

Revision of the Palaearctic genus *Apodiphus* Spinola (Heteroptera : Pentatomidae) harmful to fruits and trees in Pakistan

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Revision of the Palaearctic genus *Apodiphus* SPINOLA (Heteroptera: Pentatomidae) harmful to fruits and trees in Pakistan

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The Palaearctic genus *Apodiphus* SPINOLA is revised and redescribed along with *A. integriceps* HORVATH and four new species harmful to fruits and trees in Pakistan, with reference to metathoracic scent gland complex (including evaporatorium, peritrema and ostiole) and male and female genitalia. A key to all its 9 actually known species is presented with a brief note on their relationships.

Keywords: *Apodiphus*, stinkbugs, revision, Pakistan.

INTRODUCTION

The first major work on *Apodiphus* was that of GHAURI (1977) who included in his redescription the type species *A. amygdali* (GERMAR), *A. integriceps* HORVATH, *A. pallidus* (HOBERLANDT) and his *A. murghzarus*, transferring *A. pilipes* HORVATH, included therein by DISTANT (1902), to *Paranevisanus* DISTANT, but he did not provide a key to its species.

AHMAD *et al.* (1974) included only *A. integriceps*. Later AHMAD (1979, 1980), in addition to the above species, included *A. murghzarus* in his faunal list. HOBERLANDT (1984) revised *Apodiphus* and redescribed *A. integriceps* and a new species *A. montanus* from Eastern Afghanistan. ABBASI (1986) in the published version of his Ph.D. thesis included only *A. integriceps* from Pakistan. Neither a key to all the species of *Apodiphus* nor a hypothesis on phylogenetic relationships of its known species are published to date.

To fill these gaps the genus *Apodiphus* was revised along with descriptions of *A. integriceps* and of the four new species *A. bilobatus*, *A. gilgitensis*, *A. jaglotensis* and *A. wahensis* from various localities of Pakistan with reference to their metathoracic scent gland complex (including evaporatorium, peritrema and ostiole) and male and female genitalia.

METHODS

During various expeditions more than 250 specimens of *Apodiphus* were collected on different fruit plants, viz. *Prunus americana* LINN. (apricot), *Juglans regia* L. (walnut), *Malus pumila* MILL. (apple), *Populus* sp. (poplar) and on willow *Salix acomophila* G. from various localities of the three provinces Punjab, Baluchistan and N.W.F.P., and from Gilgit in the Northern Areas of Pakistan.

For the inflation of aedeagi the technique of AHMAD (1986) was followed. For the dissection of spermatheca and for measurements, illustrations and descriptions the conventional techniques used by AHMAD & ABBASI (1974) were generally followed.

The specimens are deposited in the following collections: Natural History Museum, University of Karachi (NHMUK); Natural History Museum, Pakistan Agricultural Research Council (NIM); British Museum of Natural History, London (BMNH); Natural History Museum Basel, Switzerland (NHM).

DESCRIPTIONS

Apodiphus SPINOLA

Apodiphus SPINOLA, 1837:295; DALLAS, 1851:190; HOBERLANDT, 1959:499; STICHEL, 1960-62:524; PUCHKOV, 1965:172; KIRITCHENKO, 1966:452; AHMAD *et al.*, 1974:53; AHMAD, 1979:55; AHMAD, 1980:137; HOBERLANDT, 1984:81.

Type species: *Halys amygdali* GERMAR.

Body ochraceous with thick black punctures, except dark brown antennal segments and eyes; small blackish spot on each basal angle of scutellum; membrane of hemelytra light brown. Paraclypei slightly longer than clypeus, anterior margin more or less truncate; antecular distance usually longer than remainder of head; antennae with basal segment shorter than head apex, 2nd usually shorter than 3rd and about 2x length of basal segment; bucculae shorter than basal labial segment; labium reaching beyond hind coxae, basal labial segment usually equal to 4th. Pronotum usually longer than head, width usually 2.5x its length, lateral margins dentate, humeral angles subacute; metathoracic scent gland ostiolar peritreme usually lobe-like; scutellum usually 2x length of head, apex usually subround. Connexiva well exposed at repose with joints acutely produced.

