Short Communications

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A NEW RECORD OF OCHTERUS MARGINATUS (LATR.) (HETEROPTERA:OCHTERIDAE) FROM SIND PROVINCE, PAKISTAN

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Ochterus marginatus (Latr.) has been reported from widely separated localities in Oriental, Palearctic and Ethiopean regions.[1,3,4,5] A few subspecies have been distinguished[4] but a thorough analysis of the material from different localities is needed to elucidate the subspecies position. We are recording this species for the first time from Pakistan. A brief description of the taxon is also included here to faciliate identification. The material was collected from two localities in Sind, and also includes nymphal instars from both places.

The extremely quick flight ability renders it rather difficult to catch these insects with nets or aspirators. We were particularly successful with a glass test-tube. Due to the transparent quality of the glass almost no shadow is cast on the insect when the test-tube is placed slowly and steadily on the bug and, therefore, it remains undisturbed during the procedure. Nymphs were collected at or near the frequent landing grounds of the adults. They were covered with mud and could only be spotted due to their rather slow movements. The biology and immature stages of this species will be reported later.

Ochterus marginatus (Latreille) (Fig. 1)

Acanthia marginatus Latr. 1804, Hist. Ins. XII, p. 242.
Ochterus marginatus Latr. 1807, Gen. Ins. III, p. 143
Pelogonus marginatus Amy. & Serv. 1843. Hem. p. 409.
Pelogonus indicus Guer. 1843., Rev. Zool. p. 113.
Pelogonus caffer Stol 1855. Ofv. Vet. Ak. Forh. p. 46.
Pelogonus marginatus Fieb. 1861, Eur. Hem. p. 103.
Pelogonus marginatus Stol 1865, Hem. Afr. III, p. 170.
Pelognus marginatus Montandon 1897, Ann. Mus. Civ. Gen, XXXVII, p. 365.
Pelogonus marginatus Dist. 1906, F.B.I. Rhynchota III. p. 14.

General shape oval; coloration black with pale yellow spots along lateral margin; head declivent, vertex pitchy black, eyes large and extending posteriorly along lateral pronotal margins, ocelli distinct, placed close to anterior pronotal margin, closer to eyes than to each other; antennae short, basal two

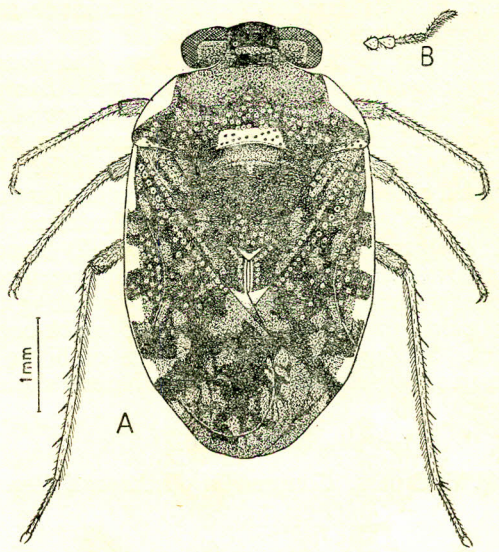

Fig. 1. *Ochterus marginatus*; (a) dorsal view, male; (b) right antenna.

segments pale yellow, third and fourth dark brown; labium long, reaching fourth visible abdominal sternum; pronotum much wider than long, lateral margins laminate, moderately convexly rounded, converging anteriorly, anterior-most part adjacent to eyes concave, anterior margin slightly concave, posterior margin sinuate, disk of pronotum convex and punctate, laminate part on lateral margins flat, impunctate and pale yellow, posterior margin with a pair of lateral and one larger median pale yellow patch, remainder of pronotum dull dark brown, callar area shiny; scutellum dull dark brown except apex pale yellow, with minute punctures all over and a few larger ones near apex, distinctly transversely constricted near base; hemelytra large, extending beyond abdomen, apical margin and apex of clavus pale, lateral corial margin with four pale yellow patches, remainder of hemelytra dark brown with scattered ashy patches, membrane of similar texture as corium except at margins, five membrane veins visible; legs lighter than venter, coxae concolorous with venter, coxae and femora with thick hairs, hind tibiae with long spines, all tibiae with short spines; thoracic sterna black, abdominal sterna pale yellow or at least with a pale yellow patch, third to sixth abdominal sterna with a shiny small area median to yellow patch; genitalia and reproductive organs have been studied by Pruthi,[7] Pendergrast,[6] Scudder[8] and Kumar.[9]

