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La distribution de cette espèce est décrite par BONNE-WEPSTER et SWELLENGREBEL (1953) et dans les régions de sa répartition (Indonésie et Inde) l'habitat normal est situé entre 1000 et 1500 m. d'altitude. Le spécimen de Krek signalé par le Dr M.-E. FARINAUD et notre spécimen de Snuol ont été trouvés dans des endroits à 100 m. et 180 m. d'altitude.

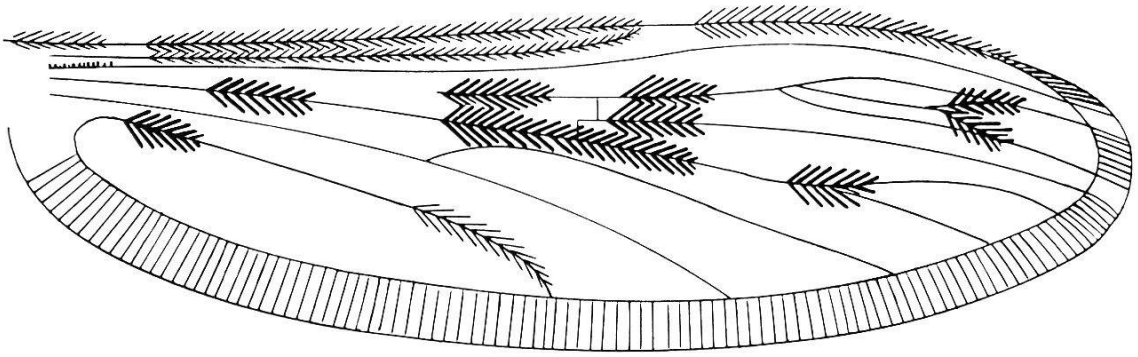

Fig. 1. Anopheles annandalei interruptus; aile. Spécimen provenant de Snuol (Cambodge).

Litérature.

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Insects in Southern Rhodesian Tobacco Culture.[1]

By G. H. BÜNZLI [2] and W. W. BÜTTIKER [2].

Part V: Insects occurring in the fields.

COLEOPTERA, NEUROPTERA, RHYNCHOTA and ARACHNOIDEA.

During the seasons of 1949-1952 the authors had the opportunity of inspecting a large number of Virginia tobacco fields in Southern Rhodesia. Most of the insects which visit or dwell in such plantations have been recorded.

In this paper, the Coleoptera (excluding Tenebrionidae and Elateridae), Neuroptera, Rhynchota and Arachnoidea are dealt with whereas in previous parts of this serial paper other groups of insects were listed. For insects injurious or beneficial which also occur in the seed-beds the reader is referred to a separate paper (BÜNZLI and BÜTTIKER [1956]).

[1] Serial papers covering part of the activity during 1948-1952 of the Entomological Section of the Tobacco Pest Control Research Scheme sponsored by the Government of Southern Rhodesia and the Rhodesia Tobacco Association.

[2] Formerly of the Research Staff of the Tobacco Pest Control Research Scheme, Salisbury (Southern Rhodesia).

LAMELLICORNIA

Melolonthidae.

Melolonthinae.

Larvae: Whitegrubs. Adults: True Cockchafers [3].

Schizonycha profuga Pér., very common and abundant.

S. citima Pér., more frequently in areas with red-loam than on sandy soils; occasionally, prior to the flight period, found congregated end August-September on rootstock of *Eriosema englerianum.*

S. infantilis Pér., wide-spread, fairly frequent.

S. sp. near *comosa* Burm., fairly common on loamy sand areas.

S. (Atys) sp.? *inverta* Pér., not very frequent, sandy districts.

S. manicana frequent (quoted by JACK [1935] and MITCHELL [1946]).
First imago in soil mid-June.
In East Africa at least 40 different *Schizonycha* species have been recorded, in North Africa only two (MOUTIA 1940).

Genyoschiza straminea Pér., infrequent, recorded from two localities on red loam only, end September, mid-February; *G.* sp. mentioned by MOSSOP (1948).