Male genitalia: Pygophore broader than long, ventro-posterior margin sinuate, dorso-inner processes usually round; paramere L-shaped with stem usually large; aedeagus with distinct bilobed theca, postero-ventral margin concave, pair of distinct thumb-like lateral thecal appendages, a broad dorsal membranous conjunctival appendage, penial lobe medially fused forming X-shaped appearance, vesica distinctly passing beyond medially fused penial lobes.

Female genitalia: First gonocoxae wide apart; 2nd gonocoxae medially impinged; proctiger sinuate; spermatheca with pump region tube-like, bulb round with usually 3 finger-like processes, sclerotized median duct dilate distally and proximally.

Comparative note: *Apodiphus* is closely related to *Paranevisanus* in general external features but it can easily be distinguished by its narrower body, in males posterior margin of paramere crenulate, in females distal and proximal portions of sclerotized spermathecal duct dilate and by other characters as noted in the description.

Apodiphus amygdali (GERMAR)

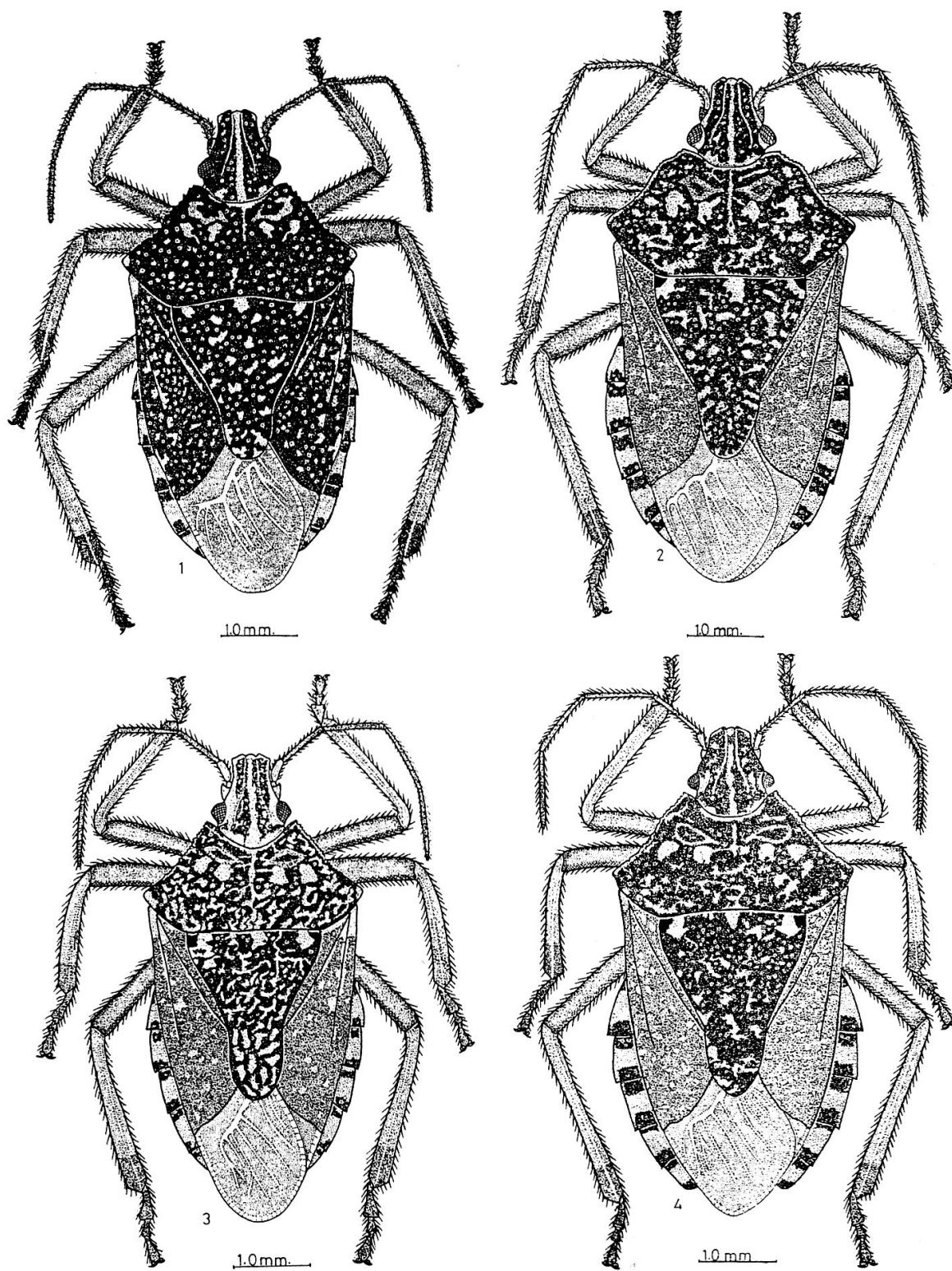
Halys amygdali GERMAR, 1817:284.