Body Measurements. Frontal length head 1.0 mm, maximum width 1.6 mm, median length pronotum 1.2 mm, maximum width pronotum 2.5 mm, length scutellum 1.2 mm, maximum width scutellum 1.6 mm, length antennal segments I 0.12 mm, II 0.12 mm, III 0.25 mm, IV 0.30 mm, body length 4.7 mm.

Material Examined. Four males and five females, Gulamullah, Sind, Pakistan, 5. VII. 1971 (A. Hamid); two males and two females, Kalri Lake, Sind, West Pakistan, 12.V.1970 (A. Hamid). Specimens deposited in Zoological Museum, University of Karachi and A. Hamid collection.

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ABNORMAL FORMATIONS OF LEAF, FLOWER AND FRUIT OF PAPAYA SUFFERING FROM VIRUS INFECTION

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In a small house-garden in north Karachi at least three species of plants were apparently suffering from a common virus infection. Some three years ago one of them, a lemon tree, showed typical 'rolled-leaf' disease so much so that it had to be coppiced. By now it has regrown to the height of some 3 ft and is free from the previous symptoms. Another plant was a creeper, an *Ipomea* sp., which bore the infection tolerably well, as its leaves merely showed malformation and a scaly white encrustation along the ribs. The third was papaya which suffered from 'shredded-leaf disease' reported already.[1] Here the leaves could be reduced to mere ribs with 'rags' of a leafy portion hanging on them. Even fruits revealed abnormal formation. Present article extends previous observations. It may be repeated that there are no more than a dozen papaya trees and all are infected with the disease.

A full grown normal papaya leaf is shown in Fig. 1. Invariably seven ribs can be counted but frequently nine; these are numbered in Fig. 1. When the observer is facing the leaf, standing in front, the main rib, in line with leaf stem, bears No. 1 and the ribs seen here on the right would be those on his left. However in Fig. 1. ribs 3,5,7, and 9, as odds, are indicated to our right, the evens, 2,4,6 and 8, to our left. The ribs seem to radiate from a conspicuous central spot self-evident in Fig. 1.

Along rib, No. 1, as also on the margin of the leaf (Fig. 2) abnormal leafy growths project as flat protrubrances. These remain relatively dwarfed but can be as numerous as galls on some leaves. The main rib, No. 1, is never free from such growths whenever they appear. One such abnormal growth is seen, not far from the central spot, on the main rib (Fig. 2). Again from the same central spot a number of additional leafless ribs arise as malformations (Fig. 3). These are properly seen enlarged in Fig. 4. The tips of these 'shreds' are bearing mere vestiges of a leafy growth.

Figure 5 presents a feature quite common on some croton species cultivated as ornamental plants, but known to bear virus infection. A papaya leaf, otherwise also misshaped, (Fig. 5), presents such a case. Its margin shows projecting bare elongated ribs at first without any leaf and after a little distance, from the same ribs green leafy portions expand as though leaf formation had restarted with an interval in between. Such discontinuity with the ends of ribs bearing a miniature terminal leafy portion is seen in Fig. 5. Fig. 6 represents a highly reduced abnormal papaya leaf; Fig. 6 has to be compared with the normal leaf (Fig. 1), to realize the effect on size due to disease. The margin of the leaf, (Fig. 6) shows two bare ribs projecting without accompanying leafy portion and again bursting into foliage later on. However, where Fig. 6 further differs from Fig. 5 is that the ribs in Fig. 6 reveal a screw like twisted growth. Now this 'twisted growth was most conspicuous on young stems, two of which (Fig. 7) reveal coiled growth, like typical horns of a ram. In order to photograph them properly a stem lying in front had to be cut down which is noticeable in the picture. The curling of leaves, on the lemon tree, the twisting of ribs in Fig. 6, and the coiled stems of Fig. 7, all represent the identical phenomenon. Fig. 6 has to be contrasted with Fig. 5 and critically examined to find the absence of 'twisted growth' in Fig. 5, and Fig. 6, has to be compared with Fig. 7 to realize how both reveal twisted growth. The central leaf spot, from where 'shredded-ribs' arise in Fig. 3, showed in an otherwise normal leaf, a rib projecting vertically to the surface of the leaf and then bursting into leafy growth. This is seen in Fig. 8.

