

CONTRIBUTION TO THE KNOWLEDGE OF THE INSECT-GALLS OF SIAM.

BY

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INTRODUCTION.

Our knowledge of the plant-galls of Siam is very scanty, and in the literature which stands at my disposal in Buitenzorg I cannot find any description of such plant-diseases from Siam. It may be therefore of interest to give a description of the galls collected by me during a few days trip in that country. Part of this material was collected in the direct vicinity of Bangkok, and part along the railway which connects Bangkok with Malakka.

On September 30th, 1920, I departed, in company with the American botanist, Dr. J. F. Rock, from Alor Star for Bangkok Noi. This is a three days journey through a very monotonous country, consisting almost entirely of dry or swampy grass plains intermixed with thin forests of *Leucodendron* and coastal marshes. Only in the surroundings of Tung Song were there hills covered with forest. We stopped at a number of small railway stations which are mostly surrounded by grass and shrub jungles.

During halts at stations I had an opportunity to jump out of the car and to collect what was growing in the direct vicinity of the railway. Twenty-two galls were collected in this way, directly labelled and dried or partly preserved in alcohol.

In Bangkok I stayed ten days. The surroundings of this capital consist chiefly of cultivated country. The real virginal forest does not grow near the city and in a few places only are there remnants of the old flora. Dr. A. Kerr was so kind as to accompany me on some collecting trips and I wish to express hearty appreciation of the assistance given me by him. Especially round an old temple, Wat Lum, in the dense shade of old *Dipterocarpus* trees I was able to make a small collection of galls which have some resemblance to the galls of virginal forest.

My collection, consisting of 37 different galls, cannot of course give more than an idea of the gall-flora of a country so rich in plants. Undoubtedly it will be easy to collect hundreds more in the uncultivated parts of the Kingdom.

Most galls were found in open places among shrubs and hedges and only a few, as mentioned above, in shady places. In connection herewith it was to be expected that the greatest part of the galls would be formed by the action of gallmites and only a few by tonids. In a former publication⁽¹⁾ on the galls of Java (in which country at the present time about 1000 different galls are known to me) I drew attention to the fact that generally the juicy gnat-galls abound in the moist virgin forests while in drier regions mite-galls prevail. Among the 37 gall producers there are 19 gall-mites, 5 gall-midges, 7 thrips, 3 moths, 2 jumping-lice and one plant-louse.

The literature cited consists chiefly of articles from my hand on the galls of Java; they are mentioned as Java, Beitrag, etc., they appeared partly in the periodical "Marcellia" edited by Prof. A. Trotter, Avellino, Italy, partly in the "Bulletin du Jardin Botanique de Buitenzorg." The illustrations are by the native draughtsman Hoesen, and show the galls in their natural size. Of the thripsgalls I collected 7 different kinds. The thrips are now in the possession of Dr. H. Karny, the well-known writer on this group of insects. Some of the thrips collected are known from Java but others are new to science. The description of this material will appear later in this Journal.

Below follow the descriptions of the cecidia, those not yet described have been marked by an asterisk.

DESCRIPTION OF THE GALLS.

No 1. *Acacia leucophloea* Willd.

Fam.: Leguminosae-Mimosaceae,

This is an acarid-gall caused by *Eriophyes acaciae* Nal.

It is common in Java and mostly abundant on the infected trees. The material collected by me was part of a small tree without flowers, the determination of this specimen is therefore not quite

(1) W. und J. Docters van Leeuwen-Reynvaan. Einige Gallen aus Java. Sechster Beitrag. Bulletin du Jardin botanique de Buitenzorg. Série II, No. III, 1912, page 2.

sure. But the gall is in all points identical with the galls collected in Java by me.

They are only about $1\frac{1}{2}$ -2 mm. in extent and developed on either side of the small leaflets, so as form a tiny elongated or ball shaped exerescence. The surface is glabrous. Inside there exists a chamber with exerescences from the inner wall, such as is often found in acarid-galls. This chamber has an aperture on the under-surface. The wall is covered with white unicellular and unbranched hairlets.

South-Siam. Wong Pong, 2/X 1920. Herb. 4748.

Literature : Java. Beitrag III. Marcellia IX. 1910. No. 91. p. 37.

No 2. *Allophylus cobbe* Bl.

Fam : Sapindaceae.

Leafgalls caused by an acarid : *Eriophyes allophyleus* Nal.

A very common gall in Java and Sumatra everywhere this polymorphous plant occurs. Towards the upper surface of the leaf develop small flat vesicles mostly of a yellow colour, The bladders are irregular and from 1-4 mM. in diameter. The under surface is covered with an erineum, consisting of long unicellular and unbranched hairlets.

Bangkok. Wat Lum. 9/X 1920. Herb. 4778.

Literature : Java. Beitrag IV. Marcellia IX. 1910. No 151. p. 168.

*No 3. *Azima sarmentosum* Benth.

Fam : Salvadoraceae.

