the base of the trunk. Partial wilting and dieback of plant.

61

Apate monachus F.

COLEOPTERA; *Bostrychidae*

see page 69 (Coffee)

Leaf fall on older trees. Partial dieback, or death of whole tree. Plants easily broken by the wind.

Sphenophorus striatus Fähr.

62

COLEOPTERA; *Curculionidae*

Slender, dark brown to black weevil, about 15 mm long, its snout long and curved. The elytra have deep longitudinal furrows. The females place their eggs on the trunk, the lower parts of which are mined by the newly hatched larvae, resulting in deep tunnels.

Distribution: San Thomé, Fiji Islands

Stems of newly planted saplings cut off close to the ground.

Gryllulus gracilipes Sauss.

ORTHOPTERA; *Gryllidae*

63



Brownish-black field cricket, about 20 mm long, the head and legs of which are deep black. They appear mainly in April/May.

Distribution: East Africa

Freshly planted saplings bitten off above the ground.

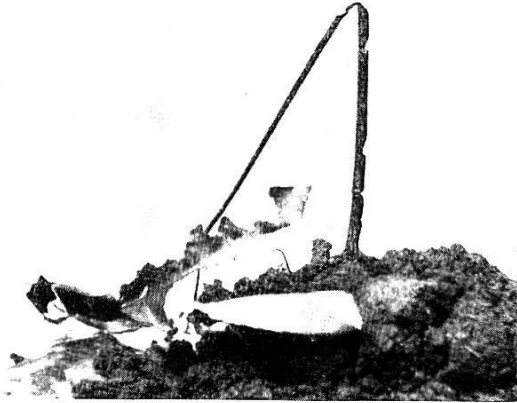
trunk

Brachytrypus membranaceus Drury
Tobacco cricket.

ORTHOPTERA; *Gryllidae*

64

150, 687



Large and stout cricket, about 50 mm long, light brown in colour. The head is large and globular, the forehead flat (see Fig. 9). The tibiae of the hind legs are equipped with strong spines.

Distribution: Africa

Bark gnawed off in places. Under the bark tunnels in a spiral direction are visible. Frass is ejected through bore-holes. Partial dieback.

Tragocephala nobilis F.
Ring-barking beetle.

COLEOPTERA; *Cerambycidae*

65

Black Longicorn beetle, measuring about 20 mm by 8 mm. The dorsal surface of the body is thinly clothed with green hairs. The pest infests young twigs, gnawing in the bark. Oviposition takes place on the trunk and on branches. The larvae mine in the wood. Total life cycle: 4-5 months.

Distribution: Africa

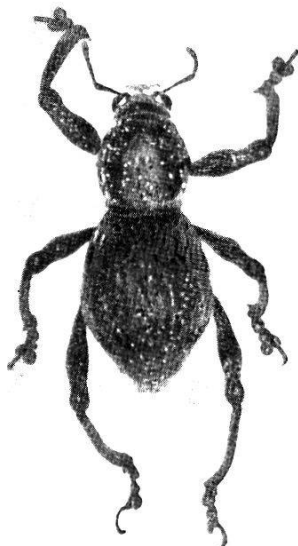
Leaves partly devoured. Bark of young twigs and shoots injured or dead in places. Dieback of branches, inside which creamy-white, footless larvae are found.

branches

Pantorhytes plutus Obert.

COLEOPTERA; *Curculionidae*

66

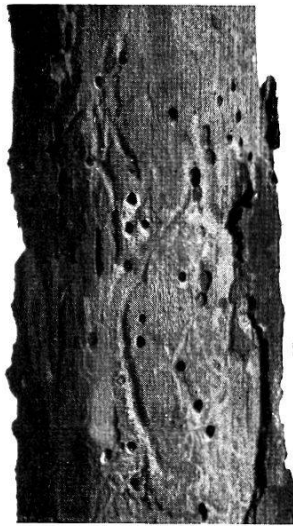


Dull coloured, oblong beetle, 5-7 mm long, having a short and broad snout. The adults feed on soft bark of young shoots. The eggs are inserted singly under the bark of twigs. The larvae bore tunnels under the bark which eventually dies; then they penetrate into the wood.

Distribution: New Guinea

branches

67



Branches and twigs with round bore-holes. Signs of partial dieback. When bark is removed axially directed mines become visible. Trees under bad climatic conditions or in unsuitable soil particularly affected.

Xyleborus morstatti Haged.
Shot-hole borer.

COLEOPTERA; Scolytidae

Dark brown bark beetle, about 2 mm long (see Fig. 24) which bores holes of 2 mm diameter. Development cycle of one generation: about 5 weeks; several generations a year. The attack is heaviest during the growing period.

Distribution: Africa, Indonesia

Leaf-shedding and dieback of young branches showing bore-holes from which reddish excrement is ejected. Wood mined by large tunnels. Canopy of trees very irregular.

Eulophonotus myrmeleon Feld & Rog.
Cocoa trunk borer.

68

LEPIDOPTERA; *Cossidae*

Female moth with brownish-black forewings which are transparent in some places. The hind wings are much smaller and darker. The wing expanse is about 50 mm. The thorax is reddish-yellow, the abdomen pink, and the caudal end of the body is furnished with brilliant silvery hair tufts. The male is smaller than the female, its wings are transparent, decorated with black spots. The yellowish-white caterpillars are dotted with dark spots; they reach up to 50 mm when full grown. They mine into the branches, proceeding from leaf or fruit stalks.

Distribution: San Thomé, Nigeria

Some branches of a tree die. Frass is ejected through bore-holes.

Zeuzera coffeae Nietn.
Red branchborer.

69

17

LEPIDOPTERA; *Cossidae*

see page 71 (Coffee)

Tops of shoots denuded of leaves, leading to dieback.

shoots

Alcides Leeuweni Hell.

COLEOPTERA; Curculionidae

Slender, dark brown to blackish-brown weevil, 8-10 mm long. The prothorax and elytra are densely and coarsely punctate (cf. No. 310). When ovipositing the female pierces the twigs below the tip and the hatching larvae tunnel up to the apical point, evacuating frass through bore-holes as they go. *A. leeuweni* attacks also kapok.

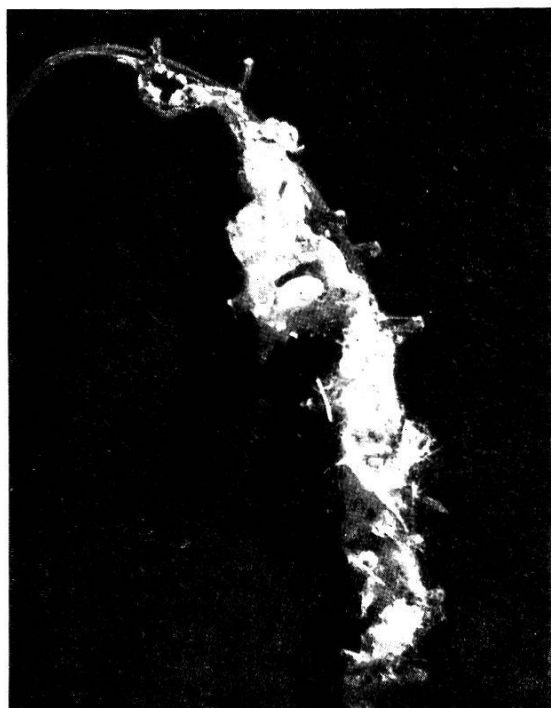
70

Distribution: Indonesia**Saplings and young shoots partly necrotic.***Parabryocoropsis typicus* China

HETEROPTERA; Miridae

Dark brown plant bug, 6-8 mm long. The prothorax and shield are strongly granulated. The wings are brown, hyaline, with a dark, opaque dot at the tip of the membrane. Adults and young all suck the sap from tender shoots.

71

Distribution: New Britain

Colonies of mealybugs forming white, fluffy bundles on shoots and flowers. Leaves often drooping and covered with sooty mould; ants present.

Ferrisia virgata Ckll.

HOMOPTERA; Pseudococcidae

72

113, 444, 733
780, 819

Ovate-bodied mealybugs, about 4 mm long. Their back is covered with wax, leaving a few small patches free. At the sides of the body are fine and long white waxy filaments. Several generations a year. *F. virgata* transmits "swollen shoot disease".

Distribution: widespread

shoots **Small, white, waxy balls on trunk and branches. Symptom of virus disease: leaf mosaic, partly with large chlorotic patches. Growth of shoots stunted, twigs and branches swollen, finally death of whole tree.**

Pseudococcus njalensis Laing.

