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# A Revision of the Genus Holcostethus Fieber (Hemiptera: Pentatomidae: Pentatominae: Carpocorini) from Middle and Near East with four new species from Iraq and Pakistan and their distribution and relationships*

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## Summary

The genus **Holcostethus** Fieber is redescribed with its four Palaearctic species known from Middle and Near East and four new from Iraq and Pakistani Baluchistan and NWFP which are keyed with their detailed synonymy and distribution. The new species along with **imtiazi** Abbasi are described in detail with special reference to their metathoracic scent gland complex and male and female genitalia and in this light the distribution and relationships of all the included taxa are briefly discussed.

## Introduction

During various expeditions to different areas of northern Iraq and Pakistani Baluchistan and N.W.F.P. (1967-84) a number of specimens representing the genus *Holcostethus* Fieber were collected from Mosul, Quetta, Pishin, Urak and Ashroat including *imtiazi* Abbasi and four new species. Kirkaldy (1909) in his catalogue of ten Palaearctic species *albipes* (Fabr.) from Syria, *strictus* (Fabr.) from Mediterranean basin and *vernalis* (Wolff) from Persia in Near and Middle East.

Hoberlandt (1954) listed *strictus* from Syria and Israel in Middle East and recorded it for the first time from Iran and quoting Jakovlev (1877) listed *vernalis* from Anatolia, Israel, Syria, Iraq, Caucasia, Armenian SSR

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and Iran in the Middle East. In the following year he also listed *strictus* from Cyprus.

Stichel (1960-62) in his description of seven European Palaearctic species, mostly based on colour patterns and external features included the above three species from Near and Middle East.

Kerzhner and Yachivaski (1964) keyed three species and gave diagrams of ventroposterior margin of pygophore of only *vernalis* treated presently.

Puchkov (1965) described eight species from Central Asia (including only *vernalis)* from the present areas giving detailed diagrams of external male and female genitalia.

McDonald (1974) in his revision of *Holcostethus* in north America not only gave the main diagnostic characters of the genus but also included the diagrams of male and female genitalia including the inflated aedeagus and spermatheca of the type species *sphacelatus* (Fabr.) and *vernalis* from Palaearctic region.

Recently Abbasi (1977) described one species *H. imtiazi* from Quetta, Baluchistan without comparing it from other already described species of Palaearctic region. His diagrams specially that of aedeagus does not seem to be fully inflated and his description also appears incomplete. Cheema *et al.* (1973) recorded *vernalis* for the first time from Quetta, Baluchistan giving its host plant. Ahmad *et al.* (1974) and Ahmad (1979 and 1980) listed *imtiazi* and *vernalis* with reference to their distribution, seasonal abundance and host/food plants.

Presently the above four species viz *albipes, imtiazi, strictus* and *vernalis* from various areas of Near and Middle East and four new species are keyed and their distributions are given. The new taxa alongwith *imtiazi* are described in detail with special reference to their metathoracic scent gland complex and male and female genitalia and in this light the distribution and relationships of all the included taxa are briefly discussed.

For the descriptions, the measurements and for diagrams the methods of Ahmad and Kamaluddin (1979) are generally followed. The aedeagus was inflated after taking out the pygophore from the relaxed specimen which was boiled in 10% KOH solution for 15 minutes. The opening of the phallus was taken out from the anterior opening of the pygophore without detaching it from the latter and by simple mainpulation of the theca the conjunctival appendages and the vesica were fully inflated. Keeping the pygophore overnight in 10% KOH solution also helped the inflation complete. The spermatheca was studied after taking out the entire abdomen from a relaxed

specimen and boiling it in 10% KOH solution for 15 minutes and finally exposing the spermatheca by splitting the terga and sterna longitudinally. After the examinations the pygophore was glued with the specimen sometimes with inflated aedeagus retracted within it or some times the aedeagus alongwith parameres were placed in a microvial with a drop of glycerine pinned with the specimen. The female abdomen was dried and was glued with the specimen sometimes with spermatheca tucked in the gynatrium or sometimes the latter was placed in a microvial containing a drop of glycerine pinned with the specimen. All the measurements are given in millimeters and all the diagrams are to the given scales.

## *Holcostethus* Fieber

*Holcostethus* Fieber, 1860, 79; 1861, 333; Kirkaldy, 1909, 47; Hoberlandt, 1954, 131; 1955, 189; Stichel, 1960-62; Kerzhner and Yachivaski, 1964, 1113; Puchkov, 1965, 237; Cheema *et al.*, 1973, 55; McDonald, 1974, 245; Ahmad *et al.*, 1974, 23 and 42; Ahmad, 1979, 21.

*Peribalus* Mulsant and Rey, 1866, 185; Stoal, 1872, 34; Distant 1880, 65; Jakovlev, 1902, 158; Van Duzee, 1904, 32; Zimmer, 1912, 221; Van Duzee, 1917, 32; Blatchley, 1926, 105; Froeschner, 1941, 127.

*Dryocoris* Mulsant and Rey, 1866, 190.

Type species : *Cimex sphacelatus* Fabricius

Body ovate; head broader than long; paraclypei foliaceous, longer than clypeus, usually entirely enclosing but in some species not enclosing the clypeus in front; sides of head beyond compound eyes convexly bulging outwardly; labium usually reaching to hind coxae, first labial segment as long as bucculae; anterior angles of pronotum with or without denticle; anterior margin broader than the width of the head across eyes; pronotum always without prominent humeral angles; scutellum postreiorly not much narrowed with rounded apex and extedning 2/3 abdominal terga; metathoracic scent gland complex usually with acuminate peritreme reaching to outer edege of evaporatoria.

Male genitalia; ventroposterior margin of pygophore medially distinctly bilobed; parameres L or F-shaped, in some species a pair of pseudoclaspers also present, ventrolateral thecal lobes absent; penial appendages prominent, plate like; one to three pairs of conjunctival appendages present, in ane species dorsal membranous conjunctival appendage apically sclerotized.