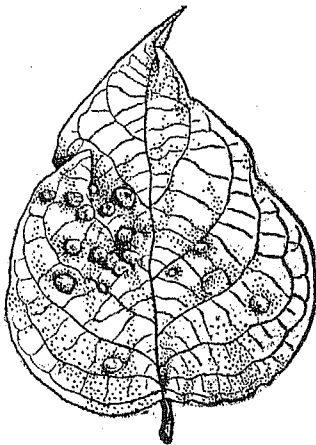


Fig 1. A leaf of *Azima Sarmentosum* Roxb. ; with mite-galls.

Leafgall caused by a gallmite. This gall is common on this plant which grows on uncultivated grounds and along roadsides. On the upper surface of the leaf there are little discs which are slightly convex, or flat semiglobular exerescences. See figure 1. On the under surface of the leaf they have the same disc-like form or they may be far less developed. But in the middle there is always a short chimney or funnel giving access to the larval cavity tenanted by hundreds of gallmites. The innerwall of the cavity and

the exterior are glabrous. In the cavity there are however developed several excrescences which are attached on the upperside of the chamber.

South-Siam, Pran, 2 Oct. 1920. No. 4746; Bangkok, 3 Oct., 1920. No. 4753.

*No 4. *Barringtonia acutangula* Geartn.

Fam: Lecythidaceae.

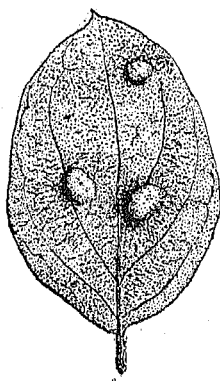
Leafgalls caused by a gallmidge. In Java we have found a similar gall, also caused by a gallmidge, on the leaves of *Barringtonia spicata* Bl. The galls form small circular flat swellings on both sides of the leaves. On the upper side of the leaf these swellings are only very low, they are more developed on the underside. These small excrescences are formed by the action of usually three larvae, which live each in a very small chamber, lying near the centre of the gall.

Bangkok, Wat Lum. 7 Oct. 1920. No. 4768.

Literature: Java. Beitrag III. Marcellia IX. 1910. No. 99 p. 41.

*No. 5. *Carissa carandas* L. (syn. *Archina carandas* Schum.)

Fam: Apocynaceae.



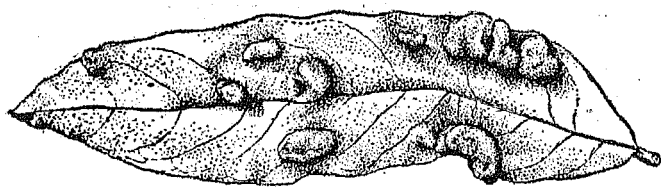
Leafgall caused by a gall-mite. This gall forms small flat bladders on the upperside of the leaf, (see figure 2). They are mostly circular or ovoid; 2-4 mm. long and broad and only $\frac{1}{2}$ mm. high; on the undersurface of these bladders there are developed thin and long excrescences which fill the cavity and are covered with stiff pointed hairs, consisting of 2-3 cells.

Fig 2. A leaf with mite-galls of *Carissacarandas*. L.

South-Siam. Wang Pong. 20 Oct., 1920. No. 4747.

*No. 6. *Combretum trifoliatum* L.

Fam: Combretaceae.

Fig. 3. A leaf with gall-mite galls of *Combretum trifoliatum* Lent.

Leafgall caused by a gall-mite. The plant on which this and the following gall were collected was not in bloom therefore it is not possible to name it with surety. But this gall resembles so strikingly a not yet described gall found by me near Batavia on this *Combretum* species, and the leaves are so alike the leaves of *Combretum trifoliatum* that I feel sure that the galls belong to the above named plant.

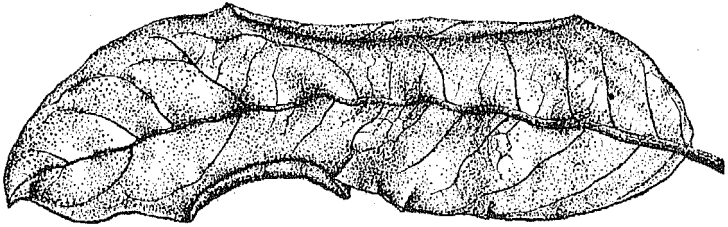
The galls are small but high bladders on the surface of the leaf mostly of a yellow colour, slightly incurved at their base. They measure 4-10 mm. and are mostly irregular and ovoid. They are often so closely attached to each other on one leaf that this may be curved and wrinkled. (See figure 3).

At the undersurface of the leaf there is a wide opening giving entrance to the inside of the bladder. The wall is not thickened but covered with a dense white erineum consisting of long unicellular pointed hairs with a relatively thick wall.

South-Siam, Rajburi, border of a lake or of an overflown rice-field. 2 Oct. 1920. No. 4749.

*No. 7. *Combretum trifoliatum* L.

Fam: Combretaceae.

Fig. 4. A leaf with mite-galls of *Combretum trifoliatum* Vent.

Leafgall caused by a gall-midge. The border of the leaf is partly or totally rolled; this rolling is developed to the undersurface and often the leafborder contracted and convex, as may be seen in the figure 4 of this gall. The gallechamber is only a thin canal, tenanted by tiny of white gall-midge-larvae.