HOMOPTERA; *Pseudococcidae*

73

160

Oval mealybug, orange coloured and covered with white waxy filaments, its legs being very short (see Fig. 17). The mealybugs are usually surrounded by ants which cover them with protective galleries. They transmit various strains of "swollen shoot disease" but the virus does not persist in the vector. Bisexual or parthenogenetic reproduction are possible.

Distribution: Africa

White woolly balls on shoots and leaf stalks. Plant covered with sooty mould, its growth stunted.

Pseudococcus bukobensis Laing.

74

HOMOPTERA; *Pseudococcidae*

Elliptic mealybug, 3-4 mm long, its body covered with wax and having waxy filaments at the sides. Several generations. The pest occurs mainly in newly planted areas, and transmits "swollen shoot disease".

Distribution: Ghana, Ivory Coast Republic

Young shoots and leaves infested with flat, oval, yellowish scales, about 3 mm in size. Shoots distorted. Plants covered with sooty mould.

Coccus viridis Green

Green coffee scale.

HOMOPTERA; *Lecaniidae*

see page 72 (Coffee)

Stems, especially those of saplings, infested with scales. Necrotic, stained patches. Growth checked.

Howardia biclavis Comst.

HOMOPTERA; *Diaspididae*

76

757

Greyish-white to yellowish-white, convex scales, 2.5-3 mm in size. Several generations (see page 387: Quinine).

Distribution: widespread throughout the Tropics (especially Puerto Rico)

Leaves with chlorotic streaks, falling off prematurely. Shoots with necrotic patches, infested with scales. Pods often partially discoloured.

Pseudaonidia trilobitiformis Green

HOMOPTERA; *Diaspididae*

77

Dark brown, round or oval scale insects, moderately convex, 1.5-2 mm in size. The larvae move freely, while the adults adhere to the plant and hide under the scales. They are capable of multiplying during the dry as well as during the rainy seasons. Several generations.

Distribution: South-East Asia, Africa

Leaves severely damaged, sometimes tied together.

leaves

Syllepta prorogata Hamps.

LEPIDOPTERA; *Pyralididae*

78



Moth with light yellow forewings, marked with dark wavy crossbands; they expand to 25 mm. The eggs are laid on the underside of the leaves, where the whitish-green to dirty-grey caterpillars emerge. The larval stage lasts about 15 days. Several generations.

Distribution: Brazil

Leaves severely attacked. Caterpillars cause serious skin irritation.

Parasa lepida Cram.

Bluestripped nettle grub.

LEPIDOPTERA; *Limacodidae*

Moth with a wing span of about 35-40 mm. The forewings are green, their base reddish-brown, the margin light brown; the hind wings are tawny-brown. The eggs are deposited in batches on the undersurface of the leaves. The caterpillars are provided with stinging hairs (see Fig. 38) and reach 25 mm when full grown. Their colouring is yellow with blue stripes along the back and on the sides. The moth emerges at the beginning of the rainy season.

Distribution: South-East Asia

79

439, 580

Young leaves and buds attacked.

Earias biplaga Walk.

Stem tip borer.

LEPIDOPTERA; *Noctuidae*

Moth with a wing span of 20-25 mm. The ground colour of the female's forewings is yellowish-green with a light brown spot or stripe in the centre. The hindwings are silvery-white. The male has also yellowish-green forewings with a dark margin at the tip.

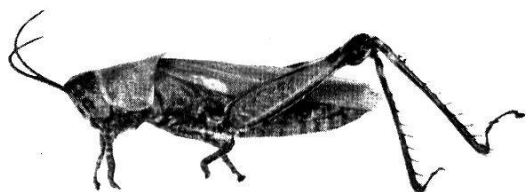
The eggs are laid on leaves and leaf buds. The caterpillars tunnel into the buds, hollowing them out; they also feed on young leaves. The green or brownish, spindle-shaped caterpillars are furnished with long hairs or setae on each segment. The abdominal segments bear two strong dorsal tubercles each. Full grown the caterpillars are about 20 mm long.

Distribution: Africa south of the Sahara

80

828

leaves



Saplings defoliated, stem often gnawed off.

Zonocerus variegatus L.
Stink locust.

ORTHOPTERA; *Acridiidae*

81

157, 376
417, 786

Locust of many colours, 40-50 mm in length, with olive-green wings, dotted blood-red. The legs are yellow and black, the prothorax green and the abdomen yellow. The wings are as long as the abdomen. The yellow and black larvae bear a white line down the middle of the thorax. Mating takes place in February and September; the eggs are laid in the ground.

Distribution: Africa, the West Indies

Trees bearing large ants' nests. Usually poor yield, due to infestation with scale insects.

Azteca chartifex For.

82

HYMENOPTERA; *Formicidae*

Yellowish-brown ant, 3-4 mm long, which builds nests, 30-50 cm in size and 20 cm thick, using wood fibres, fruits and shoots as building material. It protects scale insects by building galleries over their colonies.

Distribution: Brazil

Heavy injury on leaves. Trees may be defoliated within a very short time.

Atta sexdens L.
Sauva.

83

HYMENOPTERA; *Formicidae*

Large, 8-10 mm long, dark brown ant (worker), which lives in colonies of various castes in underground nests (see page . . .).

Distribution: South America

Presence, among the foliage, of ants' nests, built of leaves which are tied together.

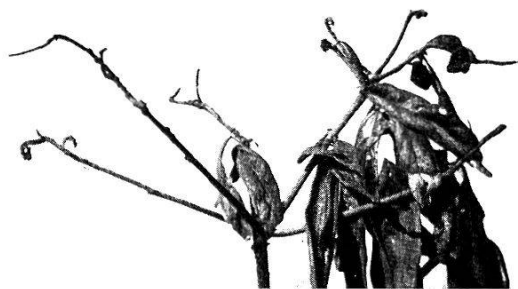
Oecophylla longinoda Latr.

84

HYMENOPTERA; *Formicidae*

Reddish-brown ant, 10-12 mm long, which builds round nests attached to the trees. They are made of leaves tied together and are 15-30 cm in diameter (cf. No. 497, page 271, Citrus). The ants usually live in association with aphids or scale insects and are also found on Citrus trees.

Distribution: many parts of Africa



Leaves spotted yellow or rusty-red, finally withering. Often severe leaf-shedding. Young pods stained reddish to grey, their development disturbed.

leaves

Selenothrips rubrocinctus Giard.
Cocoa thrips.

THYSANOPTERA; *Terebrantia*

Dark brown thrips, 1-1.5 mm long. Its first abdominal segment is red, while the wings are fringed with bristles. The eggs are laid in the leaves. The larvae are light in colour, with the abdomen decorated with red bands and red dots. They usually occur in colonies on the undersurface of the leaves and develop best in the dry season. Several generations.

85

158, 442

Distribution: Africa, Central and South America, Ceylon (practically wherever cocoa is grown)



Young leaves shrivelled. Flower buds swollen, injured and thickened. Young shoots also slightly deformed. Infestation with sooty mould.

buds

Mesohomotoma tessmanni Aulm.

HOMOPTERA; *Psyllidae*

86

Psyllid, the wings of which are transparent and about 3 mm long, while the body measures only 1.5 mm and is reddish-yellow to brownish-grey. The prothorax is decorated with 3 thin, yellow, longitudinal bands. The eggs are fixed on petals, buds, and leaf stalks with some fluid, secreted by the female. The embryonic development requires 8 days. The pest occurs especially in young crops.

Distribution: Cameroons, Togo, Ghana, Ivory Coast Republic, Sierra Leone

flowers

87



Leaves curled up and wrinkled. Often flowers attacked also, which dry up and fall off. Fertility reduced. Young shoots also affected and deformed.

Toxoptera rotundiventris Sign.

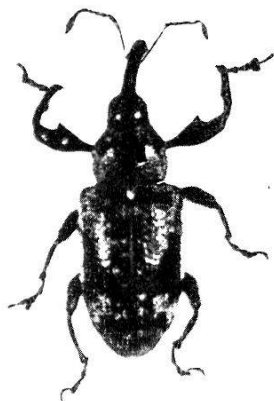
HOMOPTERA;
Aphididae

Dark brown to black aphid, about 2 mm long, with light coloured legs and antennae. The females are viviparous and there may be parthenogenetic reproduction. Up to 12 generations a year.

Distribution: Africa, Indonesia, Brazil

pods

88



Feeding holes on pods, sometimes 5-8 mm in diameter. After some time the pods show cankerous wounds which exude a gum-like fluid, and stop developing.