Female genitalia, 1st gonocoxae large, broad, platelike and wide apart, posterior margin sinuated; 9th paratergites lobe-like, not passing beyond fused posterior margin of 8th paratergites; 2nd gonocoxae broad, with

posteromedian margin concave; spermathecal bulb of variable size, with two fingerlike processes of variable size, sclerotized median duct dilated at proximal end, proximal spermathecal duct much longer than distal spermathecal duct.

Key to the species of the genus *Holcosthethus* from Middle and Near East

1. Paraclypei longer but never enclosing the clypeus in front, with a narrow apex, anterior angles of pronotum rounded below the eyes, in male lateral lobes of pygophore subacute ... *albipes* (Fabr.)
— Paraclypei longer and completely enclosing the clypeus in front with broad apex, anterior angles of pronotum more or less acute or toothed below the eyes, in male lateral lobes of pygophore not as above ..... 2

2. Lateral margins of paraclypei distinctly convex, anterior angles of pronotum subacute, in male lateral lobes of pygophore sharply produced into tooth-like structure ..... *strictus* (Fabr.)
— Lateral margins of paraclypei sinuated, anterior angles of pronotum toothed, in male lateral lobes of pygophore produced into lobe-like structure ..... 3

3. Anteocular distance only slightly longer than posterior of head including eyes, lateral lobes of pygophore remarkably produced into acute apices, ventroposterior margin medially deeply inpushed ..... *vernalis* (Wolff)
— Anteocular distance distinctly longer than posterior of head including eyes, lateral lobes of pygophore only slightly produced into subrounded or rounded apices, ventroposterior margin medially usually shallowly inpushed ..... 4

4. 5th antennal segment slightly shorter than 2x length of 2nd, in male parameres F-shaped, dorsal membranous conjunctival appendage of inflated aedeagus with sclerotized apex, in female posterior margin of arcus acutely produced posteriorly ... *lodosi* sp.n.
— 5th antennal segment distinctly shorter than 2x length of 2nd, parameres usually L-shaped, dorsal membranous conjunctival appendages of inflated aedeagus without sclerotized apex, in female posterior margin of arcus rounded ..... 5

5. Head atleast slightly longer than the length of pronotum, anteocular distance about 1½x longer than posterior of head including eyes ..... *pishinensis* sp.n.

— Head length shorter or at the most equal to the length of pronotum, anteocular distance shorter than 1½x of posterior of hea dincluding eyes ..... 6

6. Length of head shorter than length of pronotum, labium with basal segment about 2x length of 4th segment, metathoracic scent gland ostiolar peritreme broad, rounded at apex ..... *sinuatus* sp.n.
— Length of head equal to the length of pronotum, labium with basal segement distinctly less than 2x of 4th segment, metathoracic scent gland ostiolar peritreme with apex acute ..... 7

7. Antennae with 4th segment more than 2x length of basal segment, 2nd labial segment slightly longer than 3rd, ventroposterior margin of pygophore slightly inpushed, aedeagus with one pair of membranous conjunctival appendages ..... *imtiazi* Abbasi
— Antennae with 4 th segment distinctly less than 2x length of basal segment; 2nd labial segment about 2x length of 3rd, ventroposterior margin of pygophore distinctly inpushed, aedeagus with three pairs of membranous conjunctival appendages ... *urakensis* sp.n.

*Holcostethus albipes* (Fabr.)

*Cimex albipes* Fabricius, 1781, 345.

*Holcostethus albipes* (Fabricius) Kirkaldy, 1909, 47; Stichel 1960-62, 578.

*Holcostethus congener* Fieber, 1861, 334.

*Peribalus albipes* (Fabricicius) Puton, 1881, 58.

*Material.* Holotype and other reference material in Natural History Museum Vienna, Austria; a list of other materials from Algeria, Moracco, Spain, South France, Sardania, Malta, Italy and Czechoslovakia given by Stichel (1960-62)

*Comments.* It appears isolated in the complex of species in Near and Middle East in having paraclypei longer but never enclosing clypeus infront. It is infact closely related to *sphacelatus* (Fabr.) but can easily be separated from the same by apex of paraclypei broad with lateral margins straight, anterior angles of pronotum truncated below the eyes and in male lateral lobes of pygophore rounded in *sphacelatus*.

*Holcostethus imtiazi* Abbasi (Fig. 1)

*Holcostethus imtiazi* Abbasi, 1977, 81; Ahmad, 1979, 49; 1980, 136.

Colour; body ovate and punctate, pronotum except lateral margins, scutellum, corium dark; eyes black; ocelli pink; 4th and 5th antennal

segments dark; 1st, 2nd and 3rd brown, lateral margins of pronotum brown; connexiva yellowish black.

Structure; head as long as pronotum; lateral margine of paraclypei sinuated, longer than clypeus, and enclosing it; anteocular distance longer than posterior of head including eyes; antennae with 2nd segment slightly longer than 3rd, length of antennal segments, I 0.4; II 0.7; III 0.6; IV 0.9; V 1.06; antennal formula 1<3<2<4<5; labium reaching hind coxae, basal segment not extending beyond bucculae, 3rd segment shorter than 2nd, length of the labial segments, I 0.9; II 0.85; III 0.7; IV 0.6; labial formula 4<3<2<1; length anteocular distance 1.0; length posterior of head including eyes 0.75; width 2.2; interocular distance 1.45; interocellar distance 0.8; width of pronotum distinctly more than 2½x its length, humeral angles rounded, lateral margins substraight, length of pronotum 1.75; width 4.5; scutellum slightly longer than broad, slightly more than 1½x of head length with apical lobe distinct, apex subrounded, length of scutellum 2.9; width 2.8; mesosternum carinated; metathoracic scent gland ostile (Fig. 6) long, ovate, peritreme elongated, tapering, latero apically bulging, evaporatoria distinct; membrane of hemelytra slightly shorter than abdomen; base scutellum-apex clavus 2.1; apex clavus-apex corium 1.4; apex corium-apex abdomen including membrane 1.4; apex scutellum-apex abdomen including membrane 2.1; connexiva exposed at repose; total length ♂ 8.50. In male genitalia pygophore (Figs. 11, 12) quadrangular, dorsomedian surface sinuated, lateral lobes prominent and rounded, dorsolateral inner processes lobe-like with apex rounded, ventroposterior sinuated, medially slightly concave; proctiger somewhat quadrangular, longer than broad with apical lobe broadly rounded; paramere (Fig. 19) somewhat L-shaped, apex of blade broad, postero-outer margin medially depressed, inner margin without tooth like structure at base; aedeagus (Fig. 20, 21, 22) with lobe-like dorsolateral thecal appendages, a prominent large dorsal membranous conjunctival appendagesf, biloded at apex, penial lobes plate-like, vesica curved, S-shaped, just passing beyond junction of ventral membranous conjunctival appendages.

