

***ANOMIS FRUCTUSTEREBRANS* SP. NOV., A NEW FRUIT-PIERCING MOTH
OF NORTHERN THAILAND, WITH NOTES ON AGRICULTURALLY
IMPORTANT *ANOMIS* SPP. (LEPIDOPTERA: NOCTUIDAE)**

Hans Bänziger*

A B S T R A C T

Anomis fructusterebrans sp. nov., an adult fruit-piercing moth of mountain areas, is described. One of the largest and brownest of all *Anomis* of the region, its wings have more strongly undulating lines than the related *A. nomis* sp. nov. and *A. lineosa* (Walker), besides distinctive genitalia. The piercing mouth parts are compared with those of other *Anomis* and their significance as pests in fruit orchards is discussed.

I N T R O D U C T I O N

Adult moths with mouth parts evolved into a strong piercing proboscis for boring holes into the skin of fruit to suck juice have been the subject of study by the author for well over 12 years in Thailand. The emphasis has been on biology, ecology, proboscis morphology, piercing capability, larval host plants, population fluctuations, economic importance and control possibilities (BÄNZIGER, 1982). Some 86 Noctuidae species have been listed as primary, secondary or suspected piercers of not less than 24 kinds of fruits.

Continued research on the moths involving investigation of both wild and cultivated fruit, especially in mountain areas in northern Thailand, has resulted in the discovery of many more species attacking fruit. New results on biology and ecology will be published later while the present paper describes a new *Anomis* species.

Anomis fructusterebrans sp. nov.

Figs. 1-5

Holotype ♂, THAILAND: Chiang Mai Prov., Chiang Dao, NW Pass, 1150 m, 28.x.1985, Bänziger leg., genitalia slide 2013, in British Museum (Nat. Hist.).

Paratypes. 2 ♂, 1 ♀, ibid. 28.xi.1983 and 28.x.1985, all Bänziger leg., genitalia slides 1643 (in Dept. Entomology, Fac. Agriculture Chiang Mai University) and 2021 3 ♂, 1 ♀, Fang District, Doi Ang Khang, 1450 m, 25. and 26. ix. 1986 all Bänziger leg., genitalia slides 2331, 2333, 2334 (in Bänziger coll.).

*Department of Entomology, Faculty of Agriculture, Chiang Mai University, Chiang Mai, Thailand

Derivation of name. The species is named after the adult's feeding habits, i.e. the piercing of fruit.

Diagnosis. With its size, wing markings and dark brown colouration the species cannot be confused with any other *Anomis* of the region, though the more reddish brown *A. lineosa* and *Anomis* sp. nov. (preliminarily indexed as No.3, currently being described by Dr. J. D. Holloway) come quite near. *A. fructusterebrans* differs from the first in lacking the very evident, pale, more or less straight cross lines on the fore wings, and from the second in the larger size and more pronounced undulation of the cross lines. Genitalic differences are clear as mentioned below.