Hecistopsilus molitor Kolbe, very common and abundant.
First adults in October.

Apogonia marshalli Arrow, locally numerous but distribution rather limited. Swarming observed at noon-time, full sunshine; concentrated flight just above surface of grass-covered ground.
A. destructor H. Bos., in Java, larvae damaging roots of sugar cane, grasses, maize; adults occasionally attack groundnuts and soya beans.

Lepidiota (Eulepida) mashona Arrow, and *L. nitidicollis* Kolbe, infrequent, rather sporadic in the main tobacco-growing areas. In the marginal districts of tobacco production in the south and south-east of Rhodesia, *Lepidiota* seems to be frequent, the larvae attacking the roots of tobacco, maize, pine-apple, etc.
JACK (1935) reported damage to maize and vegetable in the Victoria District; CHORLEY (1939): whitegrubs of *Eulepida mashona* attack roots of large trees. *L. stigma* F. in Java and Sumatra is most injurious to groundnuts, cassava, sugar-cane and *Hevea. L. pinguis* in Ceylon attacks roots of *Hevea,* coffee and cinnamon (DAMMERMAN 1929).

Genus near *Pseudachloa* Pér., sp. indet., rare, strong flier, on the wing exceptionally early 4-5 p.m. in tobacco fields, never caught after nightfall.

Congella mashunensis Pér., frequent in red loam areas, rare in sandy districts, strongly attracted by light. Adults till end February and again mid-June onwards.

Serica (Autoserica) proteana Pér., rather frequent, wide area of distribution, large populations develop especially under racemous regrowth of *Protea* sp. in pasture land.
Adults of *S. javana* Har. and *S. (Microserica) pulchella* Brsk. attack cultivated perennial plants (tea, coffee, *Erythrina*) in the East Indies (DAMMERMAN 1929). Various sericine beetles assume the status of a pest in Asia and America.

Sericinae ssp. *(Neoserica?)* indet., wide-spread, not numerous.
Rhodesian species, with one year cycle, hibernate (like *Schizonycha*) as adults, first imagines in the soil 2.5 inch deep in March.

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[3] The months of occurrence of imagines and their host plants are listed in a separate paper (BÜTTIKER and BÜNZLI [1958]).

Larvae harmless, live in and feed on debris, i.e. mould and decaying vegetable matter, do not attack living roots.

Adults rather low-flying, nocturnal, feed on young foliage of indigenous woody plants, including some of the common hosts of *Schizonycha* and *Anomala,* but also on older and hard fronds of trees such as *Parinaria mbola* Oliv. (Muhatja) and *Uapaca kirkiana* Mull. Arg. (Mahobohobo). Frass characteristically serrated.

Idaecamenta Pér. sp., not frequent. *J. eugeniae* Arrow most prevalent in clove plantations, Zanzibar (MOUTIA 1940).

Trochalus mashunus Pér., less frequent than *Serica* ssp.

T. vagus Pér., not very common.

T. sp. indet.; *T. carinatus* in Nigeria attacks young leaves of cocoa.

Rutelinae.

Larvae: Whitegrubs. Adults: Cockchafers.

Anomala exitialis Pér., commonest species, very frequent. PÉRINGUEY records it from: Salisbury, Middle Limpopo and Lourenço-Marques.

A. pinguis Pér., very frequent.

A. tendinosa Gerst., not frequent (occurs also in Zanzibar).

A. ustulatipes Fairm., not frequent; *A ustulata* Arr. and *A. nigrovestita* Arr. occur in S.W. Africa (ARROW 1908).

A. tolerata Pér., fairly frequent.

A. dorsata Fahrs., frequent.

A. opacicollis Pér., frequent, locally abundant.

A. sp. near *opacicollis* Pér., rather rare.

A. cingulata Ohs., rare.

A. resplendens Fahrs., fairly frequent.

A. intrusa Pér., frequent, especially on loams.

A. phthysica Pér., rather rare.

Anomala vetula Wiedm., is a larval pest in turfs in the coastal area of the Eastern Cape Province (OMER-COOPER et al., 1941, BRADFORD 1948).