South-Siam, Rajburi, border of a lake or an overflown rice-field. 2 Oct., 1920. No. 4750.

No. 8. *Cordia myxa* L.

Fam: Borraginaceae.

Leafgall caused by a gall-mite: *Eriophyes cordiae* Nal. On the uppersurface of the leaf are developed irregular round bladders, mostly of a yellow colour. They are 2-5 mM. in diameter. There may be found specimens which are developed in the opposite direction, *i.e.*, in which the bladder is on the nether surface. The underside of the gall is covered with a dense white erineum consisting of long frilled and twisted multicellular hairs. A very common gall, already described from Java and Celebes. (Under the name of *C. Suarcolens* Bl.),

Bangkok, in a Garden, 4 Oct., 1920. No. 4754.

Literature: Java. Beitrag V. Marcellia IX, 1910. No. 161 p. 174;
Celebes, Bulletin. Serie II. No. XXI. 1916. No. 14.
p. 28. Figure 14.

No. 9. *Crotalaria Subtiana*, Andt.

Fam: Leguminosae-Papilionaceae.

A stem-gall caused by a moth, *Graphobita subrufillana*. Snellen. The stems distend into short fusiform galls. Their length varies between 1-3 cm, with an elevation up to 1 cm. They are mostly situated at the termination of the twig, because the growth of the growing point of the twig is often arrested after the infection. The anatomy and biology of this gall was also investigated by us. The nourishment for the caterpillar is supplied by a callustissue growing into the cavity.

Also collected and described from Java.

Bangkok, 5 Oct. 1920. No. 4755.

Literature: 1) Java. Beitrag I. No. 3. Marcellia VIII. 1909. p. 24.

Fig. 3.

2) Ueber die Entwicklung und Anatomie einiger Markgallen und über Kallus. Recueil d. Trav. bot.

Néerlandais. Vol. VIII. 1911. p. 16.

*No. 10. *Dipterocarpus alatus* Roxb.

Fam: Dipterocarpaceae.

A leafgall caused by a thrips, *Coryphothrips trochiceps*, Karny
n. g. n. sp.

Inquiline: *Gynaikothrips siamensis* Karny. n. sp.

This gall was very common in the vicinity of an old temple near Bangkok. Practically all the young leaves of the seedlings and young plants of this giant tree were badly infected. The margin of the leaf is rolled over the undersurface and often the whole leaf-blade is curved downward and covered with yellow or redbrown spots.

Wat Lum near Bangkok, 7 Oct. 1920, No. 4766 and 9 Oct. 1920, No. 4773.

* No. 11. *Elytranthe globosa* (Roxb) Engl.

Fam: Loranthaceae.

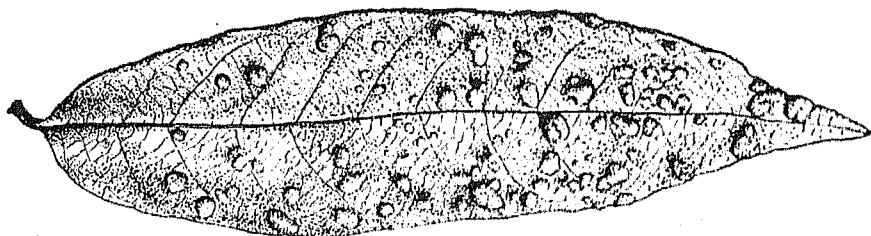
Fig. 5. A leaf of *Elytranthe globosa* Eng. galled by an aphid.

A leaf-gall caused by an Aphid. The young leaves are curved upwards like the sides of a boat; the margins of the rolled leaves meet over the middle. (See figure 5). In addition the leaf-blade is slightly thickened and silvery-grey on the outside. As the growth gets older the margins unroll of their own accord, so that the animals can easily leave their dwelling place. I have found this gall in Buitenzorg, Java, but up till now it has not been described.

South-Siam, Chaiya, shrub-jungles. 1 Oct. 1920. No. 4741.

* No. 12. *Euphorbia* spec.

Fam: Sapindaceae.

Fig. 6. A leaf of *Euphorbia* spec. with mite-galls.

A leafgall caused by a gallmite. The galls are irregular bladders 2-6 mm. in diameter which resemble the galls on *Combretum trifoliatum* Vent. (See No. 6), but they are not so large. (See fig. 6). The bladders are about 3 mm. high and mostly of a yellow colour. The underside of the bladder is covered by a velvety erineum, which consists of unicellular and tiny hairs.

Bangkok, Wat Lum, shady places. 7 Oct. 1920. No. 4764.

No. 13. *Ficus Benjamina* L.

Fam: Moraceae.

A leafgall caused by a physapod. A very common gall all over the tropics. Both parts of the leafblade are folded upwards so as to form a small but broad chamber. The main nerve forms the backside of the gall and is slightly curved. The leaf remains smaller than the normal leaf and is covered with dark, almost black spots. Inside the galls, which I have collected in Siam the following species of physapod were living. Probably *Gynaikothrips Uzeli* Zimm. is the gallformer; the other ones only inquilines: *Gynaikothrips* nov. spec. (vic. *convolvens*) and *Androthrips mulastomae* Zimm.