Papaya is a dioecious plant. A male tree showed a leaf at its 'central spot', from where a vertical rib is projecting (Fig. 8), a bunch of young flowers arising (Fig. 9.) On account of its importance it is shown further enlarged in Fig. 10. This is an odd place to find-flowers where in other cases may have been found a rib projecting vertically as in Fig. 8. Normally male flowers are seen hanging down from the top of the tree as regular influorescence. The conclusion is obvious that the virus acclerates growth and when this becomes further intense flowers appear. Female flowers arise near the canopy and on the side of the trunk. And fruits are likewise found there in between leaf stalks. But in a diseased plant the

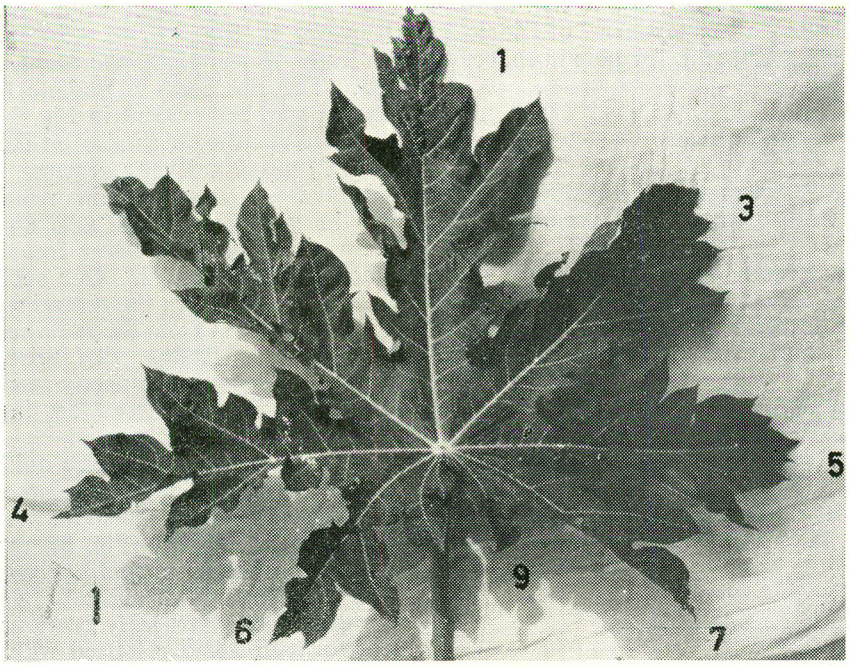
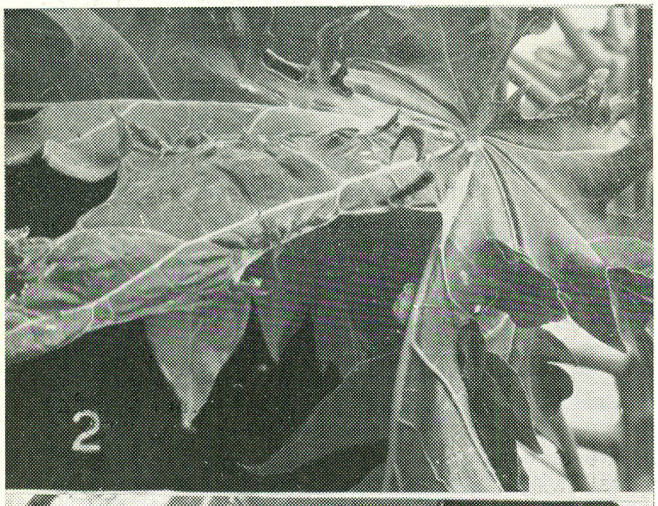


Fig. 1. Normal papaya leaf showing eleven ribs, selectively numbered. They radiate from a central spot.