*Material.* Holotype ♂, Pakistan: Baluchistan, Quetta on grass 15.3.1967, leg. Imtiaz Ahmad, in Natural History Museum, Department of Zoology-Entomology, University of Karachi.

*Comments.* This species is closely related to *urakensis* sp.n. in having head length equal to the length of pronotum, metathoracic scent gland ostiolar peritreme with apex acute and dorso median surface of pygophore distinctly sinuated, but it can easily be separated from the same having 4th antennal segment more than 2x the basal segment, ventroposterior

margin of pygophore slightly inpushed, aedeagus with one pair of membranous conjunctival appendages and by other characters as noted in the key and description.

*Holcostethus lodosi* sp.n. (Fig. 2)

Colour; body ovate and punctate; head, lateral margins of pronotum and half of the 4th and middle portion of 5th antennal segments black; eyes black; ocelli and 3rd antennal segment pink.

Structure; head longer than pronotum; lateral margine of paraclypei sinuated, longer than clypeus, and enclosing it infront; anteocular distance longer than posterior of head including eyes, antennae with 2nd segment slightly shorter than 3rd, length of antennal segments, I 0.45; II 0.60; III 0.70; IV 1.0; V 1.05; antennal formula 1<2<3<4<5; labium passing beyond hind coxae, basal segment not extending beyond bucculae, 3rd segment shorter than 2nd, length of labial segments, I 1.05; II 1.0; III 0.7 mm; IV 0.6; labial formula 4<3<2<1; length anteocular distance 1.1; length posterior of head including eyes 0.8; width 2.1; interocular distance 1.4; interocellar distance 0.9; width of pronotum distinctly more than 2½x its length, humeral angles rounded, lateral margins straight, length of pronotum 1.75; width 4.75; scutellum slightly longer than broad, more than 1½x head length with apical lobe distinct, apex rounded, length of scutellum 3.0 mm, width 3.1; metathoracic scent gland ostiole (Fig. 7) large, peritreme elongated, tapering laterad, apically narrowed, evaporatoria distinct; membrane of hemelytra longer than abdomen; base scutellum-apex clavus 2.1 mm; apex clavus-apex corium 1.8; apex corium-apex abdomen including membrane 1.5; apex scutellum-apex abdomen including membrane 2.5; connexiva exposed at repose; total length ♂ 8.50; ♀ 9.0. In male genitalia pygophore (Figs. 13, 14) quadrangular, dorsomedian surface medially notched, lateral lobes prominent and subrounded, ventroposterior margin sinuated, medially deeply inpushed; proctiger dome-shaped; paramere (Fig. 23) F-shaped, apex of blade narrowed with tooth-like structure at base, outer margin of stem straight, inner margin with a tooth-like structure at base; aedeagus (Figs. 24-26) without dorsolateral thecal appendages, a prominent dorsal membranous conjunctival appendage, bilobed at apex, latter sclerotized, penial lobes plate-like, vesica curved; 'S'-shaped, just passing beyond junction of ventral membranous conjunctival appendages. In female genitalia (Fig. 35) posterior margin of fused 8th paratergites sinuated, triangular, medially concave; arcus short with posterior margin concave; spermatheca (Fig. 38) with proximal spermathecal duct more than 4x the length of distal spermathecal duct, pump region equal to the length of distal spermathecal duct, spermathecal bulb elongated bag-like with apex subrounded.

*Material.* Holotype ♂ Iraq: Mosul, Alkhat, 27.9.1972, leg. Imtiaz Ahmad, in NHM, Department of Zoology-Entomology, University of Karachi. Paratype 1 ♀, Iraq: 17.6.1973 leg. I. Ahmad, in Ahmad's coll.

*Comments.* This species is closely related to *pishinensis* sp.n. in having anteocular distance distinctly longer than posterior of head including eyes and ventroposterior margin of pygophore medialy shallowly inpushed, but it can easily be separated from the same in having 5th antennal segment slightly shorter than 2x length of 2nd, length of head distinctly longer than pronotum, in male paramere F-shaped and dorsal membranous conjunctival appendage of inflated aedeagus with sclerotized apex.

The species is named in honour of Prof. Dr. Niyazi Lodos of Izmir University, Turkey, to acknowledge his valuable contributions on Hemiptera.

*Holcostethus pishenensis* sp.n. (Fig. 3)

Colour; body ovate and punctate; head and lateral margins of pronotum light black; eyes black; ocelli pink; 4th and 5th antennal segments black; 1st, 2nd and 3rd yellowish, pronotum, scutellum and corium yellowish.

Structure; head shorter than pronotum; paraclypei with lataral margins s'nuated and recurved, enclosing clypeus; anteocular distance longer then posterior of head including eyes; antennae with 2nd segment longer than 3rd, length of antennal segments, I 0.45; II 0.75; III 0.55; IV 0.8; V 1.1; antennal formula 1<3<2<4<5; labium reaching hind coxae, basal segment not extending beyond bucculae, 3rd segment shorter than 2nd, length of the labial segments, I 1.05; II 1.0; III 0.7; IV 0.6; labial formula 4<3<2<1; length anteocular distance 1.2; length posterior of head including eyes 0.8; wodth 2.3; interocular distance 0.17; interocellar distance 1.0; width of pronotum distinctly more than 2x its length, humeral angles subrounded, lateral margin straight and recurved, length of pronotum 1.85; width 4.95; scutellum slightly longer than broad, slightly less than 1½x of head length with apical lobe distinct, apex rounded, length of scutellum 3.25; width 3.0; mesosternum carinated; metathoracic scent gland ostiole (Fig. 8) large, ovate, peritreme elongated, tapering laterad, apically bulging, evaporatoria distinct, membrane of hemelytra longer than abdomen; base scutellum-apex clavus 1.7; apexclavus apex corium 2.1; apex corium-apex abdomen including membrane 1.7; connexiva slightly exposed at repose; total length ♀ 9.40. In female genitalia (Fig. 36) posterior margin concave, spermatheca (Fig. 39) with prox'mal spermathecal duct about 3x the length of distal spermathecal duct pump region elongated and shorter than the lenth of distal spermathecal duct, spermathecal bulb bag-like with apex rounded.