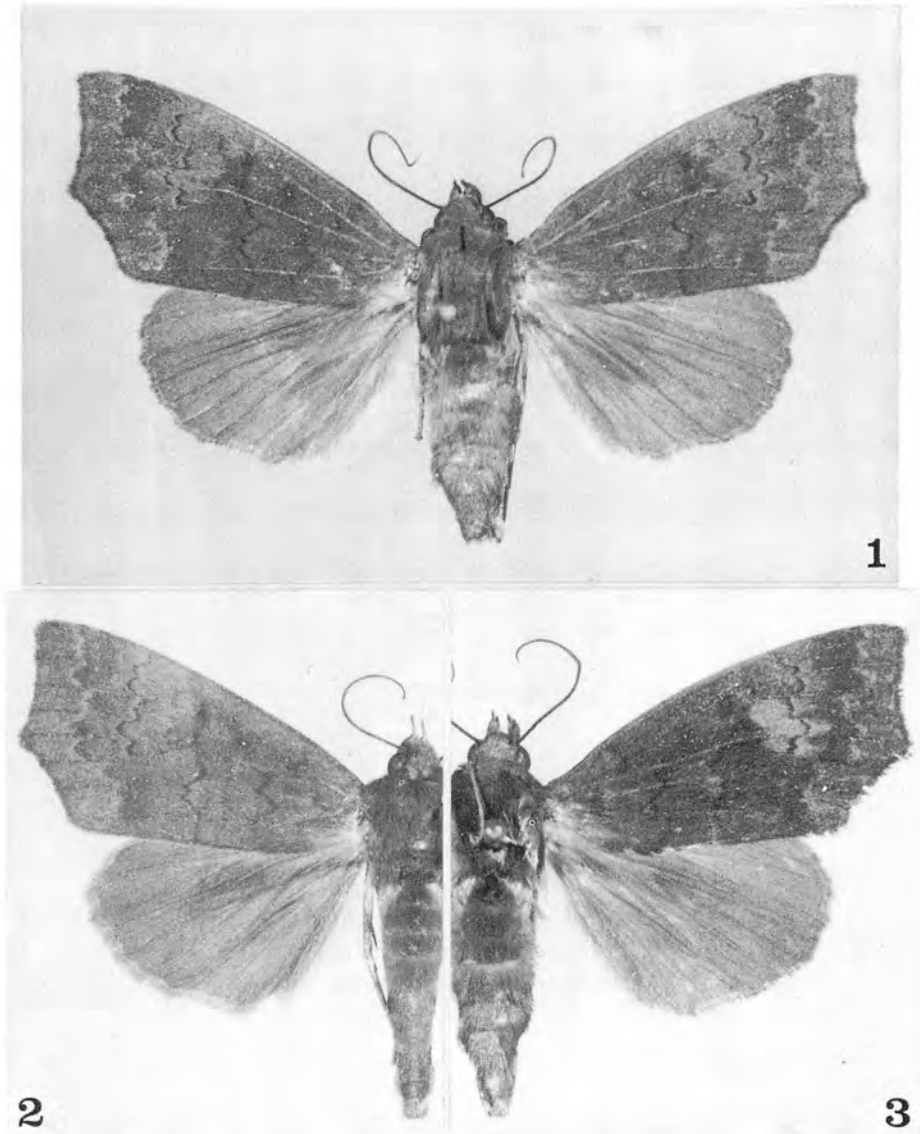
Description. Male (Figs. 1, 3) : Wingspan 47–51 (mean 50.5) mm (*Anomis* sp. nov. : 43–47 mm, *A. lineosa*: 45-50 mm). Body and appendages, except wings and abdomen, dark brown but for the distal half of the fore tibia which is white and for the tip of the hind tibia where there is a white dot. Thorax may have light brown areas. Abdomen light to dark greyish. Fore wing upperside brown to very dark brown with antemedial, postmedial (all dark) and submarginal (pale) lines more strongly undulating, the latter also much better defined, than in the related reddish brown *Anomis* sp. nov. (almost no undulation in the first three pale lines of reddish brown *A. lineosa*). Reniform stigma a faint dark shade. Orbicular stigma with a minuscule white dot in the middle. A light brown area distal to the reniform, and a smaller one more basally, are often but not always presents (Fig.3). Hind wing plain light to dark grey. Underside of fore wing brownish with a dark fleck at costa near the apex where the postmedial is sharply curved before disappearing further distally; a pale area stretches along the marginal excision of the wing. On the hind wing the postmedial is strongly undulating and over half the anal area is pale.

Female (Fig. 2) : Wingspan 52 mm. Overall habitus as in male.