Hilipus claripes F.

COLEOPTERA; *Curculionidae*

Dark glossy weevil, 12 mm long, with light spots on its elytra and thorax. The adults do not develop on cocoa trees but merely feed on them.

Distribution: South America

Young pods shrivel and dry up. Beans in older pods ripen precociously; their quality is impaired.

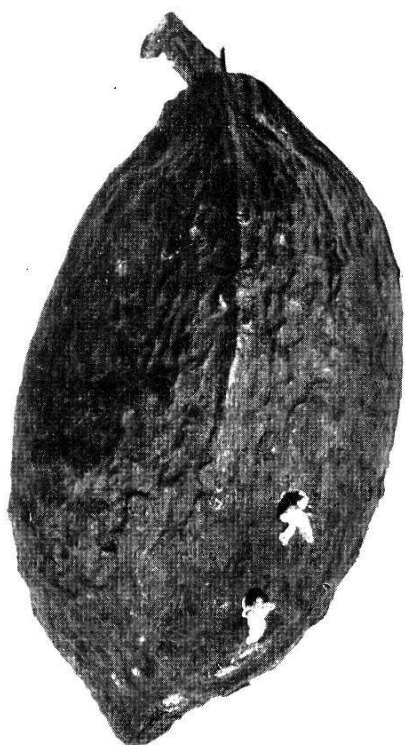
Acrocercops cramerella Snell.

LEPIDOPTERA; *Gracilariidae*

89

Moth with greyish-brown forewings, marked with yellow dots and white lines. It lays its eggs on the pods; the young caterpillars tunnel through the husk into the pulp. Their development requires 4 weeks. The caterpillars, when full grown, are brown-headed and have a greenish body. They pupate on pods or leaves. Several generations.

Distribution: Indonesia



Leaves eaten away, often spun together. Pods with dark bore-holes. Pericarp traversed by galleries which contain caterpillars and excrement. Attacked pods rot.

Pods

Characoma stictigrapta Hmps.
Pod husk borer.

LEPIDOPTERA; *Noctuidae*

90

161

Moth with a wing span of 20-25 mm. The forewings are pale, greyish-brown, speckled with small, dark dots and one large, dark, almost black spot in the centre near the inner margin. The hindwings are beige with a pale seam. The eggs are laid during the dry season. The hairless caterpillars are grey with lighter patches. The larval stage lasts for about 30 days. Leaves and pods are attacked, and it is also a pest in cocoa nurseries.

Distribution: all cocoa growing areas of Africa (West Africa)

Pods partly shrivelled, and showing dark mottlings. Hollowed out beans, webbing, and excrement are found inside the pods.

Mussidia nigrivenella Reg.

LEPIDOPTERA; *Pyralididae*

91

Moth with beige forewings, veined black, and dirty white hindwings, expanding to 25-30 mm. Oviposition takes place on the pods. The pale yellow to pinkish caterpillars feed on beans inside the pods.

Distribution: Congo, Cameroons

pods

Older pods show soft patches infested with rot. Presence of white footless maggots inside the pods. Fruits ripen precociously.

Ceratitis punctata Wied.

Cocoa fruit fly.

DIPTERA; *Trypetidae*

92

Fly, about 5 mm in size, yellow-headed and red-eyed. The thorax has dark spots, while the outspread wings have dark bars. The husks are pierced by the insect's ovipositor and the eggs inserted under the skin. The hatching maggots live in the parenchymatous tissue and in the pulp. Development cycle: 6-8 weeks. Severe secondary fungus and bacterial infections may occur.

Distribution: West and East Africa.



93

Young shoots wilt and die. Numerous black spots, either round or oblong, pods misshapen and spotted with sucking marks.

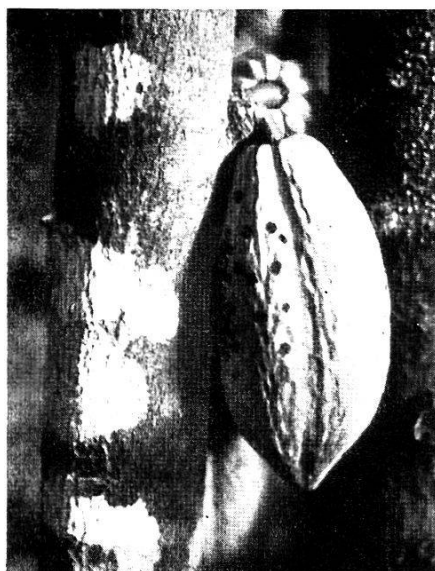
Leaves never attacked. Canopy of cocoa trees defective ("pockets"). Cocoa yield poor and gradually decreasing.

Distantiella theobroma Dist.

HETEROPTERA; *Miridae*

Dark brown plant bug, about 8 mm by 3 mm in size. The thorax and wing-membranes bear distinct humps. The tips of the antennae are clubbed, the eyes protuberant. The eggs are inserted into tender green twigs, where the nymphs hatch out after 2-3 weeks and after further 4 weeks reach the adult stage. They infest saplings in particular, puncturing their trunks or twigs and may also attack pods. The punctures thus produced turn dark brown or black after a few hours, and the tissue around them collapses.

Distribution: West Africa



Slight to moderate leaf-shedding. Young branches with dark, distinct spots, due to decayed tissue which cause them to break. Shoot growth inhibited. Young pods with black mottlings, especially on the side against the trunk. Canopy defective. Serious loss in cocoa yield.

pods

94

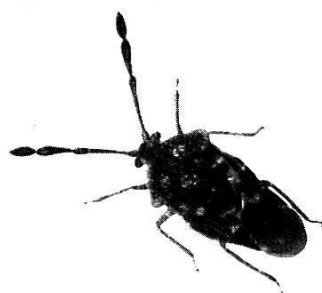
164

Sahlbergella singularis Hagl.
Stem sapper.

HETEROPTERA; *Miridae*

Oblong to oval plant bug, about 10 mm long, reddish-brown with lighter spots. The prothorax and wing-membranes bear distinct humps. The eyes are very protuberant and the tips of the antennae are thickened, club-shaped. The bug inserts its eggs into green shoots, pod and leaf stalks. Egg development in 12, nymph development in 25 days. Both nymphs and adults infest older and younger wood, pod stalks and young fruits. The saliva of the bug is toxic to the plant.

Distribution: West Africa



Young pods covered with dark, well defined spots. Pod walls deformed, thus preventing the pods from ripening.

Bryocoropsis
laticollis Schm.

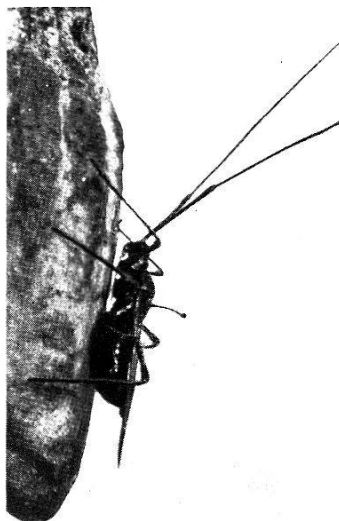
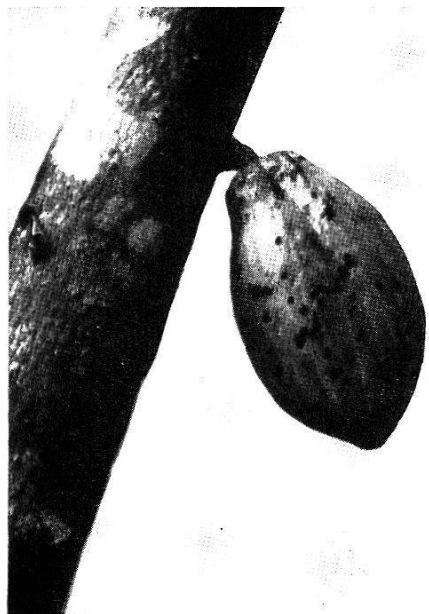
HETEROPTERA;
Miridae

95

Brownish-grey plant bug, about 8 mm long, with fine light dots. The head is contracted behind the eyes, which are protuberant. The antennae are long, their ends club-shaped. Several generations.

Distribution: Africa

pods



Pods droop, showing dark scars surrounded by callus. Pods also misshapen. Young twigs with black patches, withering. Damage shows from July to December.

Helopeltis antonii
Sign.

HETEROPTERA;
Miridae

96

Slender plant bug, about 8 mm long, with a reddish thorax and white and yellow/black abdomen. The antennae are dark and long, longer than the body, the prothorax is furnished with an appendage.