*Material.* Holotype ♀ Pakistan: Baluchistan Pishin, 14.10.1978 leg. Azhar

Ali Khan, in Natural History Museum, Department of Zoology-Entomology, University of Karachi.

*Comments.* This species is most closely related to *sinuatus* sp.n. in having anteocular distance longer than posterior of head including eyes and having, same antennal formula, but it can easlly be separated from the same in having head length distinctly longer than the length of pronotum, anteocular distance about 1½x of posterior of head including eyes and by other characters as noted in the key and description.

*Holcostethus sinuatus* sp.n. (Fig. 4)

Colour; body ovate and punctate; entire head, pronotum except lateral margins, scutellum, antennae and corium black; ocelli pink; lateral margins of pronotum brown; apex scutellum brown.

Structure; head shorter than pronotum, lateral margins of paraclypei sinuated, longer than clypeus, enclosing clypeus in front; anteocular distance longer than posterior of head including eyes; antennae with 2nd segment slightly longer than 3rd, length of antennal segments; I 0.4; II 0.6; III 0.55; IV 0.8; V 0.9; antennal formula 1<3<2<4<5; labium reaching hind coxae, basal segment not extending beyond bucculae, 2nd segment slightly more than 2x of 3rd, length of the labial segments, I 0.9; II 1.15; III 0.55; IV 0.45; labial formula 3<4<1<2; length anteocular distance 0.9; length posterior of head including eyes 0.7; width 2.0; interocular distance 1.65; inter-ocellar distance 0.9; width of pronotum more than 3x of its length, anterior angles toothed, directed anterolaterad, humeral angles rounded, lateral margins straight, length of pronotum 1.7; width 4.3; scutellum slightly broader than long, slightly more than 1½x of head lenth with apical lobe distinct, subrounded, length of scutellum 2.65; width 2.8; mesosternum carinated; metathoracic scent gland ostiole (Fig. 9) large, ovate, peritreme elongated, tapering laterad, apically bulging, evaporaoria distinct; membrane of hemelytra longer than abdomen; base scutellum-apex clavus 1.7; apex clavus-apex corium 1.3; apex corium-apex abdomen including membrane 1.2; apex scutellum-apex abdomen including membrane 1.8; connexiva slightly exposed at repose; total length ♂ 7.75. In male genitalia pygophore Fig. 15, 16) quadrangular, dorsomedian surface sinuated, lateral lobes prominent and rounded, dorsolateral inner processes lobe-like, ventroposterior margin remarkably sinuated, medially slightly concave; proctiger somewhat quadrangular with apical lobe narrowing; paramere (Fig. 27) somewhat L-shaped, apex of blade broad, postero-outer margin of stem straight, inner, margin without tooth-like structure; aedeagus (Figs. 28, 29 and 30) with lobe-like dorsolateral thecal appendages prominent, large dorsal membranous

conjunctival appendage bilobed at apex, penial lobes plate-like, vesica curved, S-shaped, slightly passing beyond junction of ventral membranous conjunctival appendages.

*Material.* Holotype ♂, Pakistan: N.W.F.P. Ashroat, Uthmugum; on grass, 20.7.1976 leg. M. Afzal, in Natural History Museum, Department of Zoology-Entomology, University of Karachi.

*Comment.* This species is most closely related to *pishinensis* sp.n. in having anteocular region longer than posterior of head including eyes and same antennal formula but it can easily be separated from the same in having basal labial segment about 2x length of 4th segment, metathoracic scent gland ostiolar peritreme broad and rounded at apex, dorsomedian surface of pygophore distinctly sinuated and by other characters as noted in the key and description.

*Holoostethus strictus* (Fabr.)

*Cimex strictus* Fabricius, 1861, 339

*Holcostethus strictus* (Fabr.) Kirkaldy, 1909, 48; Hoberlandt, 1955, 189; Stichel, 1960-62, 575; Puchkov, 1965, 239

*Peribulus strictus* (Fbr.) Stal, 1868, 28; Jakovlev, 1902, 158

*Peribuls distinctus* Puton, 1881, 57.

*Material.* Holotype and other reference material in Natural History Museum Vienna, Austria. 1 ♂, 1 ♀ from Iran given by Hoberlandt (1954); 1 ♂, 2 ♀ from Turkey given by Hoberlandt (1955) other material from South France, Spain, Portugal, Maracco, Algeria, Lybia, Sardanian, Syria, Czechoslovakia, Cyprus, Turkey, South Russia and Iran given by Stichel (1960-62).

*Comments.* It is closely related to *vernalis* in general shape of the body and in its wide distribution in the Palaearctic region including Near and Middle East but it can easily be separated from the same by lateral margins of paraclypei distinctly convex, anterior angles of pronotum subprominent and in male lateral lobes of pygophore sharply produced into tooth-like structure.

*Holcostethus urakensis* sp.n. (Fig. 5)

Colour; body ovate and punctate; entire head, pronotum, except lateral margins, scutellum, corium and eyes black; ocelli pink; inner area of 5th antennal segment black, except the tip, latter yellowish; apex of scutellum yellow.