Anomala ssp. which can assume the status of pests, either as larvae and/or imagines in other countries:

A. vitis F., S. Europe in vineyards, *A. horticola* in England, in grasslands and forest nurseries, *A. horticola* in Denmark on rye, *A. nazarena* in Palestine on wheat, in the East Indies, DAMMERMAN (1929) records:

A. viridis F., *A. obsoleta* Blanch., *A. anchoralis* Lansb., *A. humeralis* Burm., on cocoa, tea, *Erythrina*-shade trees, sugar-cane, maize and tobacco, *A. dorsalis* F. on chillies, egg-plants, cucumber, dahlia. DE FLUITER (1941) reports *A. viridis* F. larvae-attacking *Hevea* roots in Java only in absence of decaying matter. GHOSH (1930) states that *A. antiqua* Gyll. attacks *Arachis, Sesamum* and *Hibiscus canabinus* in Burma. In India *A. lineatopennis* Blanch. defoliates plum trees, *A. gemmula* Arr. tea bushes (ANANDA RAU 1943). Adults of *biharensis* Arr. feed on underground stems of sugar-cane (ISAAC 1941). In Ceylon *A. dussumieri* Blanch. attacks *Albizzia* (JEPSON 1935). In Japan grubs of *rufocuprea* Motch. attack soya beans, dry rice and vegetables (SAWA 1936; KUWAYAMA 1940).

A. sulcatula Burm. in South Sea Islands on sugar-cane (ESAKI 1940).

A. shanica Arr. in Malaya on golf courses (CORBETT and PAGDEN 1940).

A. denuda Arrow is recorded in Southern Nigeria in soil near young cocoa trees, together with *Apogonia nitidula* Thoms. and *Trochalus* sp. (PEACOCK 1913/14).

Adoretus fraudulentus Pér., very frequent.

A. tessulatus Burm., very frequent, also recorded in S.W. Africa (ARROW 1908). Reported by CHORLEY (1939) to attack foliage and blossoms of apple trees in Rhodesia (October-November).
A. flaveolus Fahrs., infrequent (*A. flavus*[?]).
A. cribosus Har., frequent in areas with red loam only.
A. mashunus Pér., occasionally.
A. sp. near *fusculus* Boh., not frequent.
Adoretus sinicus Burm. (with diurnal habits) occurs as a general beetle pest in South-East Asia, Hawaii, sometimes causing serious defoliation of coffee and roses (DAMMERMAN 1929), feeding at night on green beans (HOLDAWAY and NISHIDA 1944).
A. versutus Har. on roses in Fiji (LEVER 1943) on beans etc. in the Seychelles. *A. umbrosus* F. (*hirtellus* Lap.) in the Gold Coast and Nigeria on seedlings of cocoa (COTTERELL 1943), adults eating leaves of cocoa and cola in S. Nigeria (PEACOCK 1913/14). In the Sudan on *Dolichos lablab* (BEDFORD 1940).

Cetoniidae.

Larvae: Whitegrubs. Adults: Rose beetles.

Leucocelis lucens Janss., *L. amoena* Pér., *L. haemorrhoidalis* F., all the three species, the first most abundant, on flowers of *Vernonia glaberrima* mid-November, also on *Protea angolensis* mid-December.
Cheirolasia burkei Westw. var. *histrio* Bates, December, not frequent.
Pachnoda carmelita F., December, very common on flowers of *Vernonia leucocalyx,* December, *P. impressa* Gold, infrequent. *P. calceata* Har. and *P. cincta* Geer. are on record from Damaraland (KOLBE 1908).
Plaesiorrhina recurva var. *plana* Wied., rare, December.
Mazoe albonotata Pér., on Tobacco November, rare visitor, harmless.
Pseudoclinteria infusa G. & P. ssp., February, infrequent.
Cymophorus intrusus Blanch., December, occasionally.
Lyssogonius pentarthrius Westw., November-December, fairly common.
Trogodes rotundicollis Boh., November, rare.

Copridae.