The peak of attack occurs towards the end of the rainy season. The eggs are buried in the plant tissue. The life span of the adults may be up to 50 days. They are strong fliers. The nymphs suck the juice of young pods and pod stalks. The larval stage lasts about 3 weeks.

Distribution: Indonesia

Pods with deep scars. Young pods turn black and wither.

Monalonion atratum Dist.

HETEROPTERA; *Miridae*



97

Slender, metallic-green plant bug, about 10 mm long, which oviposits after the rainy season inside the pod walls or on the pod stalks. Development from egg to adult: about 4 weeks. Several generations.

Distribution: South America

Young pods covered with masses of dark globules which cause them to degenerate and to fall. Fruit growth stunted.

pods

Stictococcus sjöstedti Ckll.

HOMOPTERA; *Stictococcidae*



98

165

Large, oval, brilliant brown to olive-brown Coccids, measuring 4 mm by 3 mm and about 2 mm high. They have a slightly dented back and are frequently attended by ants.

Distribution: Ghana, Nigeria

Pods mottled, misshapen and their development stunted. Beans poorly formed (small and flat). Black, bean-shaped or globular bodies on pod stalks.

Stictococcus aliberti Vayss.

99

HOMOPTERA; *Stictococcidae*

Globular, convex scales, 2-3 mm in size. The upper surface of the body is either smooth, slightly granular or ribbed. Several generations a year.

Distribution: most cocoa growing parts of Africa

pods

www.citrus.org



Shoots and pods dwarfed. Cocoa yield reduced. Leaves mottled with brown and white mosaic. Pods spotted and deformed.

Planococcus citri Risso
Citrus mealybug.

HOMOPTERA; *Pseudococcidae*

100

19, 386, 423

30, 692, 779

873

Yellowish-brown to orange-red, elliptical mealybug, 3 mm long, covered with a white, mealy, waxy secretion. The marginal waxy appendages are short. The eggs are wrapped up in a loose web. The forewings of the male are hyaline, iridescent blue, longer than the body (see Fig. 17). There are two halteres on the metathorax. The caudal filaments are very long. The male is about 1-1.5 mm long. The female larva has 4 moults, the male 5. They attack shoots, leaves and fruits (near the stalk) and transmit virus diseases. Several generations.

Distribution: widespread

Tea

(*Camellia* sp. = various varieties)

Most important pests: 101, 110, 115, 123, 124, 137, 139, 141, 143, 144, 145, 146, 147



On young plants in nurseries: leaves turn yellow and drop off. Formation of many secondary roots; root system thus bushy, beset with globular or oblong galls. Growth inhibited.

root

Meloidogyne sp.
Root knot nematode.

NEMATODA

101

Lustrous white female nematodes, pear- or lemon-shaped, are found inside the root-galls.

see also page 37

Distribution: widespread



Growth of young plants stunted. Roots stained dark and often spiral-shaped.

Radopholus similis Cobb.
Burrowing nematode.

NEMATODA

102

2, 353, 382, 400
466, 625, 731
746

Endoparasitic nematode, 0.5-0.7 mm long.

Distribution: widespread throughout the Tropics

root **Tea gardens, especially in high altitudes, with areas of chlorotic bushes which fail to thrive.**

Pratylenchus coffeae Z. (loosi)
Coffee nematode.

NEMATODA

103

3, 53, 404
543, 772

Slender, endoparasitic nematode, about 0.5 mm long. From the root extremities upward, brown to black patches (dead tissue) show when the bark is lightly scraped with a knife. The fine roots are underdeveloped. When bark fragments (with live and dead tissue) are placed in water, nematodes can be observed under a low-powered magnifying glass.

Distribution: widespread

**Plants become stunted, wilt and die.
Roots destroyed by white grubs.**

Exopholis hypoleuca Wied.

COLEOPTERA; Scarabaeidae

104



Strong, convex, oval cockchafer, over 20 mm long, of dark reddish-brown colour, which is on the wing towards the end of the rainy and at the beginning of the dry season. The eggs are laid in the ground. Seed beds and newly planted fields are preferred. The white grubs gnaw the roots. They pupate towards the end of the dry season. One generation a year.

Distribution: Indonesia

trunk **Plants die suddenly and topple over, especially during dry periods. Trunk and branches hollowed out. Often whole clumps of bushes attacked.**

Neotermes militaris Desn.

105

ISOPTERA; Kalotermitidae

Termites which build earth nests. The soldiers are about 10 mm long and have strongly developed mandibles.

Distribution: Ceylon

Partial dieback of tea bushes.**trunk***Agrilus sp.*COLEOPTERA; *Buprestidae*

106

Small, metallic blue or green beetle, 8-10 mm long, its body tapering towards the posterior end. The eggs are inserted in slits on the twigs. The first thoracic segment of the whitish larvae is conspicuously large and broad. The larvae tunnel under the bark, penetrating also into the wood. The insect is on the wing at the beginning of the dry season.

Distribution: China, Indonesia

Leaves on large parts of bushes droop and wilt. Trunks and thicker branches gnawed superficially and tunnelled with irregular, large mines, lined with excrement.

*Aeolesthes induta Newm.*COLEOPTERA; *Cerambycidae*

107

Longicorn beetle, 25-30 mm long, with dark brown and grey specks. The antennae are much longer than the body. The beetle feeds on twigs and shoots, laying its eggs in feeding scars on the trunk. The larvae are yellowish-white with a broadened thoracic portion. They mine under the bark, penetrating into the wood.

Distribution: Formosa, New Guinea

trunk

Trunks of young bushes gnawed off immediately above the ground.*Euxoa (Agrotis) segetum* Schiff.

108

LEPIDOPTERA; *Noctuidae*

9, 684

see page 66 (Coffee)



Trunks of young bushes show gall-like, callous deformations. Development of leaves inhibited. Young plants usually wither.

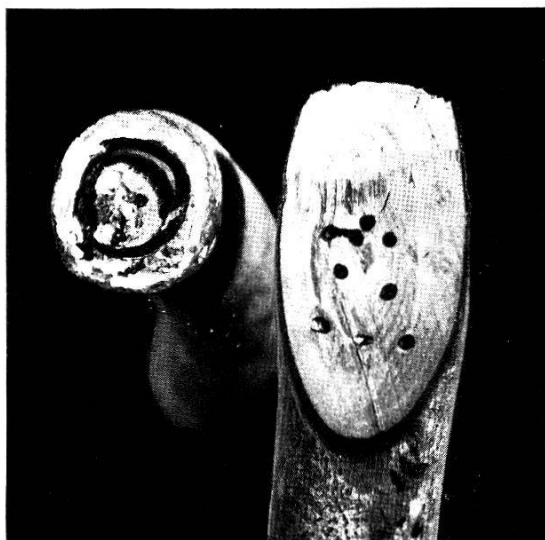
Pseudococcus sp.*Mealybug.*HOMOPTERA; *Pseudococcidae*

109

Small, oval mealybug, about 2 mm long, covered with a secretion of white waxy filaments.

Distribution: Ceylon

twigs



Foliage reduced; twigs break off when touched, owing to galleries traversing them. Plants wilt and die, especially during the dry season.

Xyleborus fornicatus Eichh.*Shot-hole borer.*COLEOPTERA; *Scolytidae*

110

Small, reddish-brown to dark brown beetle, about 2 mm long. The females mine the twigs radially from the bark inward to the xylem, after which they eat their way in spiral direction. Development period of one generation: 5-6 weeks. Several generations.

Distribution: Ceylon

Shoots die, being traversed by feeding galleries and occupied by dirty-white caterpillars.

shoots

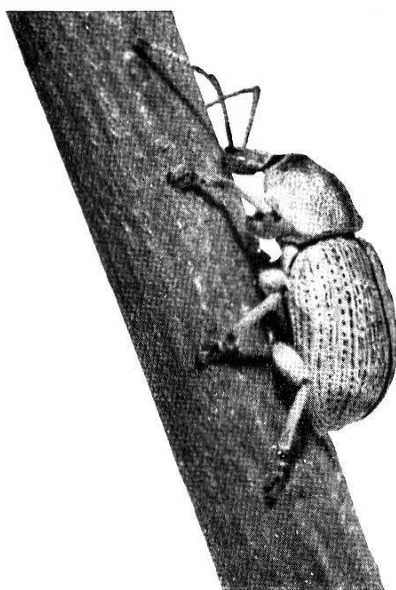
Casmara patrona Meyr.