Structure; head longer than pronotum; lateral margins of paraclypei sinuated, longer than clypeus and enclosing it infront; anteocular distance longer than posterior of head including eyes; antennae with 2nd segment slightly longer than 3rd, length of segments, I 0.5; II 0.7; III 0.6; IV 0.85; V 1.0; antennal formula 1<3<2<4<5; labium reaching hind coxae, basal segment not extending beyond bucculae, 2nd segment slightly more than 2x of 3rd, length of the labial segments, I 0.7; II 1.2; III 0.6; IV 0.6; labial formula 3 = 4<1<2, length anteocular distance 1.0; length posterior of head including eyes 0.75; width 2.1; interocular distance 1.45; interocellar distance 0.9; width pronotum distinctly more than 2½x of its length, anterior angles toothed directed anterolaterad, humeral angles rounded, lateral margins straight, length of the pronotum 1.7; width 4.5; scutellum slightly broader than long, slightly more than 1½x of head length with apical lobe distincty subrounded, length of scutellum 2.8; width 2.9; meso sternum carinated; metathoracic scent gland ostioles (Fig. 10) large ovate, peritreme elongated, tapering laterad apically bulging, evaporatoria distinct; membrane of hemelytra longer than abdomen; base scutellum-apex clavus 2.1; apex clavus-apex corium 1.5; apex corium-apex abdomen including membrane 1.5; apex corium-apex abdomen including membrane 1.5; apex scutellum-apex abdomen including membrane 2.2; connexiva distinctly exposed at repose; total length ♂ 8.55; ♀ 8.8. In male genitalia pygophore (Figs. 17, 18) quadrangular, slightly broader than long, dorso median surface sinuated, lateral lobe prominent and rounded, dorsolateral inner process lobe-like with apex broadly rounded, ventroposterior margin distinctly sinuated, medially somewhat concave; proctiger somewhat quadrangular with apical lobe broad; paramere (Fig. 31) somewhat F-shaped, apex of blade broad, postero-outer margin medially depressed, inner margin with a tooth-like structure; aedeagus (Figs. 32, 34) with lobe-like dorsolateral thecal appendages, a prominent large dorsal membranous conjunctival appendage apically bilobed with tips unsclerotized, a pair of short dorso-lateral membranous conjunctival appendages fused at base, a pair of ventral membranous conjunctival appendages with trancated apex and a pair of ventrolateral lobelike membranous conjunctival appendages fused at base, penial lobes plate like, vesica curved, S-shaped, slightly passing beyond junction of ventral membranous conjunctival appendages. In female genitalia (Fig. 37) posterior margin of fused 8th paratergites medially substraight; 9th paratergites blade-like, just reaching posterior margin of fused 8th paratergites triangulin slightly convex; arcus short with convex posterior margin; 2nd gonocoxae broad and large; proctiger with posterior margin straight; spermatheca (Fig. 40) with proximal spermathecal duct about 2x length of distal spermathecal duct, pump region elongated and much shorter than the length of distal spermathecal duct, spermathecal bulb somewhat spherical.

*Material.* Holotype ♂ , Pakistan: Baluchistan, Irak, on grass, 8.5.1978, leg. Azhar Ali Khan, in NHM, Department of Zoology-Entomology University of Karachi. Paratype 1 ♀ same data as above in the above museum.

*Comments.* This species is most closely related to *imtiazi* Abbasi, in having head length equal to the length of pronotum and labium with basal segment distinctly less than 2x of 4th segment, but it can easily be seperated from the same in having 4th antennal segment more than 2x of basal segment, labium with 2nd segment about 2x the length of 3rd, aedeagus with three pairs of membranous conjunctival appendages and by other characters as noted in the key and description.

*Holcostethus vernalis* (Wolff)

*Cimex vernalis* Wolff, 1804, 140; Fieber, 1861, 339.

*Cimex baccarum* Schrank, 1781, 272

*Holcostethus vernalis* Kirkaldy, 1909, 48; Hoberlandt, 1854, 131; Stichel, 1960-62, 575; Kerzhner and Yachivaski, 1964, 1114; Puchkov, 1965, 239; Cheema *et al.*, 1973, 55; Ahmad *et al.*, 1974, 43; Ahmad, 1979, 50; 1980, 136.

*Pentatoma vernalis* Hahn, 1834, 64.

*Peribalus vernalis* Puton, 1881, 58; Saunders, 1872, 7; Jakovlev, 1902, 158.

*Material.* Holotype in Natural History Museum, Paris, 1 ♂ . 1 ♀ Pakistan: Baluchistan, Quetta, March, Commonwealth Institute of Biological Control Rawalpindi; 1 ♂, 1 ♀ given by Hoberlandt (1954); 16 ♂ 4, ♀ given by Hoberlandt (1955) other material from France, Norway, Finnland, West Russia, Poland, England, Spain, Portugal, Algeria, Sardania, Italy, Albania, Czechoslovakia, Bulgharia, Cyprus, Syria, Turkey, South Russia, Iran, and Siberia by Stichel (1960-62).

*Comments.* This species is most closely related to *strictus* in having anteocular distance distinctly longer than posterior of head including eyes and anterior margin of pronotum truncated, somewhat V-shaped but it can easily be separated from the same by lateral margins of paraclypei sinuated and anterior angles of pronotum toothed.

## Distribution and Relationships of the Included Taxa

The members of the genus *Holcostethus* appear distributed in the Palaearctic including Europe, north Africa, Middle and Near East, Central and Asia minor and Mongolia, Nearctic and Neotropical regions and feed on *Brassica napobrassica* Mill and *Triticum aestivum* L. in addition to

*Verbascum, Quercus, Epilobium* and *Betula* of Verbenaceae, Fagaceae, Iropaceae, Betulaceae and Umbliferae, reported by Kirkaldy (1909). Its species appear to be rare in the collections.

The presently included eight species viz *albipes, imtiazi, lodosi, pishinensis, sinuatus, strictus, urakensis* and *vernalis* represent two lines of evolution. The first group represented by only *albipes* appears more advanced in having paraclypei longer than but never entirely enclosing clypeus in front with apices narrow, acuminate as compared to the second group represeted by the remaining seven species viz *lodosi, pishinensis, sinuatus, strictus urakensis* and *vernalis* which appears more primitive in having paraclypei longer than and entirely enclosing the clypeus in front with apices broadly rounded.

The only representative of the first group viz *albipes* although is known only from Syria in the Middle East appears widely distributed in north Africa and Europe and is in fact closely related to *sphacelatus* also widely distributed in north Africa, Europe and Russia but not known from Middle East.