Bangkok, 3 Oct. 1920. No. 4753.

Literature: 1) Java. Beitrag 2, Marcellia VIII, 1909, pag. 96. No. 39.

2) H. Kary und Docters van Leeuwen-Reynvaan. Ueber die Javan. Thysanopterococcidien und deren Bewohner. Bulletin Jard. bot. de Buitenzorg, Série 2. No. X. 1913. p. 7. No. 5. fig. 2.

No. 14. *Ficus glomerata* Roxb. var. *chittagonga* Kurz.

Fam: Moraceae.

Leafgall caused by a psyllidae. A very common gall in Java and Celebes. On the uppersurface of the leaf are developed irregular ball-shaped or oval excrescences of a light green colour, about 4 mM. broad and high. On the undersurface there is only a small outgrowth with an opening, which gives access to the gall-chamber tenanted by a psyllid larva. The galls which were found in Java and Saleier (Celebes) are developed on the undersurface but as for the rest they are the same as the galls collected in Bangkok.

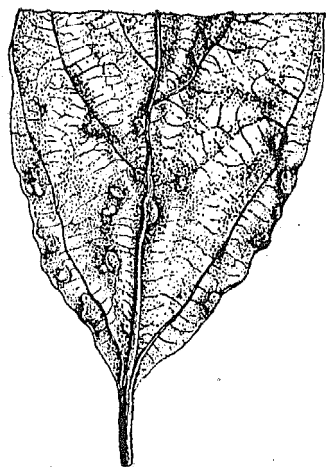
Bangkok, Riverside, Klong Bangkok Noi. 9 Oct. 1920. No. 4775.

Literature: Java. Beitrag IV, Marcellia IX. 1910. p. 179. No. 172 Fig. 71.

Celebes. Bull. Jard. bot. Série II. No. XXI. p. 30. No. 22.

* No. 15. *Ficus glomerata* Roxb. var. *chittagonga* Kurz.

Fam: Moraceae.



Leafgall caused by a gallmidge. There are very flat excrescences on both sides of the leafblade; about 3 mm. or less in diameter. See figure 7. The surface of the gall is glossy with a yellow or reddish hue. Inside there is a very small larval chamber tenanted by a gallmidge—larva; the grown animals leave their chamber through a tiny opening on the underside of the leaf. They were abundant on one tree growing on the border of a canal.

Fig. 7. A part of a leaf with gallmidge galls of *Ficus glomerata* Roxb.

Bangkok, Klong Bangkok Noi, 9 Oct. 1920. No. 4781.

* No. 16. *Ficus heterophylla* L.

Fam: Moraceae.

A leafgall caused by a gallmite. This gall closely resembles the mite-gall so prevalent on the leaves of *Ficus ampelas* (Burm 1) in Java and caused by *Eriophyes ravaeus* Nal. The galls are tiny excrescences on both sides of the leaf-blade about 1 mm. in diameter and 1 mm. high. On the upperside they are more or less spherical, on the underside of the leaf coniform and on this side the orifice is developed.

Bangkok, Wat Lum, shady places. 9. Oct. 1920. No. 4774.

Literature: Java. Beitrag III. Marcellia IX. 1910. No. 107. p. 44.

No 17. *Ficus hispida* L. fl.

Fam: Moraceae.

A leafgall caused by a gallmite. The same gall was found by me on the same *Ficus* in Sumatra (already described but under the

erroneous name of *Ficus hirta* Vahl), on Krakatau and in the botanical Garden of Penang. In Java where this plant is very frequent I did not find one single gall. Also Ruebsaamen mentions, a similar gall-growth on *Ficus* spec. of Pulu Weh near Sumatra. The galls appear as light-green, granular, accumulations on the underside of the leaf. They are sometimes small but mostly they form irregular, large patches on the leafblade. On the upperside of the leaf they are slightly concave and of lighter colour than the leaf itself. They consist of irregular excrescences in the form of a callus-tissue; these growths leave openings and channels for the animals to live in.

Bangkok. Wat Lun. 7 Oct. 1920. No. 4747

Literature: Beschreibungen von Gallen aus Sumatra und Simaloeer. Bull. Jardin. bot. de Buitenzorg. Série II. No XXI. 1916. p. 8. No 13.

Ruebsaamen. Gallen aus Afrika und Asien. Marcellia X. 1911. No 40. p. 129.

No 18. *Ficus retusa* L.

Fam. Mcraceae.

A leafgall caused by a physapod. The same gall as the already described on *Ficus Benjamina* L. (See No 13), but the surface is more reddish brown. Inside there live different species of thrips but very young galls are only tenanted by one animal; this proved to be *Gynaikothrips Uzebi* Zimm. This species will probably be the cause of the deformation, the other ones which are often very abundant are the inquilines. Especially *Gigantothrips elegans* Zimm. is very prevalent and often attached to the exterior of the gall. *Mesothrips jordani* Timm. and *Leptothrips constrictus* Karny lived also in the galls.

A very common gall all over the tropics.

Bangkok, 9 Oct. 1920. On 4772.

Literature see under *Ficus Benjamina* L. (No 13).