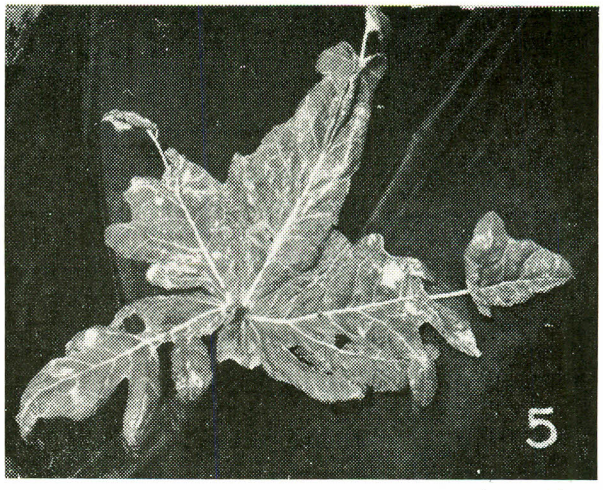
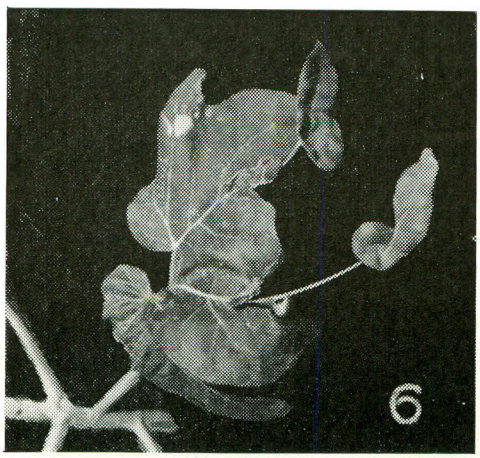
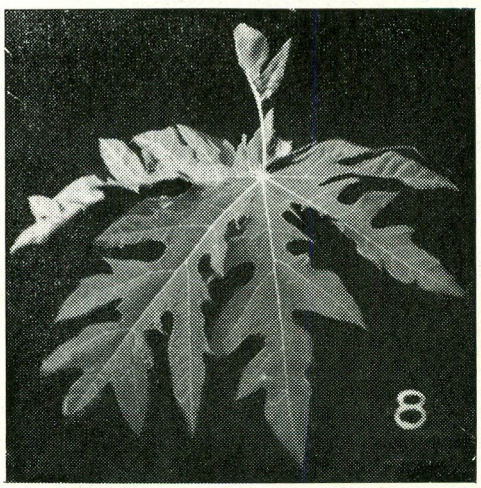


Fig. 2. A diseased leaf showing thin flat gall-like 'projections' along the main rib, No. 1, of Fig. 1 and also along the leaf margin. Fig. 3. From the central spot 'shredded leaf' ribs or bare ribs arise. These are additional ribs. Fig. 4. Parts of Fig. 3 enlarged to show extra ribs bearing mere vestiges of leafy growth. Fig. 5. An abnormally reduced leaf with ribs first bear and again bursting into terminal leafy growths.