Apodiphus amygdali (GERMAR): HOBERLANDT, 1959:499; STICHEL, 1960-62:524; PUCHKOV, 1965:172; GHOURI, 1977:101; AHMAD *et al.*, 1974:53.

Apodiphus bilobatus sp.n.

(Fig. 1)

Colouration: Body ochraceous with thick black punctures except dark brown antennal segments and eyes; pinkish ocelli; small blackish spot on each basal angle of scutellum and on connexival joints; membrane of hemelytra light brown.



Figs 1-4. - 1: *Apodiphus bilobatus* sp.n., male (dorsal view). - 2: *Apodiphus gilgitensis* sp.n., male (dorsal view). - 3: *Apodiphus integriceps* HORVATH, male (dorsal view). - 4: *Apodiphus jaglotensis* sp.n., male (dorsal view).

Head: Paraclypei slightly longer than clypeus, anterior margin truncate; anteo-ocular distance distinctly longer than remainder of head; length of head shorter than its width; antennae with basal segment slightly shorter than head apex, 2nd distinctly shorter than 3rd and about 2x length of basal segment; bucculae reaching 0.5 of basal labial segment; labium just reaching 4th abdominal venter, 2nd segment slightly shorter than 3rd, basal segment nearly equal to 4th. For other quantitative data see Tab. 1.