LEPIDOPTERA; *Oecophoridae*

Small, greyish-brown to beige moth, with a wing span of about 15 mm, which deposits its eggs on shoots and small twigs. The caterpillars eat their way into the shoots, thus producing galleries.

111

Distribution: China, Formosa



Young shoots partially devoured, or broken at the base as a result of gnawing.

Phytoscaphus dissimilis Mshl.

COLEOPTERA; *Curculionidae*

112

Greyish-brown weevil, 6-8 mm long, with a short stout snout. The larvae are found on the roots of tea and other plants. The weevils feed on young shoots. 1-2 generations a year.

Distribution: India

Leaves and shoots beset with white, fluffy, oval bodies. Infestation with sooty mould. Leaf development inhibited.

Ferrisia virgata Ckll.

HOMOPTERA; *Pseudococcidae*

113

72, 444 733
780, 819

see page 93 (Cocoa)

shoots

Shoots with conspicuous white, strongly convex scale insects. Growth disturbed; leaves severely infested with sooty mould.

Pulvinaria psidii Mask.
Guava mealy scale.

HOMOPTERA; *Lecaniidae*

114



Oval, green scale insects, 2-3 mm long, with a well developed white egg-sac. The insect attacks mainly young shoots and young leaves.

Distribution: widespread

Younger and older shoots as well as leaves beset with flat, oval, yellowish to greenish scales, about 3 mm in size. Heavy infestation with sooty mould.

Coccus viridis Green
Green coffee scale.

HOMOPTERA; *Lecaniidae*

115

20, 75, 456
756, 781



see page 72 (Coffee)

The scale insects reproduce actively at the beginning of the rainy season.

Distribution: widespread

Growth of shoots impaired.

shoots

Pseudaulacaspis pentagona Targ.
Papaya scale.

HOMOPTERA; *Diaspididae*

Almost round scale insect, 2-3 mm in diameter, the scales of which are yellowish to greyish-white, with a reddish-brown dot (exuviae) in their centre. Heavy reproduction occurs towards the end of the rainy and at the beginning of the dry seasons.

116

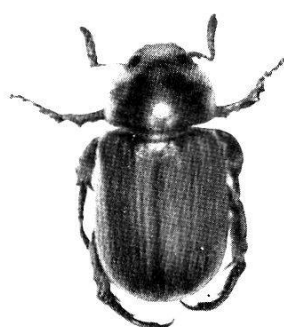
Distribution: widespread

Leaves devoured from the margin inward.

leaves

Anomala superflua Ar.

COLEOPTERA; *Scarabaeidae*



117

Small, oval and strongly convex dark garden-chafer, about 10 mm long, which feeds on young leaves and deposits its eggs in the ground. The grubs gnaw the roots. One generation a year.

Distribution: Ceylon

Leaves eaten away from the margin inward.

Dicasticus mlanjensis Mshl.

COLEOPTERA; *Curculionidae*

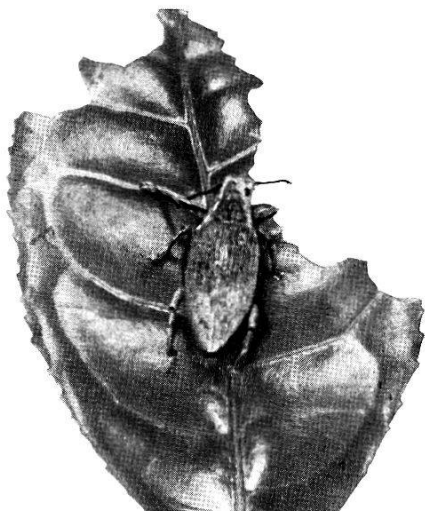


118

Robust, greyish-brown weevil, about 15 mm long, with a short snout. The adults feed on young leaves. The eggs are deposited on the leaves. The larvae live underground.

Distribution: East Africa, Nyasaland

leaves



Jagged feeding injuries on leaves, especially proceeding from the margin inwards.

Hypomeces squamosus Herbst

COLEOPTERA; Curculionidae

119

Elongated-oval weevil with greyish-brown scales and a short, stumpy snout. The eggs are laid in the ground, where the larvae feed on roots of various plants.

Distribution: Indonesia

Leaves with transparent, irregular patches, caused by feeding. Sac-like structures, tapered to a point, cling to the underside of leaves.

Acanthopsyche Snelleni Walk.

120

LEPIDOPTERA; *Psychidae*

Moth with grey, indistinctly marked forewings. The eggs are laid on the leaves. The caterpillars make a sac-like structure of leaf and bark particles, 25-30 mm long, which hang from the underside of the leaves.

Distribution: India, Indonesia

Younger leaves with either large, irregular mines, or the tip curled inward. The leaf-rolls contain webbing and caterpillars. Leaves injured with feeding marks. Damage occurs particularly at altitudes between 1000-1500 m above sea level.

Caloptilia theivora Wals.

Leafroller.

121

LEPIDOPTERA; *Gracilariidae*

Small, frail moth, about 6 mm long, with reddish-brown to purplish-brown forewings, and decorated with a yellow spot on the costal portion. The eggs are laid on the young leaves. The caterpillars are greenish and have a brown head. The young larval stages mine in the leaves, while the older ones feed superficially in the leaf-rolls, pupating later on in tents of webbing on the lower leaf surface. Development period of one generation: 4-5 weeks. Several generations.

Distribution: India, Indonesia

Leaves spun together; irregular, almost transparent patches in the parenchymatous leaf tissue, caused by feeding caterpillars. Heavily injured leaves turn brown and drop off. Shoots often die, being mined by caterpillars.

leaves

Sparganothis pilleriana Schiff.

LEPIDOPTERA; *Tortricidae*

Moth with greyish-brown forewings, crossed by broad, pale yellow to lead-coloured bands, while the hindwings are plain greyish-brown. The eggs are deposited on the leaves. The pale green to grey caterpillars bear small black warts. Head and prothoracic shield are black. Full grown the caterpillars are about 15 mm long. They pupate inside leaf-rolls. Development period of one generation: 6-8 weeks.

122

Distribution: Europe, Asia Minor to Persia, China, U.S.A.



Several leaves spun together and eaten away. Flowers of older bushes also often destroyed.

Homona coffearia Nietn.

Tea tortrix.

LEPIDOPTERA; *Tortricidae*

123

27

Small moth with a wing span of 20-25 mm. The forewings are light brown, with crossbands. The eggs are laid in clusters on the leaves. The pale green caterpillars bear numerous dark warts on each segment. Their head and prothoracic shield are black. They spin the apical leaves together and feed on them, sometimes also attacking flowers and fruits. Development period of one generation: 5-6 weeks. Several generations.

Distribution: India, Ceylon, Indonesia

leaves

124



Apical leaves and leaflets before unfolding spun together. Formation of brown, withered patches where feeding occurred; lower epidermis left intact.

Laspeyresia leucostoma Meyr.
Flush worm on tea.

LEPIDOPTERA; *Tortricidae*

Moth, 6-7 mm long, the forewings of which are broad, brown, with dark grey and purple decorations and yellow stripes. The eggs are laid on the leaves. The caterpillars are pale yellow, brownish or green. Full grown they may be 10-12 mm long. They spin the leaves together and feed on the upper leaf surface, producing irregular patches and leaving the lower epidermis intact. The buds may also be attacked. Pupation takes place on shoots or on old leaves at the plant base. Development period of one generation: 6-8 weeks. Several generations.

Distribution: India, Indonesia

Leaves devoured; bushes often stripped bare. Contact with caterpillars causes severe skin irritation.

Setora nitens Walk.

125

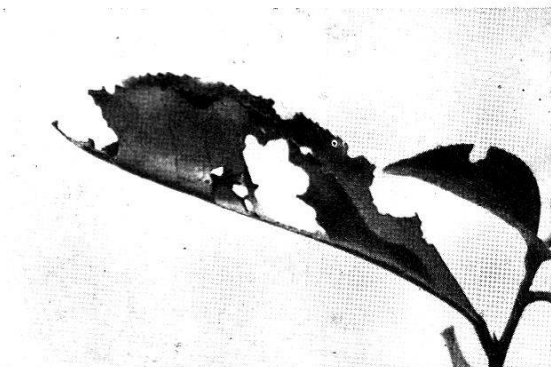
LEPIDOPTERA; *Limacodidae*

Moth with a wing span of 30 mm. The forewings are brown with a reddish-brown crossband, while the hindwings are plain pale brown. The eggs are laid on the leaves. The yellow to green caterpillars are equipped with long tufts of stinging hairs at both ends of the body; some of these hairs are also scattered along the back. Development period of one generation: about 6-8 weeks.