No 19. *Fluggea microcarpa* Bl. (= *Fl. virosa* Baill.)

Fam: Eupholiaceae.

Leafgall caused by a gallmite. A very common gall in the tropical countries. On the upper or undersurface very small excrescences of a yellow or reddish colour, and not more than 1 mm. in

diameter. On the opposite surface there is only a very small aperture giving access to the central cavity.

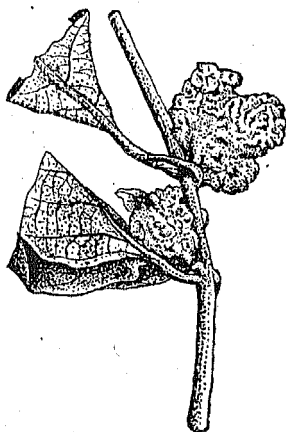
South-Siam, Surasthra Dani, 1 Oct. 1920. No 4736;

Bang-Saphan-Yai, 2 Oct. 1920. No 4744.

Litature: Java. Beitrag II. Marcellia, Vol. VIII, 1909
pag. 98. No 43.

* No 20. *Hymenodictyon parvifolium* Oliver?

Fam: Rubiaceae.



Leafgall caused by a thrips. These galls resemble the thripsgall on *Aporosa microcalyx* Bl. which is common in Java. This infection assumes the shape of closely strewn lightgreen bladders impeding the full development of the leafblade; mostly anostomosing or conglomerating laterally so as to form compact bunches. See figure 8. They are 10-20 mm. in diameter.

Fig. 8. Two thrips-galls of *Hymenodictyon parvifolium*

The name of the plant is not sure, but the material resembles specimens collected in Cochin-China.

The galls were tenanted by two species of physapods. *Euthrips* nov. spec. (vic. *atavus* and *Hapllothrips inquilinus* Priesner.

Literature: Java, Beitrag VII. Bull. XV. 1914. No 359. pag. 6.

No 21. *Loranthus pentandrus* L.

Fam: Loranthaceae.

Stemgall caused by a moth. These are spindle shaped swellings of the young stem about 15-20 mm. long and with a longitudinal larval chamber. This gall is very prevalent also in Java and already described.

Bangkok. 8 Oct. 1920. No 4769.

Literature: Java. Beitrag IV. Marcellia IX. 1910. Pag. 186,
No 186. Figure 76.

No. 22. *Melastoma malabathricum* L. (= *H. polyanthum* Bl.)

Fam: Melastomaceae.

A leafgall caused by a thrips. Already known from Java.

The leafblade is folded or rolled upwards along the main-nerve and the two lateral nerves, forming long chambers. The exterior is mostly yellow or red coloured.

There are mostly more than one species of physapods inside the gall, so that the real gall former is not yet known. In this material Dr. Karny discovered: "*Mesothrips jordani* Zimm, *Gynaikothrips chaviceae* in large numbers and one specimen of *Androthrips melastomae* Zimm.

South-Siam, Klong-Chang, 1 Oct. 1920 No. 4738.

Literature: Java. Beitrag I. Marcellia VIII. 1909, pag. 108. No. 69.
fig. 38.

No. 23. *Melothria* spec.

Fam: Cucurbitaceae.

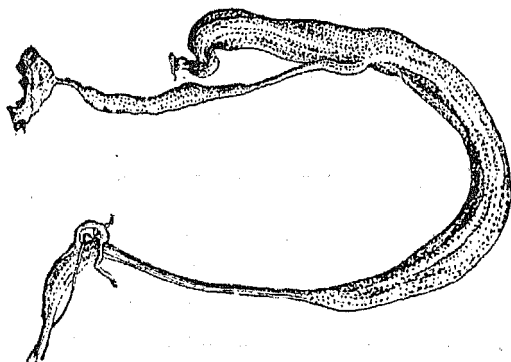


Fig. 9. Stem-gall of *Melothria* spec.

A stemgall caused by a gall-midge. A similar gall is common in Java. The young twig and sometimes the leaf-stalks are developed into elongated plurilocular galls. See figure 9. The infected parts may become curved. Internally long larval-chambers are perceived. I found two specimens on the same spot. One was of a green colour, the second dark red. It is possi-

ble that they developed on two different species of Melothria, but not being in flower they could not be identified.

Bangkok, Wat Lum, 9 Oct. 1920. No. 4776 and 4777.

Literature: Java. Beitrag I. Marcellia VIII. 1909. pag. 29. No. 13.
fig. 8.

No. 24. *Nephrolepis exaltata* Schott. var. *monstruosa*.

Fam: Polypodiaceae.

A leafgall caused by a gall-mite: *Eriophyes parvopus* Nal.

A very common gall all over the tropical countries; the galls are mostly to be met with along the frond edges. They are globular or pyriform protuberances, and often constricted at the base. At the distal end there is an orifice giving access into a gall-cavity, divided into numerous compartments, by excrescences proceeding from the inner wall, which is pilose with branched multicellular hairlets. A full description is to be found in my study of these galls published in the Annales du Jardin bot. de Buitenzorg. Vol. XXXI. 1920.

Bangkok, in a garden. 3 Oct. 1920. No. 4751.