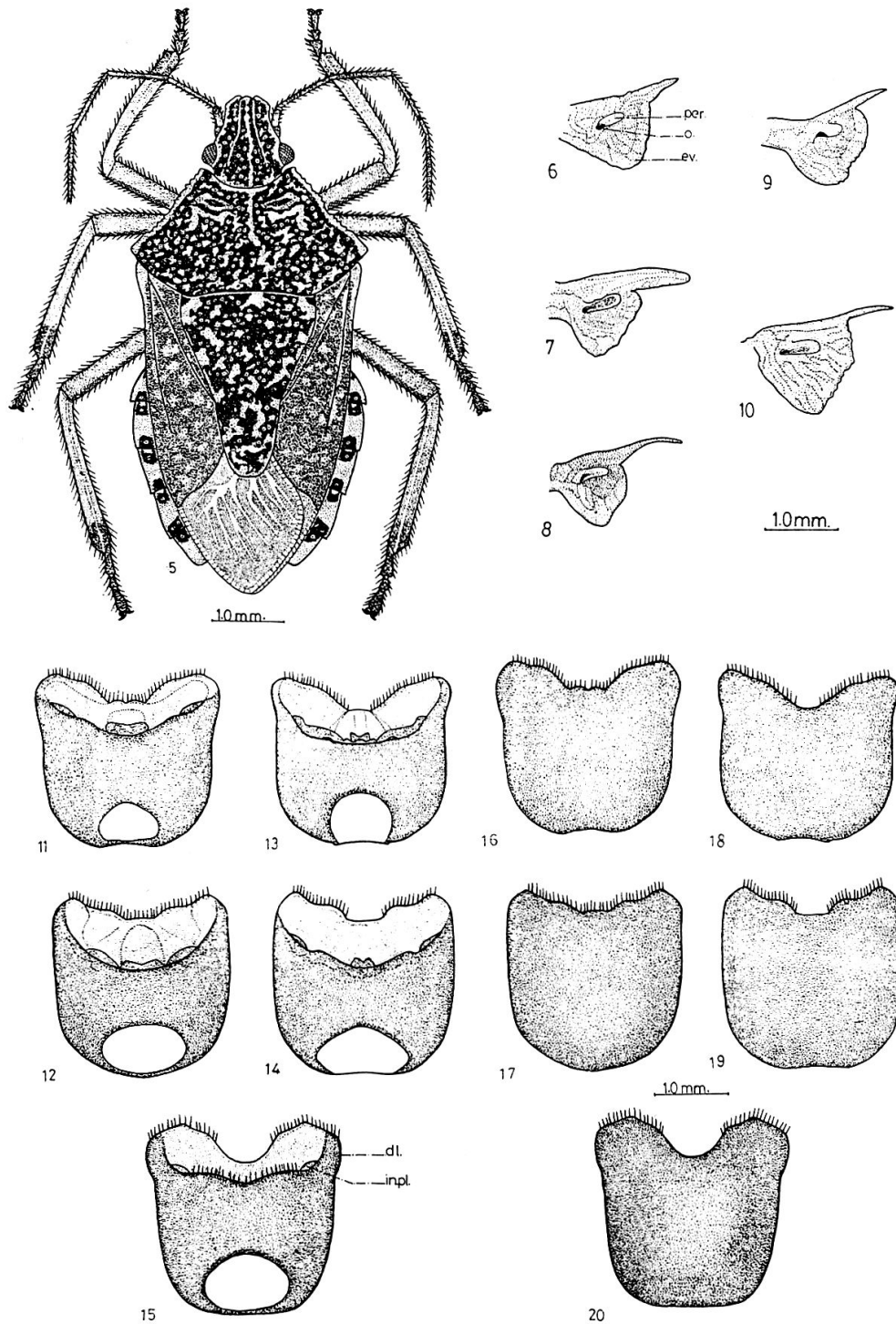
Tab. 1. Measurements in mm and ratios.