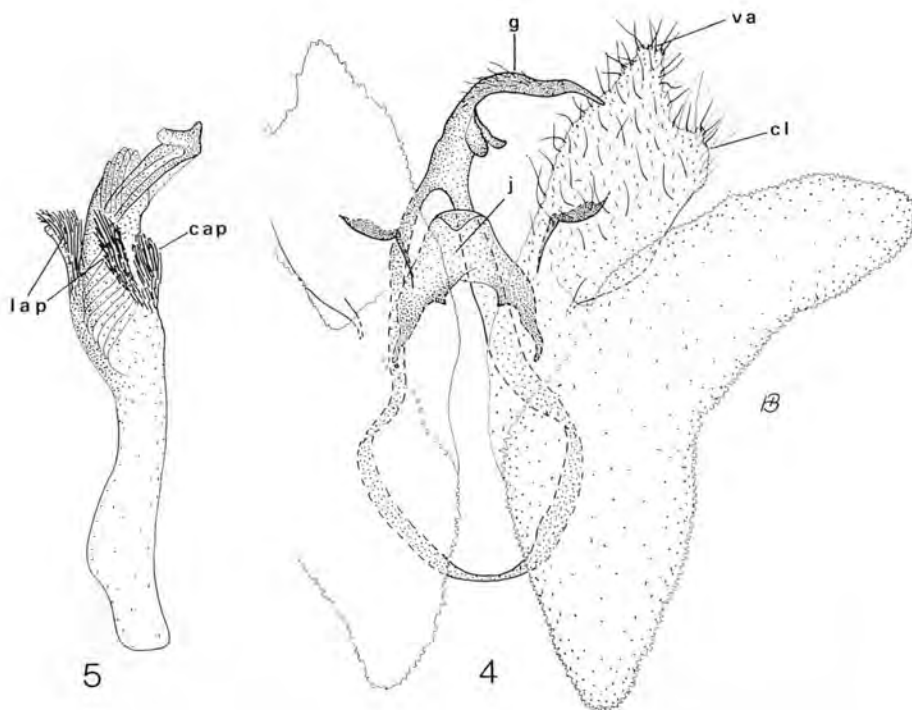
Male genitalia (Figs. 4, 5) : Distinguished from *Anomis* sp. nov. in lacking the two large sclerotized lateral lobes of the juxta; gnathos longer; ventral angle of valve apex longer than costal lobe (costal lobe equal to or more elongate than ventral angle in *Anomis* sp. nov.); aedeagus with the two lateral and the central anellus processes having strong deciduous scales (no scales in *Anomis* sp. nov.). Valve in *A. lineosa* with a sclerotized narrow band lengthwise through the middle ending with a patch of recurved teeth, and the aedeagus with coarsely scaled anellus processes.

Biology. 2 males and 1 female were caught while piercing ripe fruits of *Ficus semicordata* J.E. Smith, along with *Anomis* sp. nov., *A. lineosa*, *A. metaxantha*, *A. fulvida*. Another female pierced a ripe wild persimmon *Diospyros* sp. The immatures are unknown.

Proboscis morphology and significance to agriculture. Each galea of the moth's mouth parts has some 150 barbs which can be erected (inclined forwards and backwards) by blood pressure. But the end portion of the proboscis where it narrows down to the tip is not sclerotized to give it added stability; nor are there any tearing hooks which are important for the boring of a hole in tough skinned fruit; these two features are typical for the more advanced piercing proboscides such as found in *Othreis*, *Calyptra*,



Figures 1-3. *Anomis fructusterebrans* sp. nov. Holotype male (1); paratype female (2); paratype male, genitalia slide 2021 (3).



Figures 4-5. Male genitalia of *Anomis fructusterebrans* sp. nov. with aedeagus (5). cl = costal lobe, va = ventral angle of valve; g = gnathos; j = juxta; cap = central, lap = lateral anellus processes.

ACKNOWLEDGEMENTS

Sincerest thanks are due to Dr. J. D. Holloway, Commonwealth Inst. Entomology, for crucial information about his *Anomis* revision as well as for critically reading the manuscript, and to Mr. A. Bamford, Srinakharinwirote University, Bangkok, who corrected it. prince Bhisadej Rachanee of the Royal project extended facilities while the author's department colleagues, especially Mr. P. Sukumalanan, assisted in various ways.

etc. *A. fructusterebrans* mouth parts come nearest to that of *Scoliopteryx libatrix* L. (cf. also Fig. 19 c, BÄNZIGER, 1970), although in this the lateral edges of the last portion of the proboscis have saw-like crenatures while the edges are even but reinforced in *A. fructusterebrans*.