Larvae: Whitegrubs. Adults: Dung beetles.

Copris jacchus F. and *C. elphenor* Klug., frequent.
C. contractus Boh., common, *C. misellus* Pér. and
C. sp.(?) *capensis* Watersh., infrequent.
C. corniger Sahlb., rare.
Onitis alexis Klug., very common.
O. abyssinica Reiche., rare, *O.* sp. indet., common.
Catharsius marcellus Kolbe, very frequent.
Orphnus sp. indet., infrequent.
Copthorhina auspicata Pér., fairly frequent (November-January). Mushroom eater.
Onicellus militaris Cast., common.
Heliocopris colossus Bates and *H. gigas* L., fairly frequent.
H. bucephalus (Hope), a smaller species occurs in East Indies.
Onthopagus gazella F., rare, end November.

Geotrupidae.
Larvae: Whitegrubs. Adults: Dung beetles.

Bulboceras princeps Kolbe, fairly common.
B. pannosum K., fairly frequent.
B. princeps var. *atavus* Kolbe, rather rare.

Dynastidae.

Pycnoschema corpulenta Pér., on sandy soils, not frequent.
P. sp.(?) *scrofa* Harold, common on loamy substrata.
Heteronychus arator F., and *H. consimilis* Kl. on red loams, larvae and/or imagines attacking especially maize, probably also potato, but usually grasses, only occasionally tobacco. Beetles strongly attracted by light. JACK (1936) reported "destroyed newly-planted tobacco in November, in one district". Some other records of *Heteronychus* species assuming the status of root pests: *H. sancta-helenae* Blanch. on maize Orange Free State; *H. tristis* Boh. on turf in Natal; *H. consimilis* on wheat, Kenya Highlands, *H. claudius* Klug. on coffee (French Cameroons). On sugar-cane: *H. licas* Klug. (Mozambique), larvae and adults destructive, *H. plebejus* Klug. (Madagascar), *H. morator* F. (Java), *H. (Allissonotum) pauper* Burm. (Philippines).
Oryctes boas F., larvae frequent in dung and compost heaps, but only sporadic in virgin or cultivated lands (patches of humus-rich soil) near outcropping rocks and boulders. Imago nocturnal in habit, attracted by light.
O. rhinozeros L., a well-known pest of coconut- and other palms, is distributed all over S.E. Asia, eastwards to New Guinea and to the north as far as Formosa.

Hybosoridae.

Hybosorus ruficornis Boh., breeding in loamy substrata, rarely in sandy soils. Adult beetle attracted by light, predatory habit, observed to attack and eat the adults of smaller ssp. of *Anomala* and *Schizonycha* such as *A. tolerata* Pér., *A. dorsata* Fahrs., *A. resplendens* Fahrs. and *S. infantilis* Pér., *S. comosa* Burm. The species is also cannibalistic.
H. illigeri Reiche, one of the commonest Scarabeids in all Africa, also in S. Europe, Asia Minor, S. Arabia etc. Larvae probably grassroot feeders (OMER-COOPER 1941).

Carabidae: Ground beetles.

Scarites natalensis Boh., wide range of distribution, fairly frequent (November-June), in the tropical forest zone of Africa *S. gigas* Schiödte.
Bohemania gigantea Hob., and *B.* sp. indet., very rare.
Polyhirma bilunata Boh., very frequent (November-May).
P. tenuicollis Chaud., fairly common (November-December).
P. semisuturalis Chaud., not frequent (October-November).
P. rhanzanii Bertol. frequent (October-November).
P. sp. near *cailaudi* Cast., larvae only, widespread, not numerous (December-January), occasionally carried away by the Camponotine ant *Anoplolepis custodiens* Sm. and kept in their nests.
Eccoptoptera cupricollis Chaud., very frequent except June-October. Once found in February, under stone, numerous specimens together with a few *Mutilla* (vide Hymenoptera list). Mutilloid mimic (MARSHALL 1902).
Graphopterus velutinus Boh., infrequent (November).
G. albolineatus Wall. var. *darlingi* Pér., not common (November).
G. bilineatus Pér., infrequent.
G. cordiger Dej., fairly common, var. *whalbergi* Boh., rare.