	<i>A. bilobatus</i>	<i>A. gilgitensis</i>	<i>A. integriceps</i>	<i>A. jaglotensis</i>	<i>A. wahensis</i>
length of antennal joints:					
1	0.9 (0.9-1.0)	0.9 (0.9-1.1)	1.1 (0.9-1.3)	0.9 (0.8-1.0)	0.8 (0.8-0.9)
2	1.8 (1.7-2.0)	1.9 (1.7-2.0)	2.0 (1.6-2.0)	1.9 (1.9-2.2)	1.9 (1.9-2.1)
3	2.1 (1.9-2.5)	2.3 (2.0-2.3)	2.1 (1.7-2.3)	2.1 (1.9-2.3)	1.9 (1.9-2.0)
4	2.2 (2.2-2.6)	2.5 (2.1-2.6)	2.3 (1.7-2.3)	2.2 (2.2-2.5)	2.4 (2.0-2.4)
5	1.9 (1.9-2.6)	2.4 (1.9-2.7)	2.5 (1.6-2.5)	2.3 (2.2-2.5)	2.4 (2.0-2.4)
antennal formula	1 < 2 < 5 < 3 < 4	1 < 2 < 3 < 5 < 4	1 < 2 < 3 < 4 < 5	1 < 2 < 3 < 4 < 5	1 < 2 = 3 < 4 = 5
length of labial joints:					
1	1.5 (1.5-1.7)	1.6 (1.4-1.6)	1.4 (1.3-1.6)	1.5 (1.4-1.6)	1.5 (1.5-1.5)
2	2.5 (2.5-2.8)	2.6 (2.2-2.8)	2.3 (2.3-2.7)	2.4 (2.3-2.8)	2.6
3	2.6 (2.5-2.8)	2.4 (2.2-2.9)	2.3 (2.3-2.7)	2.5 (2.4-2.9)	2.5
4	1.5 (1.4-1.5)	1.6 (1.4-1.6)	1.5 (1.4-1.6)	1.4 (1.4-1.5)	1.5
labial formula	1 = 4 < 2 < 3	1 = 4 < 3 < 2	1 < 4 < 2 = 3	4 < 1 < 2 < 3	1 = 4 < 3 < 2
length anteocular region	1.6 (1.6-1.8)	1.5 (1.4-1.7)	1.50 (1.5-1.8)	1.7 (1.6-1.7)	1.7 (1.7-1.9)
length remainder of head	1.3 (1.2-1.7)	1.3 (1.2-1.5)	1.30 (1.1-1.6)	1.4 (1.4-1.5)	1.5 (1.5-1.8)
head width	3.0 (2.9-3.3)	3.1 (2.9-3.2)	2.9 (2.9-3.2)	3.0 (3.0-3.3)	3.1 (3.1-3.4)
interocular distance	1.5 (1.5-1.8)	1.8 (1.6-1.9)	1.6 (1.6-1.7)	1.6 (1.5-1.7)	1.4 (1.4-1.8)
interocellar distance	1.0 (1.0-1.2)	1.1 (1.1-1.2)	1.0 (1.0-1.3)	1.0 (1.0-1.2)	1.1 (1.1-1.2)
pronotum: length	3.6 (3.5-4.2)	3.8 (3.8-4.3)	3.3 (3.2-3.7)	3.9 (3.7-4.2)	3.8 (3.8-4.1)
width	8.2 (7.9-9.5)	8.8 (8.2-9.9)	7.9 (7.7-8.8)	8.5 (8.3-9.5)	8.7 (8.7-9.5)
scutellum: length	5.8 (5.8-7.0)	6.3 (5.9-7.1)	6.1 (5.8-7.0)	6.3 (6.0-6.9)	6.6 (6.6-6.8)
width	4.7 (4.7-5.5)	5.2 (4.9-6.1)	4.8 (4.6-5.5)	5.9 (5.3-5.9)	5.0 (5.0-5.7)
Total length:					
male	15.7 (15.7-17.5)	16.9 (16.0-17.5)	–	17.5 (16.7-15.5)	17.9
female	18.5 (16.0-19.4)	18.8 (18.5-19.1)	–	18.4 (18.4-19.7)	19.4

Thorax: Pronotum 1.25x length of head, width about 2.25x its length, lateral margins dentate, humeral angles subacute; mesosternum carinate; metathoracic scent gland ostiolar peritreme (Fig. 6) small lobe-like, anterior and posterior margins convex, antero-lateral lobe of evaporating area spine-like, broad at base; scutellum distinctly 2x length of head, apex subrounded. For other quantitative data see Tab. 1.

Abdomen: Connexiva well exposed at repose with joints acutely produced.

Male genitalia: Pygophore (Figs 11 & 16) with dorso-posterior margin medially broadly produced, the latter concave, dorso-inner processes round, lateral lobes broadly round, ventro-posterior margin sinuate, medially split into two small lobes; paramere (Fig. 21) with stem large, blade large, apex toothed, outer margin broadly subround, inner margin concave; aedeagus (Figs 26 & 31) with distal lobe



Figs 5-20. – *Apodiphus wahensis* sp.n. – 5: male (dorsal view). *Apodiphus bilobatus* sp.n. – 6: metathoracic scent gland ostiole (ventral view); 11: pygophore (dorsal view); 16: pygophore (ventral view). – *Apodiphus gilgitensis* sp.n. – 7: metathoracic scent gland ostiole (ventral view); 12: pygophore (dorsal view); 17: pygophore (ventral view). – *Apodiphus integriceps* HORVATH – 8: metathoracic scent gland ostiole (ventral view); 13: pygophore (dorsal view); 18: pygophore (ventral view). – *Apodiphus jaglotensis* sp.n. – 9: metathoracic scent gland ostiole (ventral view); 14: pygophore (dorsal view); 19: pygophore (ventral view). – *Apodiphus wahensis* sp.n. – 10: metathoracic scent gland ostiole (ventral view); 15: pygophore (dorsal view); 20: pygophore (ventral view). – per., peritreme; o., ostiole; ev., evaporating area; dl., dorso-lateral lobe; in.pl., inner plate.

of theca unilobed and broad with ventro-posterior margin deeply concave and cup-shaped, with a thumb-like lateral thecal appendage, dorso-posterior margin shallowly concave, dorsal membranous conjunctival appendage broad, trilobed, longer than penial lobes, latter equal to vesica.