Literature: Java. Beitrag I. Marcellia. VIII. 1909. No. 16. pag. 31.
figure 11.

No. 25. *Pluchea indica* Less.

Fam: Compositae.

A leafgall caused by a gallmite: *Eriophyes micropus* Nal.

A very common gall on this plant of the coastal-marshes, known from Java and Celebes. On both sides of the leaf the gall is developed as circular flat or semiglobular yellow excrescences. The orifice is developed on the upper or on the undersurface of the gall; inside there is a larval chamber with pluricellular hairs.

South-Siam, Tachang, 1 Oct. 1920. No. 4739; Bangkok, 5 Oct.
1920. No. 4756.

Literature: Java. Beitrag IV. Marcellia IX. 1910. No. 193. p. 189.

No. 26. *Ruellia repens* L. (syn. *Dipteracanthus lanceolatus* Nees).

Fam : Acanthaceae.

A leafgall caused by a gallmite: *Eriophyes stereothric* Nal.

A very prevalent gall in tropical countries. On the upper-side of the leaf small oblong bladders of a dark green or purple colour. On the underside this bladder is covered with a dense erineum, consisting of multicellular, branched hairlets.

South-Siam, Patalung, 30 Sept. 1920. No. 4729.

Literature: 1) Java. Beitrag II. Marcellia VIII. 1909 p. 114. No. 81. fig. 45.

2) Erste Mitteilung über einigen Gallen aus Celebes und den Inseln südlich davon gelegen. Bull. d. Jard. bot. Buitenzorg, Série II. No. XXI p. 42. No. 59. fig. 59.

No. 27. *Salacia* spec.

Fam : Hippocrateaceae.

A leafgall caused by a thrips: *Gynaikothrips claripennis* Karny.



Fig. 10. A leaf galled by thrips of *Salacia* spec.

A similar leafgall caused by the same animal was found in Java. Both parts of the leafblade are curved and rolled upwards so that the borders reach each other. The surface of the gall is rough and covered with small wrinkles. See the accompanying figure 10.

South-Siam. Petalung, 30 Sept. 1920. No. 4730.

Literature: Java. Beitrag VII. Bulletin. Série II. No. XV. 1914. pag. 51. No. 487.

No. 28. *Sandoricum indicum* Cav.

Fam : Meliaceae.

A leafgall caused by a gallmite: *Eriophyes sandorici* Nal.

Prevalent in tropical countries, and occurring almost on every tree. Found by me in Java, Sumatra, Celebes, and Malakka. On

the upperside of the leaf are developed big bladders of a dark green, afterwards yellow colour. The underside of these excrescences is clothed with a dense erineum consisting of long, straight hairlets.

South-Siam, Langsuen. I Oct. 1920. No 4743;

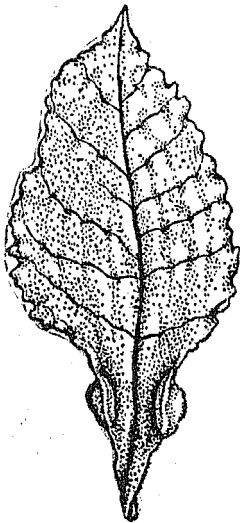
Bangkok, 5 Oct. 1920. No 4757.

Literature: Java. Beitrag VII. Bulletin. Série II. No XV. 1914.

p. 51. No 488.

No 29. *Sonneratia acida* L. fil.

Fam: Sonneratiaceae.



A leafgall caused by a lepidopteron. See figure 11. The gall is developed on the border of the leaf, mostly near its base. They resemble in form and size a wheat grain and are about 5 mm. long and 1 mm. thick. Inside there is a larval chamber tenanted by a caterpillar. Also collected in Java.

Fig. 11. Leaf of *Sonneratia acida* L. fil. with two galls caused by a lepidopteron.

Bangkok, Riverside, 5 Oct. 1920. No 4758.

Literature: Java. Beitrag III. Marcellia IX. 1916. pag. 58. No 144.

* No 30. *Trewia nudiflora* L.

Fam: Euphorbiaceae.

A leafgall caused by a psyllid. This gall has been collected in Java, but it has not yet been described. They are yellow bladders on the upperside of the leaf, which are contracted at their base, so

that there is only a small opening on the undersurface of the leaf. They are of a yellow colour and their wall is thin so that the larval-chamber is almost globular and spacious.

Bangkok. Wat Lum. shady places. 9 Oct. 1920. No 4783.

* No 31. *Vanqueria spinosa* Roxb (?)

Fam: Rubiaceae.

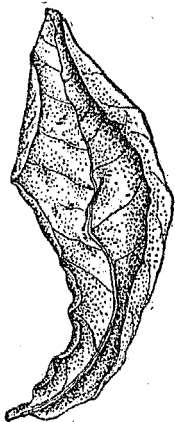
A leafgall caused by a gallmite. The twigs and leaves belong probably to the above named shrub, but flowers and fruit being not present, identification was not quite sure. The gall is the same as that collected on the same plant in Java. The galls are small bladders on the upperside of the leaf, slightly contracted at their base. The surface of the gall and also that of the gallechamber is covered with a thick hairgrowth.