G. lineolatus Boh., frequent (October-November). *G. femorata* Chaud., rare.
Rhopalomelus angusticollis Boh., frequent, especially October-December.
Anthia fabricii Crotch., fairly common.
A. masilicata Guer. var. *fornasinii* Berto., very frequent, a second var. rare; the var. *andersoni* Chaud. occurs in S.W. Africa (SCHINZ 1891).
A. burchelii Hope var. *petersi* Klug., common.
A. thoracica F., fairly common.
A. homoplata Leq. var. *mallyi* Breme, fairly common.
A. sp. larvae, May-October.
Piezia selousi Pér., not frequent (December).
P. marshalli Pér., var. *mashuna* Pér. not frequent (December).
P. marshalli Pér. var. *licita* Pér. rare (December).
Calosoma planicolle Chaud., very frequent October-January, nocturnal habit, attracted by light, preys upon larvae and pupae of noctuid moths.
C. spec., infrequent.
Tefflus delagorguei Guer., rare (November).
Orthogonius sp. young larvae (July), most probably preying upon termites.
Gen. et sp. indet. of *Pterostichini?* cf. *Rhatymus, Strigia* etc.
Larvae, May-July.

Cicindellidae: Tiger beetles.

Mantichora scrabra Klug., widespread, fairly common. Predator of Crickets. In the insectary one adult of *Brachytrupes membranaceus* was devoured within 12 minutes. *M. tuberculata* Deg. and *M. latipennis* Wat. are on record from S.W. Africa, Cape, Orange Free State and Transvaal (HORN 1908): *M. sichelii* Th. from S.W. Africa (SCHINZ 1891).
Megacephala regalis Boh., very seldom.
Cicindela brevicollis Wied. var. infrequent.
C. clathrata Dej., rare; *C. compressicornis* Boh., infrequent.

Staphylinidae: Rove beetles.

Hasumius validus Fairm., larvae and adults collected, occasional occurrence in undisturbed soil or near slab rocks in tobacco fields.

Coccinellidae: Lady-birds.

Larvae and adults on tobacco infested with *Myzus persicae.*

Cydonia lunata F. most common.
C. lunata F. ab. *sulphurea* Oliv., frequent.
C. geisha Gorh., fairly frequent.
Anisolemnia caria Muls. and
Stictoneis pardalina Gerst. and other ssp. never observed on tobacco infested by *M. persicae.*

For **Lycidae** and **Meloidae** see part I (1956) of this serial paper.

Lampyridae: Glow-worms.

Lampyris natalensis Boh., not frequent (December-January).

NEUROPTERA: Lacewings.

Various **Myrmelionidae** species indet., larvae in compact, undisturbed soil and paths.

Chrysopidae, one spec. indet. and *Chrysopa (?) flaveola* Schn. on the wings from mid-October to March, larvae and adults not frequent on *Myzus*

persicae-infested tobacco. BRAIN (1943) however, stated: Lacewings were never found on Tobacco (Southern Rhodesia).

RHYNCHOTA.

HETEROPTERA.

Pentatomidae.

Nezara robusta Dist. var. *virescens* Freem., and *N.* sp. near *robusta;* infrequent on tobacco. The smaller species *N. viridula* L. is widely distributed, but only occasionally met with on tobacco; more frequent on citrus, potatoes and Cruciferae; in tropical and subtropical countries, known as rice bug; attacks also sugar-cane, cotton, soya beans and tobacco.

Aspongopus viduatus Fabr. fairly frequent, not often on tobacco.

Eupodotus sp. and

Aeliomorpha sp. rare, share the habitat of *Mimaulus thesii* Mshl. (vide BÜNZLI and BÜTTIKER 1955).

Capsidae (Myridae).

Gallobellicus (Engytatus) volucer Kirk., frequently breeding on tobacco; it is not a vector of the Tobacco Mosaic Disease.