Female genitalia (Fig. 36): First gonocoxae partially fused, posterior margins sinuate; posterior margin of fused 8th paratergites straight; 2nd gonocoxae medially notched; proctiger slightly concave; 9th paratergites truncate at apices; spermatheca (Fig. 41) with pump region tube-like, medially convex, bulb broad, round, with three finger-like processes of about equal length, distal spermathecal duct longer than proximal one.

Material examined: Holotype ♂, PAKISTAN: Baluchistan; Fort Sandeman, on *Prunus americana* LINN. (apricot) leg. Q.A. ABBASI, 3-6-1969 deposited in NHMUK. Paratypes: 4 ♂♂, 5 ♀♀, same data as holotype, deposited in NHMUK. Other specimens: 32 ♂♂, 64 ♀♀, same data, deposited in NHMUK and NHM.

Comparative note: It is most closely related to *A. murghzarus*, in having paraclypei always longer than clypeus; labium with 2nd and 3rd segments unequal and, in males, dorso-inner processes of pygophore round, but it can easily be distinguished from it by having width of pronotum less than 3x length of head; head shorter than its width, ostiolar peritreme with convex anterior and posterior margins and by other characters of male and female genitalia as noted in the key and description.

Apodiphus gilgitensis sp.n.

(Fig. 2)

Colouration: Body ochraceous with thick black punctures except dark brown 2nd to 5th antennal segments and eyes; light ochraceous ocelli; small blackish spot on each basal angle of scutellum; connexival joints ochraceous; black punctures on each leg; membrane of hemelytra light brown.

Head: Paraclypei slightly longer than clypeus, anterior margin truncate; antocular distance slightly longer than remainder of head; length shorter than its width; antennae with basal segment slightly shorter than head apex, 2nd distinctly shorter than 3rd and about 2x length of 1st; bucculae reaching 0.75 of basal labial segment, labium just reaching 4th abdominal sternite, 2nd segment slightly longer than 3rd, 1st equal to 4th. For other quantitative data see Tab. 1.

Thorax: Pronotum distinctly more than 1.25x length of head, width slightly more than 2.25x its length, lateral margins dentate, humeral angles subacute; mesosternum carinate; ostiolar peritreme (Fig. 7) large, lobe-like, anterior margin sinuate, posterior margin straight, antero-lateral lobe of evaporating area large and broad; scutellum distinctly more than 2x length of head, apex subround. For other quantitative data see Tab. 1.

Abdomen: Connexiva well exposed at repose, joints acutely produced.

Male genitalia: Pygophore (Figs 12 & 17) with dorso-posterior margin medially broadly produced, the latter inpushed, dorso-inner processes round, lateral lobes subacute, ventro-posterior margin sinuate, medially slightly convex; paramere (Fig. 22) with stem reduced, blade large, apex acute, outer margin broadly round, inner margin truncate; aedeagus (Figs 27 & 32) with distal lobe of theca unilobed and broad, ventro-posterior margin deeply concave and somewhat V-shaped, with a pair of a thumb-like lateral thecal appendages, dorso-posterior margin shallowly concave, dorsal membranous conjunctival appendage broad

and somewhat quadrangular, shorter than penial lobes, latter slightly longer than vesica.

Female genitalia (Fig. 37): First gonocoxae wide apart, posterior margin sinuate; posterior margin of fused 8th paratergites medially sinuate; 2nd gonocoxae medially slightly inpushed; proctiger sinuate; 9th paratergites truncate at apices; spermatheca (Fig. 42) with pump region tube-like, medially convex, bulb short, round, with three finger-like processes of about equal length, distal spermathecal duct slightly longer than proximal one.