South-Siam. Tung Song. 30 Sept. 1920. No 4782,

Literature: Beitrag VI. Bull. d. Jard. bot. Série II. No III. 1912.
pag. 47. No 337. Fig. 150.

* No 32. *Vernonia elaeagnifolia* DC.

Fam: Compositae.



A leafgall caused by a thrips: *Gynaikothrips* nov. spec (vic. *G. chaviacae* and *longiceps*). The border of the leaf is rolled upwards so as to form a long chamber. (See the accompanying figure 12), wherein the insects live in all stadia of development. Mr. Karny the well-known thysenopterologist tells me that this gall is formed by a new species of *Gynaikothrips*, which will be described later.

Fig. 12. A leaf with thrips-galls of *Vernonia elaeagnifolia* D. C.

South-Siam. Takhoi, 1 Oct. 1920. No 4738.

* No 33. *Vernonia elaeagnifolia* DC.

Fam: Compositae.

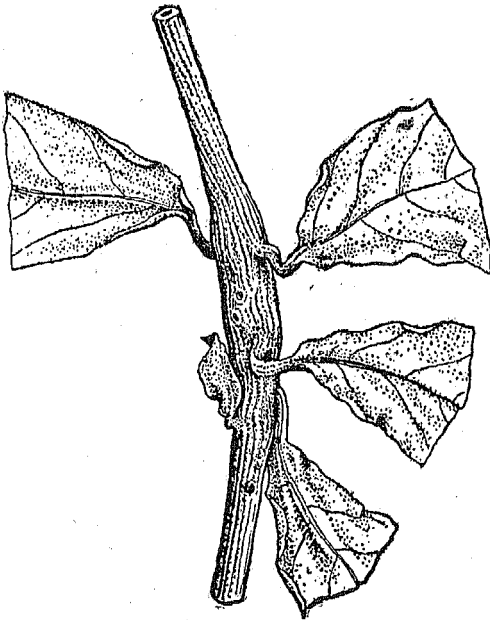


Fig. 13. A stem of *Vernonia elaeagnifolia* D.C. galled by a dipteran.

A stemgall caused by a dipteran. The stems are slightly swollen and the internodia shorter, so that the leaves remain near each other (see the figure 13). The growing point is not damaged by the gall and grows farther, forming a normal stem and leaves. Inside there are one or more longitudinal larval chambers each tenanted by the larva of a fly. I found this gall too in the neighbourhood of Saigon.

South-Siam, Nong Wai. 1 Oct., 1920. No. 4742. Bangkok,
12 Oct., 1920. No. 4784.

No. 34. *Vitex pubescens* Vahl.

Fam: Verbenaceae.

A leafgall caused by a gallmite: *Eriophyes cryptotrichus* Nal. A common gall collected in Java, Sumatra, Malakka and Cochin-China. On the upperside of the leaf there are small yellow or dark-green bladders. About 2-3 mM. in diameter. The underside of these bladders is clothed with a thick erineum.

South-Siam. Ban Lam Node. 30 Sept., 1920. No. 4731;
Ban Nak 1 Oct., 1920. No. 4735.

Literature: Java. Beitrag VI. Bull. d. Jardin bot. d. Buitenzorg.
Série 2, No. III. 1912. pag. 49. No. 342. Fig. 153.

* No. 35. *Vitex* spec.

Fam: Verbenaceae.

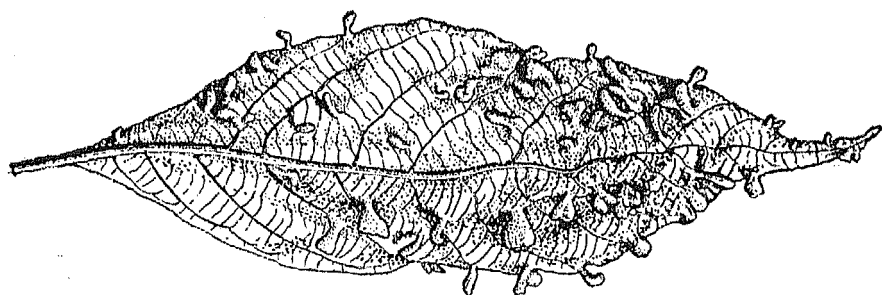


Fig. 14. A leaf with gull-mite galls of *Vitex* spec.

Leafgall caused by a gallmite. This gall closely resembles an acarid-gall on the leaves of *Vitex heterophylla* in Java. On the undersurface of the leaf are developed quite a number of conical or club shaped excrescences; densely covered with white hairlets, so that the galls have a greyish colour. See figure 14.

On the upperside of the leaf, there are only tiny hairy pustules with a small orifice in the centre. Often two galls are grown together longitudinally so as to form a club with a broad stalk.

The galls were plentiful on a shrub near the railway station, but there no flowers, so that it was impossible to identify the material.

South-Siam, Surasthra Dani, 1 Oct. 1920. No 4737 ;

Bang-Saphan-Yai. 2 Oct. 1920. No 4745.

Literature: Java. Beitrag 5. Marcellia X. 1911. pag. 90. No 249.

No. 36. *Wedelia biflora* DC.