Distribution: Indonesia

126

583



Leaves with irregular holes, or skeletonized. Plants often stripped, shoots only left.

Natada nararia Moore
Fringed nettle grub.

LEPIDOPTERA; *Limacodidae*

Moth with reddish-brown, black dotted forewings, expanding to about 25 mm. The eggs are laid on the leaves. The green caterpillars are provided with several tufts of stinging hairs. They begin by feeding on the underside of the leaves, leaving the upper epidermis intact; later on they destroy the whole tissue. Development period of one generation on tea: 6-8 weeks.

Distribution: India, Ceylon

Leaves devoured. Plucking rendered difficult, owing to skin irritating properties of caterpillars.

leaves

Thosea cervina Moore
Assam nettle grub.

LEPIDOPTERA; *Limacodidae*

Moth with a wing span of 30-40 mm. The forewings are light to dark brown, crossed by a distinct line and marked with a dark dot in the centre. The hindwings are plain grey to brown, without any markings. The eggs are fixed to the underside of the leaves. The caterpillars are green with red tubercles laterally and a pale dorsal line. They are provided with conspicuous, pinnate stinging hairs. The pupae are dark brown, globular, 10-12 mm in diameter. Total development of one generation: 10-12 weeks. *T. cervina* attacks also *Piper nigrum*.

127

Distribution: India, Ceylon, Indonesia

Younger and older leaves more or less eaten away. Presence of caterpillars on the underside of leaves.

Chalcocelides albiguttata Sn.

LEPIDOPTERA; *Limacodidae*

Moth with ochrous to light brown forewings, marked with a dark spot in the centre. They expand to about 40 mm. The eggs are fixed to the underside of the leaves, where the greenish, naked, slug-like caterpillars feed on leaf tissue. Pupation takes place in an egg-shaped or almost spherical cocoon on the leaves. Development period of one generation: about 3 months.

128

586

Distribution: India, Ceylon, Indonesia, Australia

Leaves with discoloured patches (only epidermis left intact). Often plants completely stripped; young green shoots also being eaten away.

Heterusia cingala Moore
Red slug.

LEPIDOPTERA; *Zygaenidae*

129

Moth with yellowish-green forewings, speckled with white, while the hindwings are yellow to dark brown or black. They expand to about 40 mm. The eggs are laid on the lower twigs of the bushes. The caterpillars hatch after a few days and grow to about 40 mm in size. They are first grey to yellowish, dark-striped; later on they change to reddish-brown and bear dorsal humps. They pupate on the tea bushes. Development cycle of one generation: 8-10 weeks. Several generations a year.

Distribution: Ceylon

leaves **Leaves devoured. Usually total defoliation.**

Andraca bipunctata Walk.
Bunch-caterpillar.

LEPIDOPTERA; *Bombycidae*

- 130** Moth with a wing span of 40-50 mm. The forewings are brown, crossed with 3 dark, wavy lines. Near the outer margin there are two white spots. The wing tips are grey. The hindwings are also brown, their base darker and the costal margin yellow. The eggs are fixed in clusters on the underside of the leaves. The caterpillars are first of light colour, turning dark brown with yellowish stripes along the sides. Full grown they are about 50 mm long. They live gregariously on the leaves.

Distribution: India, Indonesia, Formosa, Indochina

Plants stripped bare, sometimes young shoots attacked also.

Attacus atlas L.

LEPIDOPTERA; *Saturniidae*

- 131** Largest butterfly known, its wings expanding to 250 mm. Both fore- and hindwings are reddish-brown with a transparent triangle. The eggs are laid on the leaves. The green caterpillars may be up to 100 mm long when full grown, and are extremely voracious. The segments of the body bear long, stumpy appendages. Pupation takes place between leaves. *Atlas* appears only occasionally and locally.

Distribution: India, Ceylon, Indonesia, Southern China

Young and old leaves destroyed. Plants often completely stripped.

- 132** *Prodenia litura* F.
Cotton worm.

4, 321, 629
 2, 703, 837
 867

LEPIDOPTERA; *Noctuidae*

see page 423 (Cotton)

Leaves devoured. Young green shoots often injured also and eaten away.

Boarmia bhurmitra Walk.
Tea twig caterpillar.

- 133** LEPIDOPTERA; *Geometridae*

Greyish-brown moth with a wing span of 40-50 mm, which inserts its eggs into slits in the bark or lays them on twigs. The grey to brown caterpillars are the characteristic type of a looper (see Fig. 34) and are very well matched to the base on which they live (twigs). One, sometimes two generations each season.

Distribution: India, Ceylon

Leaves with irregular holes, often completely devoured.

leaves

Orgyia postica Walk.
Small tussock moth.

LEPIDOPTERA; *Lymantriidae*

134

34, 783

see page 78 (Coffee)

Leaves devoured, sometimes only midribs left.

Valanga nigricornis Burm.

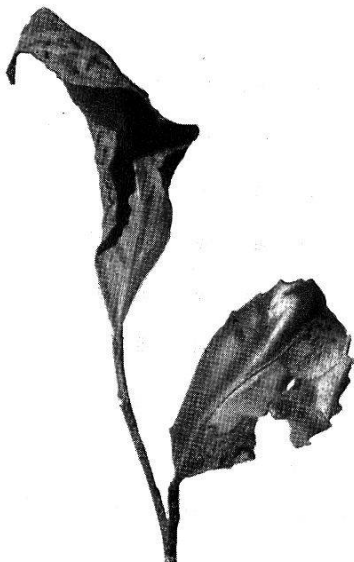
ORTHOPTERA; *Acridiidae*

135

322

Large, robust grasshopper, 50-70 mm long, brownish-grey to brownish-green, the head and thorax marked with pale median lines. The hoppers are inconspicuously brownish-green to yellowish-brown. Peak occurs at the end of the rainy season. One generation.

Distribution: India, Indonesia, Brazil



Leaves and buds with small, elongate, corky lesions. Growth of young plants impaired when heavily attacked.

Taeniothrips setiventris Bagn.
Common tea thrips.

THYSANOPTERA; *Terebrantia*

136

Small, brown thrips, 1-1.5 mm long. The female deposits its eggs in the leaf sheaths, buds, and very young shoots. Development period of one generation: about 3-4 weeks. Several generations.

Distribution: India

leaves



Young leaves with characteristic dark patches, curled and sometimes severely misshapen, rendering them unsuitable for tea production. Shoots often distorted.

Helopeltis theivora Waterh.
Mosquito blight of tea.

HETEROPTERA; *Miridae*

137

Slender plant bug, very agile flier, 6-8 mm long. The head and abdomen are yellowish-brown to brown. The thorax is dark red. The legs and antennae are dark. The prothorax bears a conspicuous clubbed horn. The eggs, furnished with 2 filaments, are embedded by the females into the tender tissue of young leaves, buds, or shoots. Both adults and nymphs pierce the plants, sucking their cell sap. They favour warm and moist areas. Development period of one generation: 6-8 weeks. Several generations.

Distribution: India, Indonesia, Indochina

Buds and freshly unfolded leaves with numerous small, brown spots, about 1 mm in diameter. Buds fail to open and plants remain underdeveloped when heavily attacked.

Lygus viridanus Motsch.

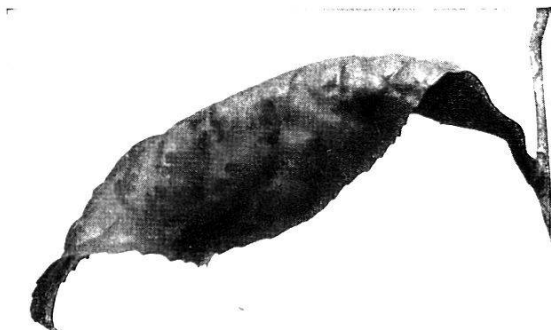
138

HETEROPTERA; *Miridae*

Elongate, oval, yellowish-green plant bug, about 5 mm long (see No. 44). The female lays its eggs singly in soft shoots, leaf stalks and midribs. Both nymphs and adults suck on shoots, buds and young leaves. Development period of one generation: 5-6 weeks.

Distribution: Ceylon

139



Young leaves with brown patches and slightly curled up. Shoots distorted.

Callicratides rama Kirk.
Bean flower capsid.