Material examined: Holotype ♂, Northern Areas: Gilgit, on *Salix acomophila* (willow) leg. A.A. KHAN, 6-8-1975 deposited in NHMUK; Paratypes: 4 ♂♂, 5 ♀♀, same data as holotype and on *Populus* sp., *Malus pumila* MILL.; 2-6-1975, 13-7-1975, 11-8-1975 and 11-6-1976, deposited in NHMUK, NHM and in AHMAD'S coll. Other specimens: 10 ♂♂, 7 ♀♀, Northern Areas: Gilgit and Manor, on *Salix acomophila* (willow), *Populus* sp., *Malus pumila* MILL., leg. A.A. KHAN, 2-6-1974, 22-7-1974, 7, 11-8-1975, deposited in NHMUK and in Ahmad's coll.

Comparative note: This species is closely related to *A. wahensis* and *A. jaglontensis* in having length of head equal or shorter than its width; but it can easily be distinguished from them by having labium reaching 4th abdominal sternite, ostiolar peritreme very large with anterior margin sinuate and by other characters of male and female genitalia as noted in the key and description.

Apodiphus integriceps HORVATH

(Fig. 3)

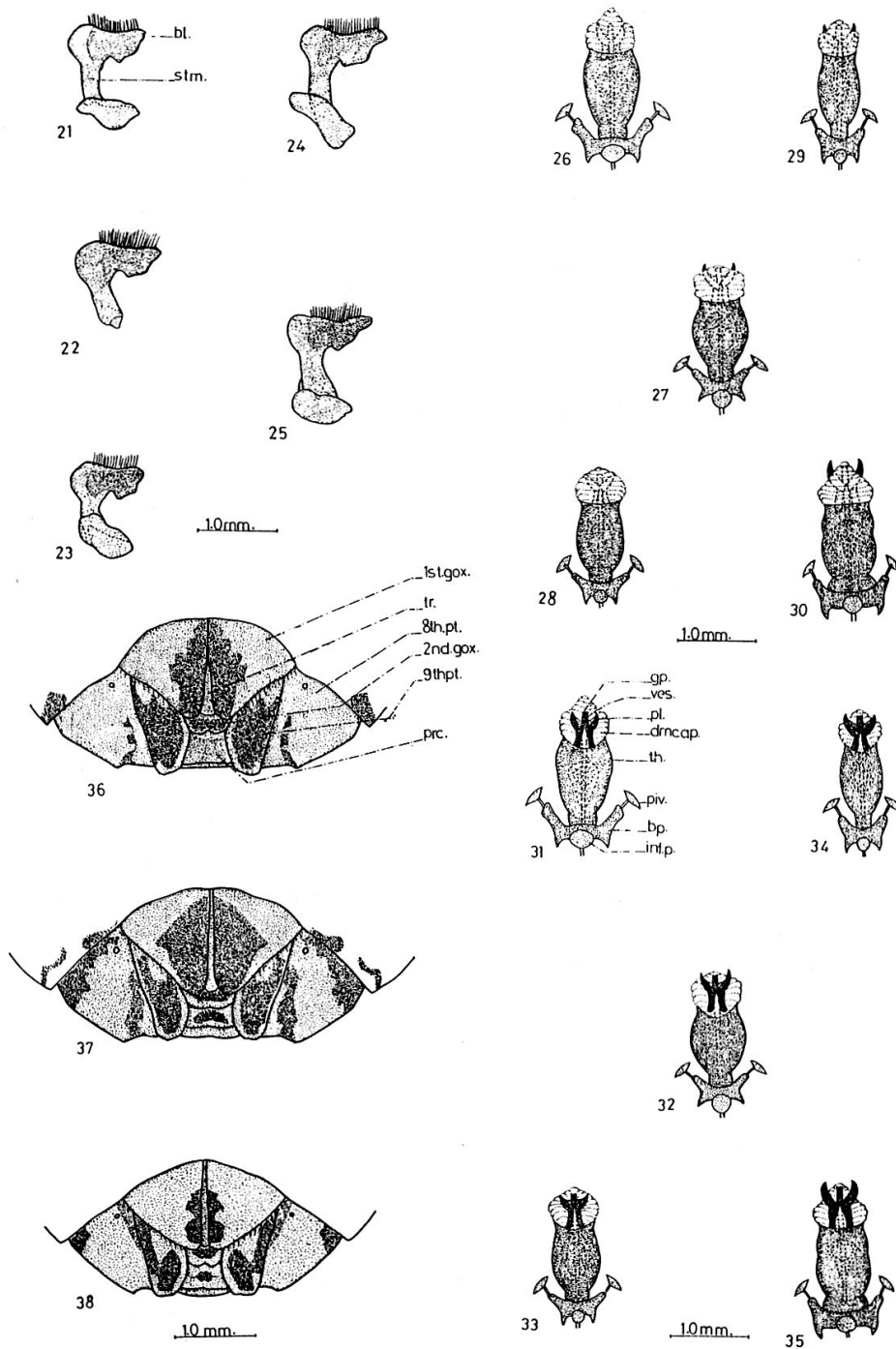
Apodiphus integriceps HORVATH, 1888:172; AHMAD *et al.*, 1974:53; GHOURI, 1977:103; AHMAD, 1979:55; AHMAD, 1980:137; HOBERLANDT, 1984:80.