Among the species of the second group, *strictus* appears more advanced in having lateral margins of paraclypei disticntly convex, anterior angles of pronotum at least subprominent and in male lateral lobes of pygophore sharply produced into a tooth as compared to the remaining species viz. *imtiazi, lodosi, pishinensis, sinuatus, urakensis* and *vernalis* which appear more primitive in having lateral margins paraclypei not prominently convex and lateral lobes of pygophore only very slightly produced into obtuse lobes. Their toothed anterior angles of pronotum probably show their later adaptations to suit some special habitat. In the entire subgroup *strictus* appears to be widely distributed in Europe, north Africa, Central and Asia minor and from Iran in Near East and Syria and Israel in the Middle East.

Among the remaining six species *vernalis* appears more advanced in having anteocular distance at the most only slightly longer than posterior of head including eyes, lateral lobes of pygophore acutely inpushed where as the remaining species viz *imtiazi, lodosi, pishinensis, sinuatus* and *urakensis* appear more primitive in having anteocular distance distinctly longer than posterior of head including eyes, lateral lobes of pygophore with subrounded or rounded apices and ventroposterior margin medially only shallowly inpushed. Among the species of *vernalis* subgroup latter appears to be the wost widely distributed in Europe, north Africa, Central and Asia minor and Pakistani Saluchistan and Iran in the Near East and Iraq, Syria and Israel in the Middle East.

The species *imtiazi, lodosi, pishinensis, sinuatus* and *urakensis* all appear to be at the moment endemic in distribution limited to the areas of Pakistani Baluchistan except *lodosi* which is from north Iraq and *sinuatus* which is from Ashroat, north of Madaglasht in NWFP an area bordering with Afghanistan and Russia.

Among these *lodosi* appears more primitive in having the length of head distinctly longer than the length of pronotum, in male moderate sized blade of paramere and in female arcus acutely produced posteriorly. The 'F'-sheped paramere and sclerotized apex of dorsal membranous conjunctival appendage proably represent its later specialization. On the other hand *imtiazi, pishinensis, sinuatus* and *urakensis* appear more advenced in having leength of head at the most equal to length of pronotum, male paramares usually with remarkably elongated blade (in *sinuatus* the blade of paramere is very similar to that of *lodosi* with basal inner knob) and in female posterior margin of arcus rounded. In this group *lodosi* the only species from northern Iraq in Middle East is represented where as the remaining species are from Pakistani Baluchistan and from north NWFP, Ashroat region.

Among these *pishinensis* appears more primitive in having head at least slightly longer than the length of pronotum and anteocular distance about 1½x longer than posterior of head including eyes in contrast to *imtiazi, sinuatus* and *urakensis* which appear more advanced in having head length usually shorter or at the most subequal to the length of pronotum and anteocular distance markedly less than 1½x posterior of head including eyes.

Among these *sinuatus* appears more primitive in having labium with basal segment about 2x length of 4th and metathoracic scent gland ostiolar peritreme broadly rounded at apex in contrast to *imtiazi* and *urakensis* which appear advanced in having labium with basal segment distinctly less than 2x the length of 4th and metathoracic scent gland ostiolar peritreme with subacute apex.

Among *imtiazi* and *urakensis* the leatter appears more advanced in having antennae with basal segment distinctly more than 1/2 length of 4th, in male ventroposterior margin of pygophore distinctiy inpushed and aedeagus with three pairs of membranous conjunctival appendages as compared to *imtiazi* which appears more primitive in having antennae with basal segment distinctly less than 1/2 length of 4th, in male ventroposterior margin of pygophore only slightly inpushed and aedeagus with only one pair of membranous conjunctival appendages.

## Özet

**Holcostethus** Fieber (Hemiptera : Pentatomini : Carpocorini) cinsinin Orta ve Yakındoğu türlerinin revizyonu ile Irak ve Pakistan'dan dört yeni tür ve bunların coğrafi yayılışlarıyla akrabalıkları

Bu çalışmada **Holcostethus** Fieber cinsinin tanıtımı yeniden yapılarak bununla birlikte Orta ve Yakındoğu ile Irak, Pakistan'a ait Balucistan'dan 4 yeni Palearktik türlerin tanıtımları da yapılmıştır. Ayrıca Orta ve Yakındoğu Bölgelerine ait türlerle ilgili bir teşhis anahtarı verilmiş, bu türlerle ilgili sinonimlerle, türlerin dağılışları ayrıntılı olarak açıklanmıştır. Yeni bulunan türlerden **H. imtiazi** Abbasi'nin ayrıntılı tanıtımının yapılması yanında özellikle metathorax'a ait koku bezi kompleksi ile erkek ve dişi genitalia'ları anlatılmış, bunun ışığında bütün taxon'ların dağılış ve akrabalıkları da belirtilmiştir.