HETEROPTERA; *Miridae*

Slender, ochrous plant bug, about 10 mm long. Its pronotum is wedge-shaped, edged with black posteriorly. The eyes are large and protuberant. Oviposition takes place in the young shoots. Several generations. *C. rama* also attacks beans.

Distribution: East Africa, Nyasaland, Ceylon



Young leaves wrinkled, curled up and brittle.

leaves

Empoasca flavescens F.
Tea green fly.

HOMOPTERA; *Jassidae*

140

636

see page 337 (Castor)

Distribution: widespread in Tropics and Subtropics



Apical leaves curled downwards, their edges deckled and wrinkled.

Toxoptera aurantii B. d. F.
Black orange aphis.

HOMOPTERA; *Aphididae*

141

41, 159, 504

see page 275 (Citrus)



Young and older leaves beset with slightly convex, oval scales along the midrib on the lower surface. Heavy infestation with sooty mould. Leaf tips slightly curled up and brittle.

Coccus hesperidum L.
Soft scale.

HOMOPTERA; *Lecaniidae*

142

446, 506

see page 276 (Citrus)

leaves

143



Youngest leaves pale green to whitish, their margin curled upward. They wither and die.

Eriophyes theae Watt.
Pink tea mite.

ACARINA; *Tetrapodilia*

Yellowish to pink mite, about 0.15 mm long, cone-shaped, broader in front. They beset the upper surface of the leaves along the midrib. Several generations. Heaviest attacks occur during the dry season.

Distribution: India, Indonesia

144



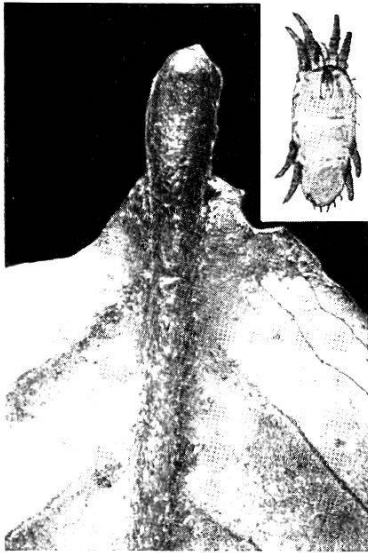
Leaves stained brownish-red to bronze or greyish-brown; no malformation. Youngest leaves usually spared. Plant growth checked.

Calacarus carinatus Green
Purple mite.

ACARINA; *Tetrapodilia*

Minute worm-like mite, 0.1-0.15 mm long, with only two pairs of legs. The body is purple, with fine, white ridges or keels (see Fig. 45). The pest infests the upper and lower surface of the leaves. Development period of one generation: 2-3 weeks. Several generations.

Distribution: India, Indonesia, Ceylon



Leaf base stained dark brown to reddish, leading to leaf-shedding. Shoots darken. Buds fail to open and wither.

Tenuipalpus obovatus Donn.
Scarlet mite.

ACARINA; *Trombidiformes*

leaves

145

Small, orange-scarlet mite, 0.2-0.3 mm long, its body pear-shaped, the cranial portion dilated. The posterior end of the body is furnished with 6-8 erect scales. The eggs are fixed on the underside of the leaves. The mites attack both leaves and shoots. Development period of one generation: about 3 weeks. Several generations.

Distribution: India, Indonesia



Leaves stained greyish-brown to brownish-red along the midrib and especially at the base. Leaf-shedding. Heavy attacks affect young leaves as well (flush).

Oligonychus coffeae Nietn.
Tea red spider mite.

ACARINA; *Trombidiformes*

146

43

Small, egg-shaped, convex mite, ruby or light red, about 0.5 mm long, which lives on the upper side of the leaves. The eggs are scarlet and globular. The mites cover the upper surface of the leaves with fine webbing. *O. coffeae* develops best in dry weather. Several generations a year.

Distribution: East Africa, India, Indonesia, Indochina, Ceylon

leaves

Youngest leaves dwarfed, shrivelled and brittle. Brown stains along the leaf veins. Buds fail to open.

Hemitarsonemus lata Bks.
Yellow mite.

ACARINA; *Trombidiformes*

147

770, 821



see page 392 (Quinine)

Distribution: Europe, India, Ceylon, Indonesia, U.S.A., Central America

seed

Flowers with dark patches, often completely shrivelled and falling off. Seeds misshapen and mottled, finally dying.

Poecilocoris latus Dall.
Tea seed bug.

HETEROPTERA; *Pentatomidae*

148



Broad, convex plant bug, about 15 mm long. The prothorax and elytra are yellow with intense dark brown spots. The eggs are fixed to the underside of the leaves. Development period of one generation: 6-8 weeks. Several generations.

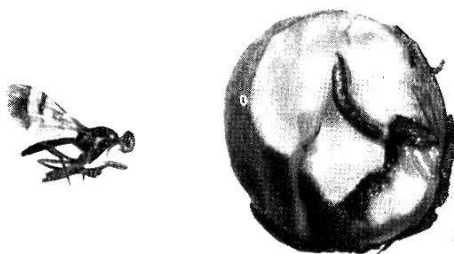
Distribution: India, Indochina, Indonesia

Inside of split seeds or germinating ones destroyed by white maggots.

Adrama determinata Walk.

DIPTERA; *Trypetidae*

149



Fly, about 10 mm long. The head, abdomen and legs are yellow, while the thorax is black. The transparent wings have a light brown tip and crossband. The eggs are laid inside the split seeds. The white, footless maggots are 10-15 mm long. Development cycle of one generation: about 20 days. Several generations.

Distribution: Indonesia

Kola-nut

(*Cola acuminata* Beauv.)

Most important pests: 153, 158, 159, 163, 166, 167

Trunks of young trees gnawed off above ground level.

Brachytrypus membranaceus Drury
Tobacco cricket.

ORTHOPTERA; *Gryllidae*

Very strong, brownish-yellow cricket, 50-60 mm long (see Fig. 9), which lives in burrows underground, where it also deposits its egg. It becomes very active at night and is attracted by light. It attacks young plants, appearing mainly in May. One generation a year.

Distribution: Africa

trunk

150

64, 687

Signs of partial dieback. Foliage of whole branches wilts and dies, owing to large round galleries in the branches.

Apate monachus F.

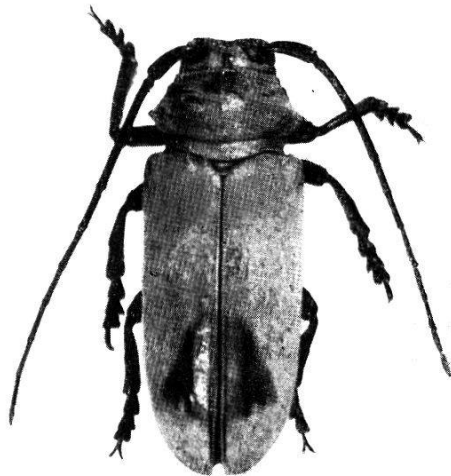
COLEOPTERA; *Bostrychidae*

branches

151

14, 61, 476

see page 69 (Coffee)



Shoots and branches superficially injured with feeding marks; tips of shoots gnawed off. Shoots, branches or whole trees show signs of wilting and die, being mined inside and occupied by yellowish-white larvae.

Phosphorus gabonator Thoms.

COLEOPTERA; *Cerambycidae*

152

Robust Longicorn beetle, 20-22 mm long. The head and prothorax are yellowish-green, the latter furnished with a distinct tooth on both sides. The base of the elytra is of the same colour, the elytra themselves are yellow, marked with a large, dark, acute triangle. The legs and antennae are black. The females lay their eggs in the shoots from whence the larvae tunnel their way into the trunk. They emerge in June/July. One generation a year.

Distribution: West Africa, Congo

shoots **Shoots and fruit stalks beset with oval, convex, black scales. Heavy infestation with sooty mould. Attacked parts of plants underdeveloped.**

Saissetia nigra Nietn.

Nigra scale.

153

HOMOPTERA; *Lecaniidae*

488, 782

Oval, convex, dark brown to black scales, measuring 2-3 mm by 1.5-2 mm, which occur on young shoots and fruit stalks. They oviposit under the scale and reproduce parthenogenetically.

Distribution: widespread

leaves **Leaves irregularly eaten away, usually from the margin inward.**

Zyrcosa brunnea Hust.

COLEOPTERA; *Curculionidae*

154

Black weevil, measuring 6-8 mm by about 3 mm, with a short, broad snout, the upper side cleft in the middle. The pronotum bulges out towards the rear end. The elytra are marked with distinct longitudinal rows of dots. The larvae develop underground on roots of a great variety of plants.