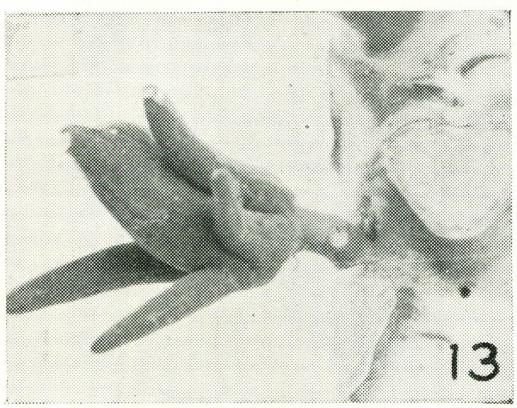
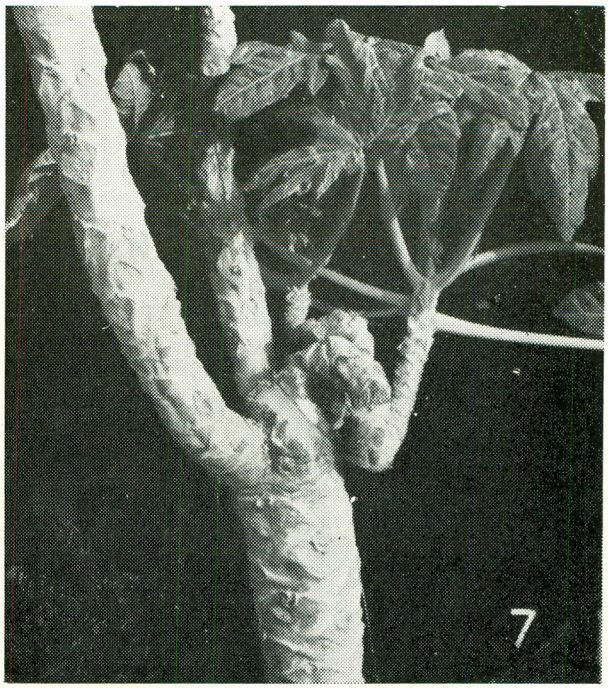
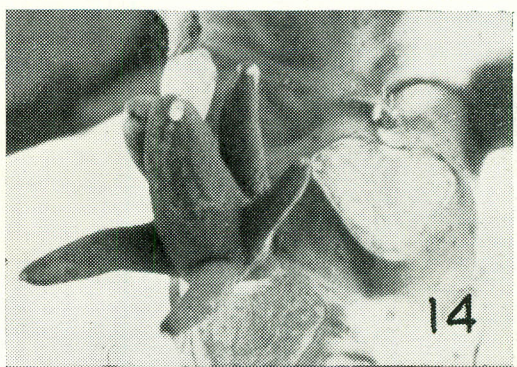


Fig. 6. A dwarf leaf showing ribs, alternately bare and bearing leafy growths. Moreover ribs reveal a twisted growth which is absent in Fig. 5. Fig. 8. An apparently normal leaf showing a rib shooting up from the 'central spot' first bare, later producing a terminal leafy growth. Fig. 13. A female flower being forced to grow rapidly developed into an abnormal fruit retaining the form of the flower; it is flower-cum-fruit.





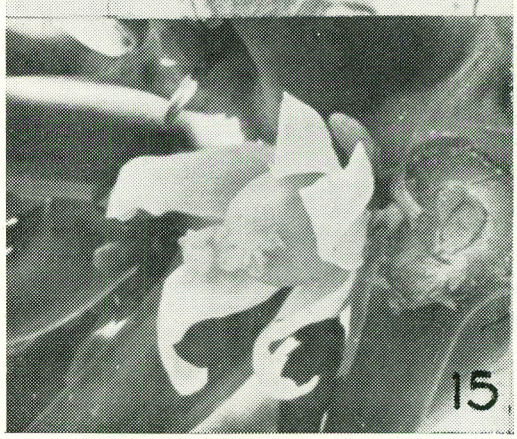


Fig. 7. Two stems adjoining each other showing a coiled growth like the horns of a ram. Fig. 14. Another aspect of the same as Fig. 13. Fig. 15. A normal female flower for comparison with Fig. 13.

pinnacle of the stem produced a female flower as bud which without opening properly developed into a fruit. Fig. 11 shows disease leaves on either side at the top of a stem and in between a young fruit projecting upwards, though at an angle and at its base some three immature flower buds. The fruit being heavy shows a droop from want of support by the stalk which was never called upon to display such strength. When this fruit was examined it

Fig. 9. Male flower buds arising from the 'central spot' seen best in Fig. 1. Fig. 10. Male flower buds of Fig. 9 shown enlarged. Fig. 12. A tree bearing inflorescence of male flowers but at the end flowers having reversed their sex have produced fruits also abnormally elongated.