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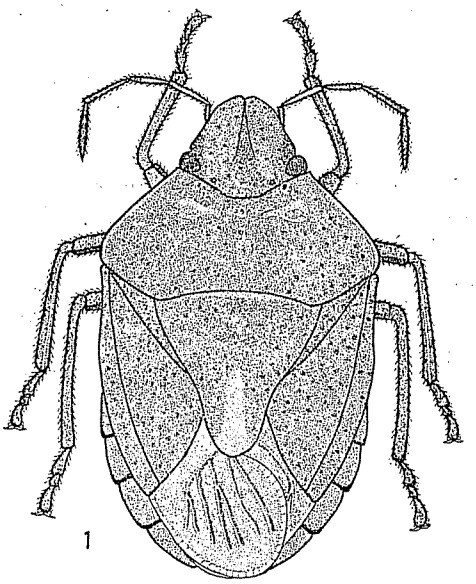
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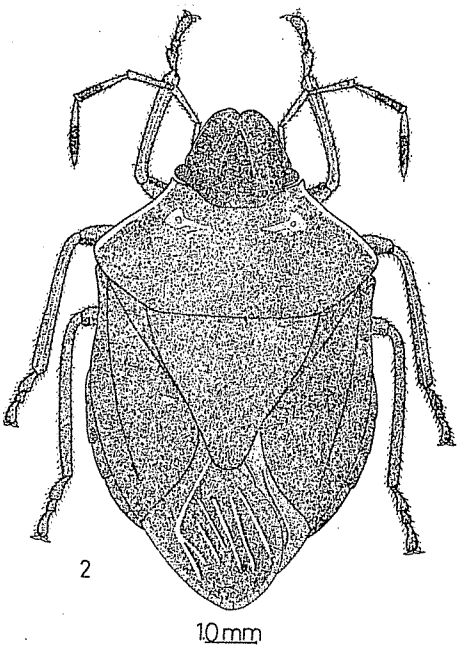
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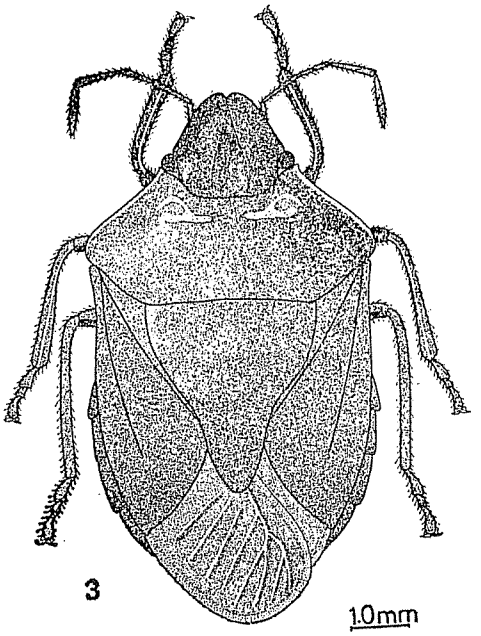
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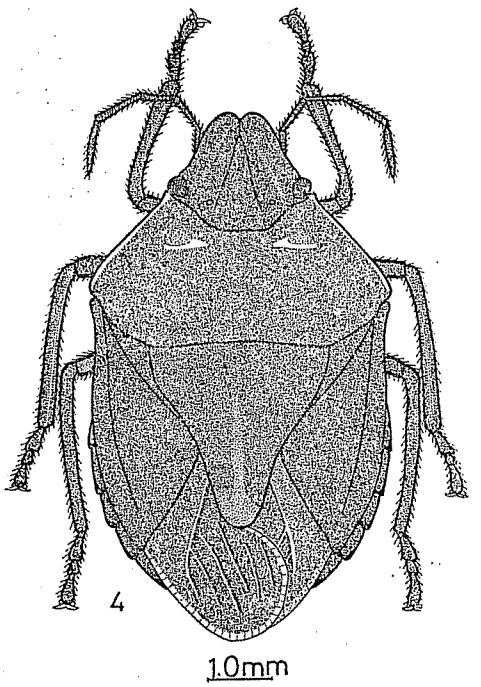
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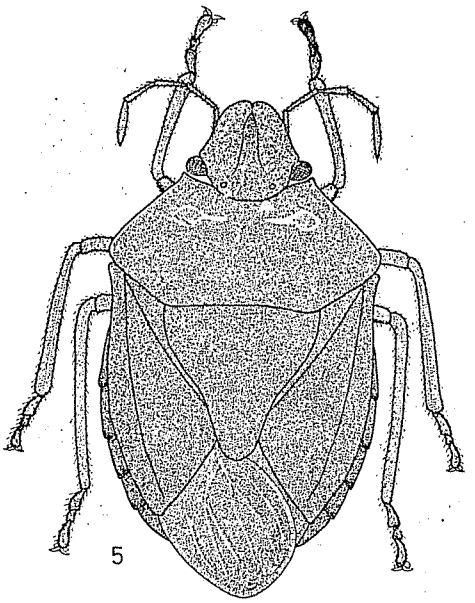