Distribution: West Africa

Leaves rolled up. Presence of caterpillars inside the rolls.

Syllepta retractalis Hmps.

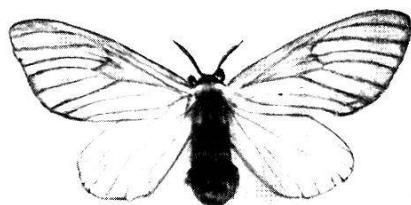
LEPIDOPTERA; *Pyrallididae*

155

Moth with a wing span of 25 mm. The forewings are pale yellow, marked with a brown M-shaped line, while the hindwings, of the same colour, bear a U-shaped brown line. The eggs are deposited on the leaves. The greyish-green, brown-headed caterpillars are about 25 mm long when full grown. Several generations a year.

Distribution: West Africa

156



Leaves devoured; plants often completely defoliated. Presence of pear-shaped nests, the contact with which causes severe skin irritation (Urticaria).

Anaphe venata Btlr.

LEPIDOPTERA; *Notodontidae*

Moth with a wing span of 50-60 mm. The forewings of the female are pale, indistinctly marked, while those of the male are whitish-yellow with a brown median crossbar. The veins between the latter and the tip are also brown. The

hindwings are yellowish, the thorax brown and the abdomen orange. The caterpillars are densely hirsute, dark brown, decorated with two dorsal rows of white dots. They live gregariously and move about in processions. Their pear-shaped nests are made of white webbing, about 15 cm by 10 cm in size. The hairs of the caterpillars cause severe skin irritation.

Distribution: West Africa, Congo

leaves

In nurseries:

Heavy attacks on leaves; plants often stripped bare.

Zonocerus variegatus L.

Stink locust.

ORTHOPTERA; *Acridiidae*

see page 96 (Cocoa)

157

81, 376, 417, 7

Leaves of young trees with pale mottlings. Leaf-shedding. Presence of small, dark insects, 1-1.5 mm long, on the lower surface of leaves.

Selenothrips rubrocinctus Giard.

Red-banded thrips.

THYSANOPTERA; *Terebrantia*

see page 97 (Cocoa)

158

85, 442

Leaves curled up and wrinkled. Growth of shoots severely checked. Damage occurs frequently in young plantations.

Toxoptera aurantii B.d.F.

Black orange aphid.

HOMOPTERA; *Aphididae*

Black to dark reddish-brown aphid (see page 275, Citrus)

159

41, 141, 504

Underside of leaves and fruit stalks covered with white fluffy colonies. Fruits dwarfed, falling off precociously when heavily attacked. Infestation with sooty mould.

Pseudococcus njalensis Laing.

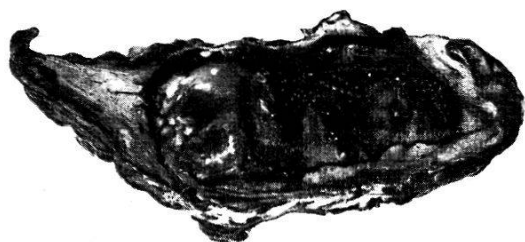
HOMOPTERA; *Pseudococcidae*

see page 94 (Cocoa)

160

73

pods



Leaves destroyed from the margin inward and often several leaves spun together. Young pods stained dark, completely hollowed out and filled with excrement, webbing and mould. Often old pods injured in the same way.

Characoma stictigrapta Hmps.
Pod husk borer.

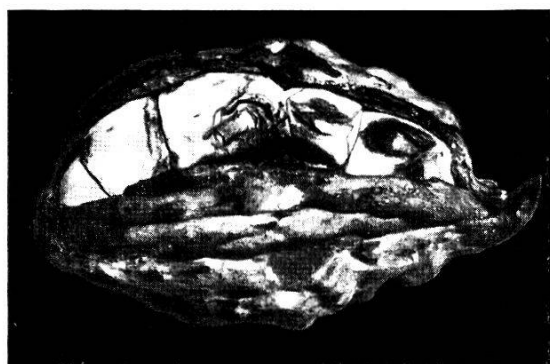
LEPIDOPTERA; *Noctuidae*

161

90

Greyish-white moth with a wing span of 20-25 mm. The forewings are decorated with 5 crossrows of small, black dots, the female in addition with a larger black spot in the centre. The hindwings are plain grey. The eggs are laid on leaves and young pods. The caterpillars are reddish-grey to grey, with dark dots on the back. They feed on leaves and mine also into young or old pods. Development period of one generation: 6-8 weeks. Several overlapping generations.

Distribution: West Africa



Pods stained dark and sometimes secreting gum. Rotting patches under which white maggots are found. Superficial dark lesions on nuts.

Ceratitis colae Silv.

DIPTERA; *Trypetidae*

162

Brown and yellow fly, 6 mm long (cf. also *Ceratitis capitata*), with hyaline wings, crossed with a median brown bar, and a brown longitudinal stripe running to the tip, another short crossband from the distal margin to the wing centre. The yellowish-brown abdomen is marked with two dark crossbands. The female lays its eggs in the fruits, where the maggots feed on tissue of the pods and attack the nuts also. Several generations.

Distribution: West Africa

Pods with dark, decayed, necrotic patches. Young fruits deformed and underdeveloped.

163

Helopeltis bergrothi Reut.
Cocoa mosquito bug.

HETEROPTERA; *Miridae*

see also No. 95

Pods with dark, decayed, necrotic patches. Young fruits deformed and under-developed.

pods

Sahlbergella singularis Hagl.

HETEROPTERA; *Miridae*

164

see page 101 (Cocoa)

94

Fruit stalks and young pods covered with oval, convex scales. Pods misshapen and dwarfed, failing to ripen (see cocoa).

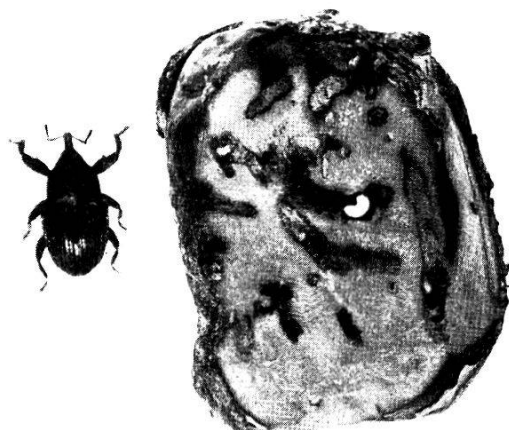
165

Stictococcus sjöstedti Ckll.

HOMOPTERA; *Stictococcidae*

98

see page 103 (Cocoa)



Nuts with superficial, brownish mottlings, the inside crisscrossed by irregular feeding mines filled with excrement and occupied by fat, white larvae.

nuts

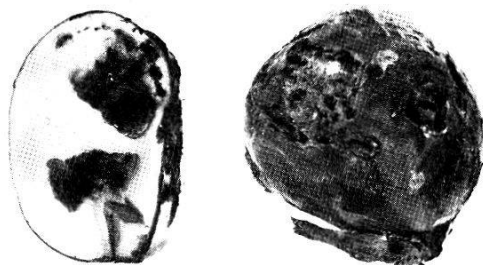
Balanogastrius kolae Desbr.

COLEOPTERA; *Curculionidae*

166

Dark, robust weevil, measuring about 3 mm by 1.5-2 mm. The prothorax is densely punctate, the elytra distinctly grooved longitudinally. The femora are furnished with distinct teeth on their inner side. The antennae are bent and their tip distinctly clubbed. The adults pair 3 days after emerging, and oviposition begins a few days later. The female inserts its eggs singly in the pulp surrounding the nuts, and the larvae feed in the seeds. The weevil attacks nuts still on the tree and, especially also the fallen ones. Attack continues in the storehouses and during transport. Several generations a year.

Distribution: West Africa



Nuts with small, blistered, dark feeding marks, and internally traversed by irregular mines filled with excrement and occupied by fat, white larvae.

167

Paremydica insperata Faust

COLEOPTERA; *Curculionidae*

Greyish-brown, yellowish-brown or dark brown weevil, 5-7 mm long, with a slightly curved snout, about 2 mm long. The upper surface of the elytra is distinctly humped. The inner side of the femora is slightly dentate. The female inserts its eggs in the pods, i.e. nuts, where the larvae hatch after 6 days to start their mining activity. After 3 weeks they pupate and after further 8-10 days the young adults emerge. Several generations.

Distribution: West Africa

