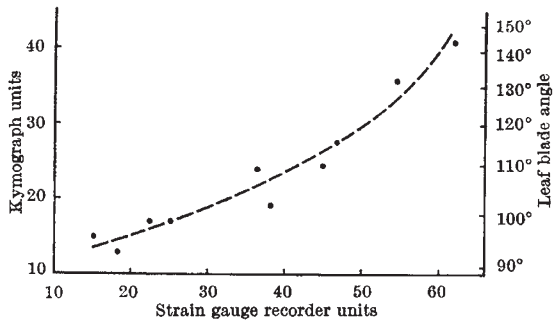

Fig. 3. The curve shows the relation between strain gauge record and kymograph record taken simultaneously from same leaf. Actual leaf angle is given at the right. Horizontal position is given a value of 90° and vertical down position is given a value of 180°. Dotted line depicts the ideal correlation curve

bean. A kymograph was also attached to the same leaf and four days of records were obtained. The kymograph recorded the leaf movements by means of a leverage system that had the leaf attached by means of a thread to one end and a pen to the other end. The pen produced a permanent record on a chart calibrated to read out the leaf angles directly. The chart was wrapped around a drum that turned once a week. The strain gauge signals were recorded on the M. H. Brown strip chart recorder. The results of the strain gauge records were compared with the records of the kymograph. The time sequence of the peaks and dips of the two records were identical. On further examination it was found that the leaf angle values were not directly correlated between the strain gauge records and the kymograph records. On plotting the corresponding points of the kymograph and the strip chart records, it was found that the maximum deviation of the strain gauge records was not more than 5° from the values of the kymograph records (see Fig. 3). Since the peaks and dips on the curves are not displaced in time sequence we feel that the deviation is not large enough to invalidate the strain gauge records for cycle-length studies.

This unit is being used in experiments testing the effects of light–dark cycles on the leaf movements of pinto beans.

We thank Dr. Robert Chipman, Mr. Raymond Kado and Mr. Stanley Noguchi for their assistance and advice. We also thank Dr. J. D. French for his help. The work was supported by the National Aeronautics and Space Administration grant *NsG* 528 and U.S. Air Force grant *AF–AFOSR* 246–63.

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Bathycoelia thalassina (Herrich-Schaeffer), (Hemiptera: Pentatomidae); a Pest of *Theobroma cacao* L.

Large nymphs and adult *Bathycoelia thalassina* (Herrich-Schaeffer) have recently been found to feed on developing cocoa pods, causing damage to the beans; the small nymphs feed mainly on the leaves and do little damage. The adults have long feeding stylets (about 2·2 cm) which can penetrate the pod cortex (see Fig. 1) and suck liquid from the developing beans; this results in malformed or atrophied beans. In ripe pods the malformed beans are brown instead of pink, and dry, lacking the sugary mucilage which normally covers beans.

The damage is often not evident externally in harvested pods apart from small black spots formed at the feeding

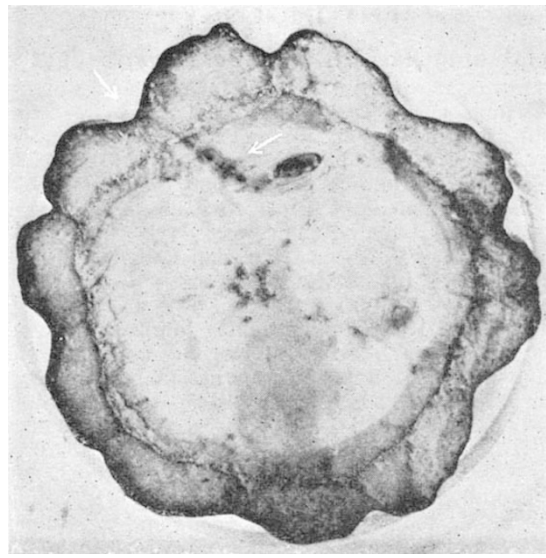

Fig. 1. Sectioned cocoa pod: damaged tissue (top left) shows the path of feeding stylets of *B. thalassina*. Pod diameter about 6 cm

Fig. 2. Damage to young pods results in distorted mature pods often with a 'waist'. Amazon pod, 12 cm long

lesions. But pods damaged at an early stage fail to swell where the beans have stopped developing, and show a characteristic distortion when fully developed, often in the form of a constriction or 'waist' in the middle of the pods (see Fig. 2).

In some harvests in early 1964 from plots at the Cocoa Research Institute of Ghana more than 20 per cent of the pods were damaged, and all the beans in some pods were imperfect. Damage to the total crop from the Institute was small, but *B. thalassina* populations were first noticed to be high in 1962 and may still be increasing. This species was found on cocoa in several parts of Ghana and at Ibadan in Nigeria in March, 1964.

B. thalassina has been reported to feed on cocoa pods in the Congo[1] and Cameroons[2], causing very small pods to shrivel and fall, but causing negligible damage to full-sized pods; the beans were not affected.

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