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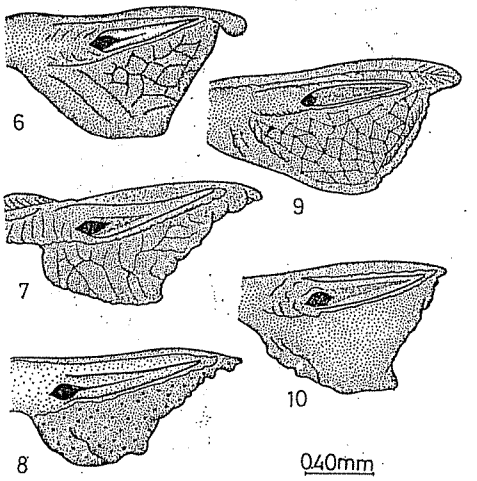
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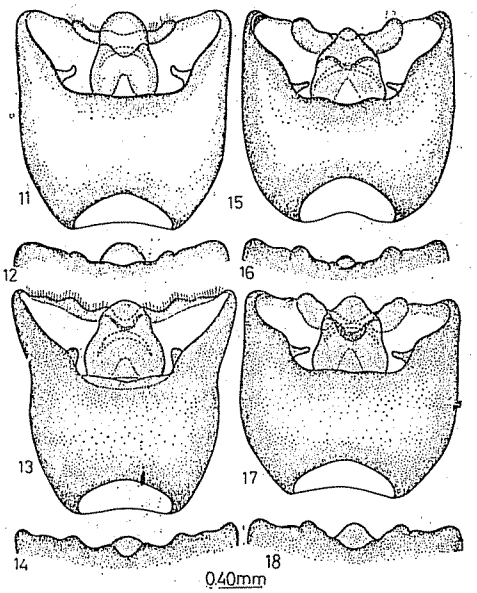
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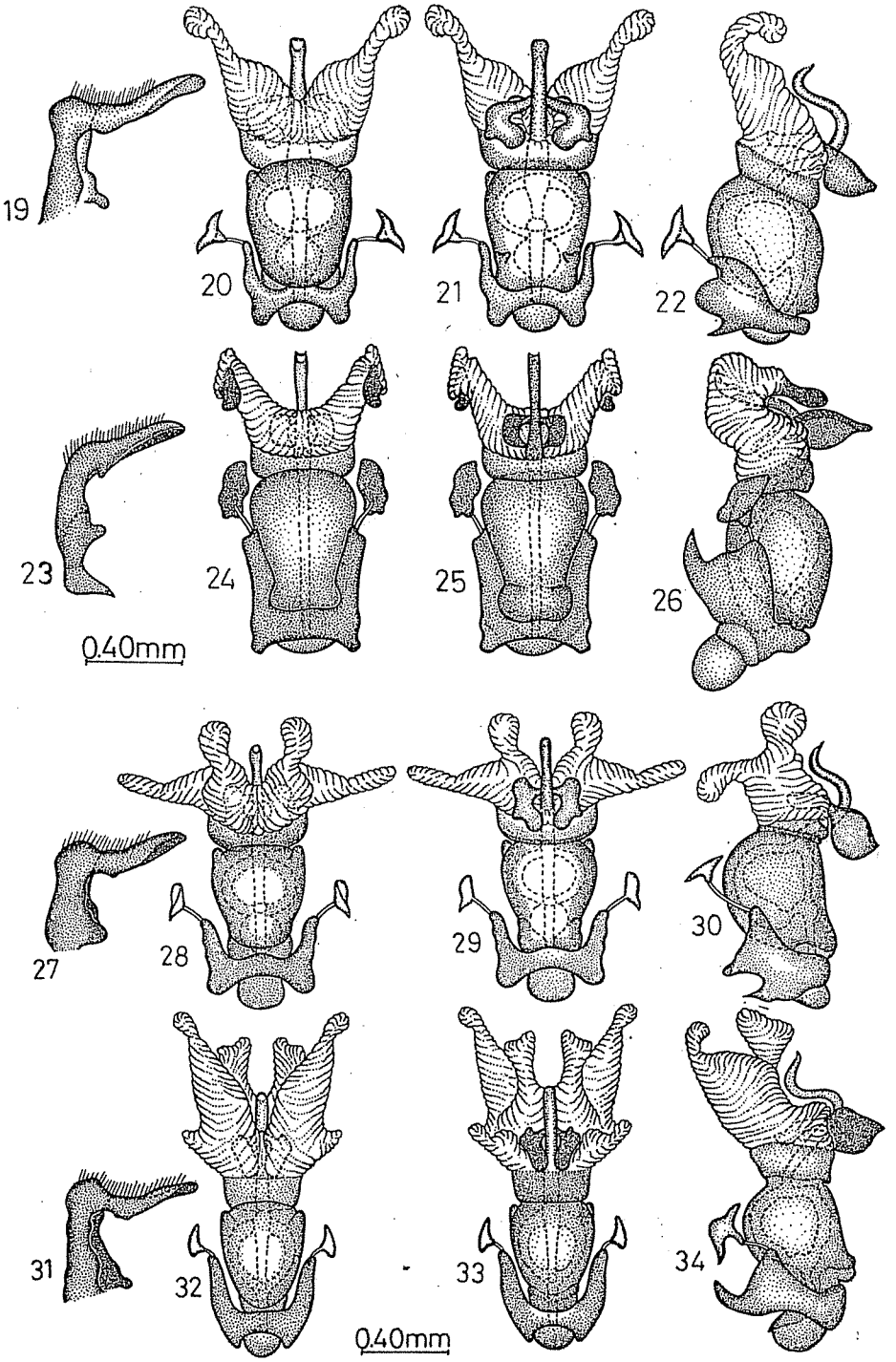
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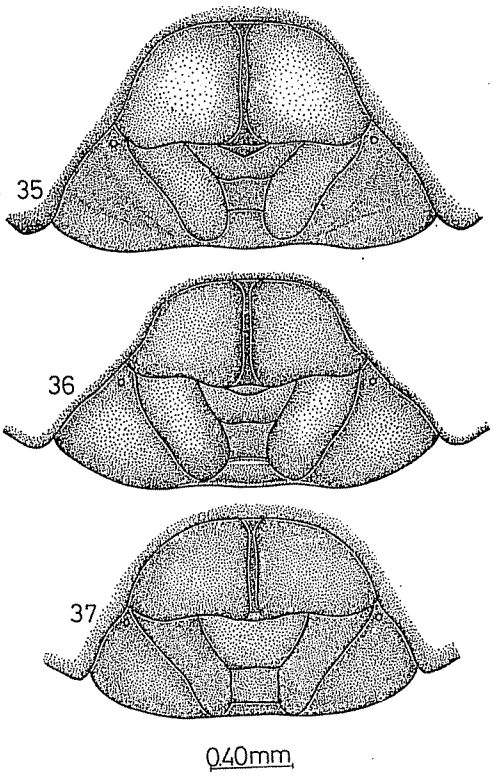
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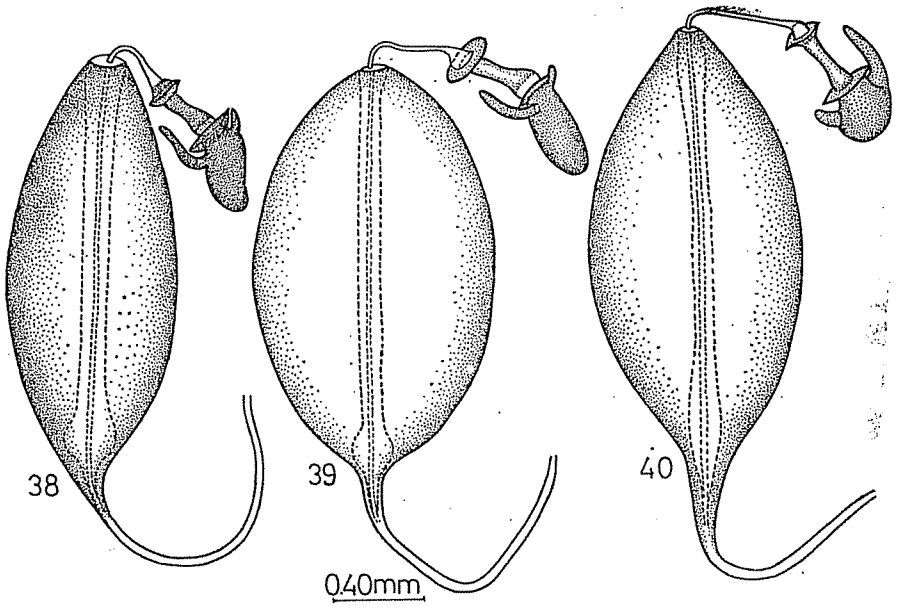
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