The general structure is the same as in other *Anomis* found in Thailand (BÄNZIGER, 1982 and in prep.), viz. *flava* L. with the smallest, least sclerotized and shortest erectile barbs; *guttanivis* (Walker), *mesogona* (Walker), *metaxantha* (Walker), *trilineata* (Moore), *metaxantha* (Walker), *trilineata* (Moore) taking an intermediate position; *lineosa*, *Anomis* sp. nov., with more sclerotization and longer barbs; and finally *fulvida* Guenee with the longest barbs though the moth is actually smaller than the new species. With only a moderately specialized proboscis, *fructusterebrans* can safely be assumed to be incapable of piercing longan (*Dimocarpus longan* Lour.) and litchi (*Litchi chinensis* Sonn.) fruits with intact skin, i.e. it cannot cause primary damage to these fruits for which it must be regarded as a secondary fruit piercer only. However, it is probably a primary fruit piercer of soft and thin skinned citrus which the moth is likely to be able to pierce at intact spots. It is obviously a primary fruit-piercing species with regard to peach (*Prunus persica* Batsch) and fruit with comparable skin strength, to which also *F. semicordata* belongs, as well as of all other, softer skinned fruit. The above is true also for *Anomis* sp. nov. which was in fact seen piercing intact *F. semicordata* and peach, and kaki (*Diospyros kaki* L.) at a spot with broken skin.

The damage to cultivated fruit can be regarded as small, at least at present, since *A. fructusterebrans* is quite scarce and localized, and *Anomis* sp. nov. is not very common though it is also present in fruit growing areas in the mountains. However, the overall damage caused by all *Anomis* species taken together could be significant, especially in hill areas where they seem to replace the essentially lowland species of *Othreis*, *Rhytia* and *Eudocima*. The other 7 species of *Anomis* found in Thailand, and their primary/secondary damage caused to fruit, were mentioned above and in BÄNZIGER (1982).

In Nepal *A. flava* and *A. metaxantha* pierced berries of *Rubus acuminatus* Smith and *A. mesogona* also pierced peach and plum (*Prunus domestica* L.) (BÄNZIGER, in preparation). In Japan NOMURA & HATTORI (1967) found *A. commoda* (Butler), *A. flava* and *A. mesogona*, while in Africa (Ghana) COTTERELL (1940) reported *A. leona* (Schaus) and *A. microdonta* Hampson as fruit piercers though without indication as to what type of damage was caused to the fruit. In Papua New Guinea *A. flava* was frequent on *Ficus calopilina* Diels and Panama berry (*Muntinja calabura* L.) (BÄNZIGER, unpublished).

In Thailand caterpillars of *A. flava* and *A. fulvida* were reared from cotton (*Gossypium* sp.) and an unidentified malvaceous herb, respectively (BÄNZIGER, unpublished). PHOLBOON (1965) mentions larval *A. flava* from Chinese hibiscus or shoe flower (*Hibicus rosa-sinensis* L.) and also from cotton. Hence it would seem that the main host plants of the *Anomis* larvae may belong to the Malvaceae. *A. flava* is one of the relatively few fruit-piercing moth species of which both the adult and the immature are pests of cultivated plants.

REFERENCES

- BÄNZIGER, H. 1970. The piercing mechanism of the fruit-piercing moth *Calpe* (*Calyptra*) *thalictri* Bkh. (Noctuidae) with reference to the skin-piercing blood-sucking moth *C. eustrigata* Hmps. *Acta tropica* (Basel) 27 : 54-88.
- BÄNZIGER, H. 1982 Fruit-piercing moths (Lep., Noctuidae) in Thailand : A general survey and some new perspectives. *Mitt. schweiz. ent. Ges.* 55 : 213-240.
- COTTERELL, G.S. 1940. Citrus fruit-piercing moths—summary of information and progress. 3rd W. Afr. Agric. Conf. Nigeria (1938), p.11-24.
- HOLLOWAY, J.D. (in preparation). A review of the subgenus *Rusicada* Walker of the genus *Anomis* Hübner (Lepidoptera: Noctuidae).
- NOMURA, K. & I. HATTORI. 1967. Fruit-piercing moths and their control in Japan. *Kontyu* 35 : 312-322 (in Japanese).
- PHOLBOON, P. 1965. *A host list of the insects of Thailand*. Dept. Agr., Royal Thai Govt., 149 pp.