Fam: Compositae.

A leafgall caused by a gallmite. Common on the tropical beaches and saltwater marshes.

I have seen this gall-growth in Java, Sumatra, Celebes, Krakatau, Malakka, Siam and Saigon. The galls develop principally on the undersurface of the leaf, among the ramification of the veins. On the upperside they are hardly visible. On the underside on one side of the top of the gall there is an aperture giving access to the gallell.

Bangkok, 9 Oct. 1920. No. 4771.

- Literature: 1) Java. Beitrag VI. Bullertin. Série II. N. III. 1921. No. 349. pag. 51.
 2) Gallen aus Celebes etc. Idem. No. XXI. 1916. No. 70.
 3) The galls of Erakatau in 1919. Annales du Jardin botanique de Buitenzorg. Vol. XXXI. 1930. p. 81. No. 23. fig 23.

* No. 37. *Wrightia mollissima* Wall.

Fam: Apocynaceae.

A leafgall caused by a gall-mite. This gall closely resembles the gall-growth on *Wrightia javanica* DC. collected in Java. On the uppersurface of the leaf there are developed semi-ball shaped excrescences about 2 mm. in diameter. On the undersurface is a conical outgrowth directed to one side. They are easily recognisable by their light-green colour. Inside there is a spacious gall-chamber with a thin canal coming out on the top of the conc. This part of the gall and the inner wall of the canal is covered with long white hairlets. This gall was also very common in Saigon.

South-Siam, Chaiya. 1 Oct. 1920. No. 4740.

- Literature: Beitrag 8. Bulletin. Série 3. Vol. I. 1918. pag. 76. No. 698. fig. 698.

Distribution of the gall-bearing plants among the plant-families.

1. ACANTHACEAE.

No. 26. *Ruellia repens* L., acaroccecidium.

2, APOCYNACEAE.

No. 5. *Carissa carandas* L., acaroccecidium.

No. 37. *Wrightia mollissima* Wall acaroccecidium.

3. BORRAGINACEAE.
No. 8. *Cordia myxa* L., acaroccoecidium.
4. COMBRETACEAE.
No. 6. *Combretum trifoliatum* L., acaroccoecidium.
No. 7. " " dipterocecidium.
5. COMPOSITAE.
No. 25. *Pluchea indica* Less., acaroccoecidium.
No. 32. *Vernonia clavagnifolia* DC., thysanopterocecidium.
No. 33. " " dipterocecidium.
No. 36. *Wedelia biflora* DC., acaroccoecidium.
6. CUCURBITACEAE.
No. 23. *Melothria* spec., dipterocecidium.
7. DIPTEROCARPACEAE.
No. 10. *Dipterocarpus alatus* Roxb., thysanopterocecidium
8. EUPHORBIACEAE.
No. 19. *Flaggea microcarpa* Bl., acaroccoecidium.
No. 30. *Trewia nudiflora* L., psyllidocecidium.
9. HIPPOCRATEACEAE.
No. 27. *Salacia* spec., thysanopterocecidium.
10. LECYTHIDACEAE.
No. 4. *Barringtonia acutangula* Gaertn., dipterocecidium.
11. LEGUMINOSAE-MIMOSACEAE.
No. 1. *Acacia leucophloea* Willd., acaroccoecidium.
12. LEGUMINOSAE-PAPILIONACEAE.
No. 9. *Crotalaria saltiana* Andt., lepidopterocecidium.
13. LORANTHACEAE.
No. 11. *Elytranthe globosa* (Roxb.) Engl., aphidocecidium.
No. 21. *Loranthus pentandrus* L., lepidopterseeccidium.
14. MELASTOMACEAE.
No. 22. *Melastoma malabathricum* L., thysanopterocecidium
15. MELIACEAE.
No. 28. *Sandoricum indicum* Cav., acaroccoecidium.

16. MORACEAE.

No. 13. *Ficus Benjamina* L., thysanopterocecidium.No. 14. *Ficus glomerata* Roxb. var. *chittagonga* Kurz.
psyllidocecidium.No. 15. " " " " Kurz.
dipterocecidium.No. 16. *Ficus heterophylla* L., acaroccecidium.No. 17. *Ficus hispida* L. fil., acaroccecidium.No. 18. *Ficus retusa* L., thysanopterocecidium.

17. POLYPODIACEAE.

No. 24. *Nephrolepis exaltata* Schott. var. *monstruosa*.
acaroccecidium.

18. RUBIACEAE.

No. 20. *Hymenodictyon parvifolium* Oliver.,
thysanopterocecidium.No. 31. *Vangueria spinosa* Roxb., acaroccecidium.

19. SALVADORACEAE.

No. 3. *Azima sarmentosum* Benth., acaroccecidium.

20. SAPINDACEAE.

No. 2. *Allophylus cobbe* Bl., acaroccecidium.No. 12. *Euphoria* spec., acaroccecidium.

21. SONNERATIACEAE.

No. 29. *Sonneratia acida* L. fil., lepidopterocecidium.

22. VERBENACEAE.

No. 34. *Vitex pubescens* Vahl., acaroccecidium.No. 35. *Vitex* spec., acaroccecidium.