A very closely related species described by KONINGSBERGER as *Dicyphus nicotianae* and which is distributed from North Africa to China and the Malay Archipelago, named in India *Gallobelicus crassicornis* Dist., is, according to HORVATH (DAMMERMAN 1929) synonymous with *Engytatus tenuis* Reut. This Capsid, in contrast to the species occurring in Southern Rhodesia, damages tobacco, although it is not an exclusive plant feeder.

Gallobellicus sp., larger than *volucer,* lives on the indigenous deciduous shrub *Iboza multiflora* (Benth) E. A. Bruce (Labiatae).

Coreidae.

Acanthocoris fasciculatus F., infrequent, occasionally on tobacco (end January-February).

Lygaedae.

Lygaeus militaris F., frequent, mostly on grasses, occasionally on tobacco (February).

Pyrrhocoridae.

Dysdercus nigrofasciatus Stal. and *D. intermedius* Dist., occasionally on tobacco; pests in cotton.

Reduviidae: Predators collected on tobacco infested with *Heliothis obsoleta.*

Cosmolestes pictus Klug., common (October-May). If numerous efficiently checks the American Bollworm.

Rhinocoris segmentarius Germ., rare (June);

Rh. violentus Germ. (February-July); fairly frequent;

Rh. (Harpactor) tibialis Stahl., rather rare;

Rh. (H.) iracundus L., common in Central Europe.

Sphedanolestes bimaculatus Miller (March) and

Stenolaemus marshalli Dist. (October), very rare.

Berytidae.

Gampsocoris sp., not frequent, occasionally on tobacco.

Tingididae.

Cysteochila sp., suspected of creating galls (rosetting) of buds of *Brachystegia randii*, never on tobacco.

HOMOPTERA.

Flatidae, one sp., rare on tobacco.

Hypochthonellidae.

Hypochthonella caeca (CHINA & FENNAH 1952), not very frequent, minor pest on tobacco roots, specimens collected in the Salisbury South district. (Separate paper to be published).

Membracidae and **Jassidae.** None on tobacco.

Aphididae. Special paper in press.

ARACHNOIDEA: Spiders.

Solifugae (Solpugidae).

Solpuga rhodesiana, ?n. sp. dwelling in the soil, powerful predator of terrestrial insects, particularly crickets (*Brachytrupes membranaceus* Drury), but also tenebrionid and whitegrub larvae, observed September-December in cultivated sandy soils. *S. monteiroi* Poc. is on record from Rhodesia, Kalahari and Delagoa-Bay. The genus *Solpuga* with approximately 50 species is restricted to Africa, of which 20 species occur in the Cape Province (KRAEPELIN 1908).

Lycosidae.

Ocyale atalanta, on surface of cultivated sandy soil, general predator, observed in May to catch very young larvae of *Brachytrupes membranaceus* Drury.

Eresidae.

Stegodyphus gregarius, a social spider with nests preferably on *Brachystegia randii*, border of tobacco fields, prey in cobweb (1. 12. 50), viz:
Lamellicornia beetles: *Schizonycha profuga, S.* sp., *Hecistopsilus molitor* and other smaller insects; 21. 9. 50, same species and *S. citima* and *Serica* sp. This spider is fairly frequent in the tobacco districts of Southern Rhodesia. It is also on record in Natal and common in Ceylon and the East Indies. *S. africanus* and *S. dumicola* are known also to occur south of the Zambesi (SAVORY 1928).

Clubionidae.

Olios sp., fairly frequent. Nests in low growing bushes, hedges, etc. Prey 29. 11. 50: *Schizonycha profuga, S.* sp. and *Serica,* Cetoniidae and Diptera. DAVIS (1919) recorded spiders as enemies of May beetles (*Phyllophaga* Harris = *Lachnosterna* Hope) in Illinois; *Lycosa hellulo* Wakeman and *Xysticus gulosus* Key attack as truly predaceous species *Ph. implicata* and *Ph. futilis* respectively, whereas *Plectana stellata* Hentz. catches *Ph. fusca* and *Ph. congrua* in the web.

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