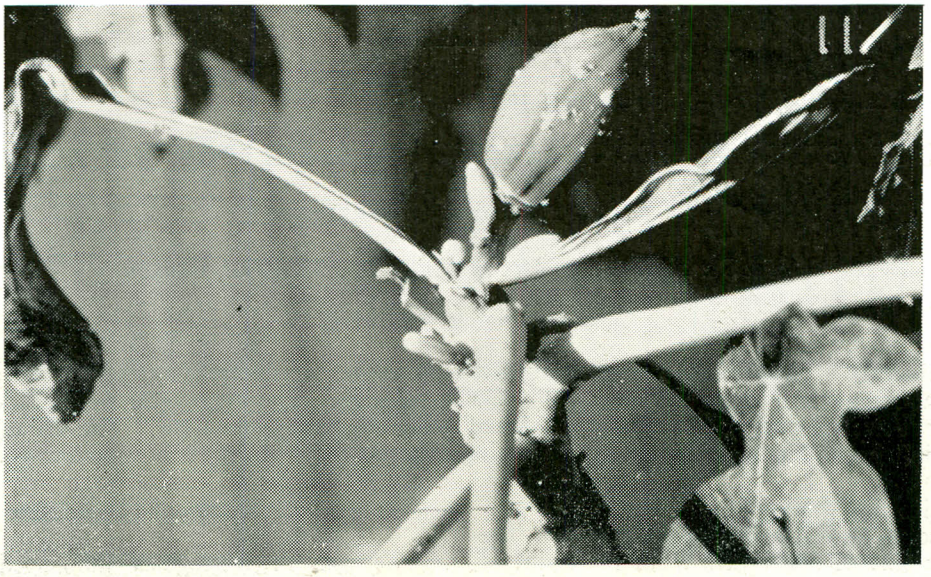


Fig. 11. At the very top of a stem, female flower buds were found and one prematurely developed into a fruit, seen here inclined. The immature female flowers may be compared with similar buds of male flowers in Fig. 10.

proved to be seedless. If we assume growth as a kind of motion then reproduction appears as acceleration of that motion, or if growth as a constant factor, then flowering would be its variable. The relationship between growth and reproduction is an important problem in biology but its exact nature still remains unsolved. At any rate the 'central spot' of the leaf shows an extra leaf growth (Fig. 8). At the same spot in Fig. 9, male flowers appear, bud at the pinnacle of a stem, in Fig. 11, actual fruit formation is found. Thus centres of growth reveal evidence of abnormal reproductivity.

While discussing our problem with Dr. Ashrafi, Head of Entomiology Division, P.C.S.I.R. he was kind enough to show the photograph reproduced here with his permission, as Fig. 12. The male influorescence appears on long ribs hanging from top downwards. On the contrary the female flowers always remain higher up adherent to the trunk and fruits likewise lie next to the tree at the top, in between the spots where leaf stalks arise. In Fig. 12 we see hanging ribs bearing male flowers but the terminal ends bear abnormal brinjal-like elongated fruits. Obviously some of the would-be male flowers had become female and these came to bear fruits. Unfortunately the tree was destroyed long age, but we are inclined to attribute this abnormality also to the same virus infection. Our explanation would be that a growth acclerating principle can transform growth into flowering, as Fig. 9 reveals, and the same acclearating tendency transforms male flowers into those of the opposite sex.

If the virus, as growth acclerator, can transmute a male flower into a female one, what would be the effect of the same active principle on a female flower; the flower starts premature fruiting. Botanically a flower is a transformed leaf, and we all know that a flower develops into a fruit. And if flower development is acclerated the flower retains its shape but becomes as much of a fruit as it is possible. Such a fruit, retaining the shape of the flower, which is its precursor is seen in Fig. 13 and 14. A female flower on the same tree and adjoining the abnormal fruit, Fig. 13, is shown in Fig. 15, for comparing it with Fig. 13.

The morphogenesis of abnormal growths in papaya trees infected with virus reveals acclerated growth beyond the control of the plant. Thus a male flower arises on the leaf, quite an unusual place for it. The male flower is transformed into a female, also unnatural. And a female flower is forced to develop into fruit so fast that the resultant becomes a flower-cum-fruit, but sterile or seedless.

Acknowledgement. We thank Prof. Akhtar Zaidi, for kindly pointing out some of the abnormalities described here as the garden belonged to him.

Reference

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