Colouration: Body ochraceous with thick black punctures, except dark brown 2nd to 5th antennal segments and eyes; pinkish ocelli; small blackish spot on each basal angle of scutellum; connexival joints light ochraceous with fine black punctures on each leg; membrane of hemelytra light brown.

Head: Paraclypei equal to clypeus, anterior margin truncate; anteocular distance longer than remainder of head, head length shorter than its width, 2nd antennal segment slightly shorter than 3rd and about 2x length of 1st; bucculae reaching 0.75 of basal labial segment; labium reaching to 3rd abdominal sternite, 2nd segment equal to 3rd, 1st nearly equal to 4th. For other quantitative data see Tab. 1.

Thorax: Pronotum slightly less than 1.5x length of head, width distinctly more than 2.25x its length, lateral margins dentate, humeral angles subacute; mesosternum carinate; ostiolar peritreme (Fig. 8) large, lobe-like, anterior margin convex, posterior margin concave, anterolateral lobe of evaporating area large, sickle-shaped; scutellum 2.25x length of head, apex subround. For other quantitative data see Tab. 1.

Male genitalia: Pygophore (Figs 13 & 18) with dorsoposterior margin medially narrowly produced, the latter inpushed, dorso-inner processes sinuate, lateral lobes narrow and round, ventroposterior margin sinuate, medially slightly convex; paramere (Fig. 23) with stem large, blade large, outer margin round, inner margin concave; aedeagus (Figs 28 & 33) with distal lobe of theca uni-lobed and broad with ventro-posterior margin concave and V-shaped, with a thumb-like lateral thecal appendage, dorso-posterior margin shallowly concave, dorsal membranous conjunctival appendage broad, somewhat oval, longer than penial lobes, latter nearly equal to vesica.



Figs 21-38. – *Apodiphus bilobatus* sp.n. – 21: paramere (inner view); 26: inflated aedeagus (dorsal view); 31: inflated aedeagus (ventral view); 36: terminalia (ventral view). – *Apodiphus gilgitensis* sp.n. – 22: paramere (inner view); 27: inflated aedeagus (dorsal view); 32: inflated aedeagus (ventral view), terminalia (ventral view). – *Apodiphus integriceps* HORVATH – 23: paramere (inner view); 28: inflated aedeagus (dorsal view); 33: Inflated aedeagus (ventral view); 38: Terminalia (ventral view). – *Apodiphus jaglotensis* sp.n. – 24: paramere (inner view); 29: inflated aedeagus (dorsal view); 34: inflated aedeagus (ventral view). – *Apodiphus wahensis* sp.n. – 25: paramere (inner view); 30: inflated aedeagus (ventral view); 35: inflated aedeagus (ventral view). – bl., blade; stm., stem; 1st.gox., first gonocoxae; tr., triangulin; 8th.pt., eighth paratergites; 2nd.gox., second gonocoxae; 9th.pt., ninth paratergites; prc., proctiger; gp., gonopore; ves., vesica; pl., penial lobe; dmc.ap., dorsal membranous conjunctival appendage; th., theca; piv., pivot; bp., basal plate; inf.p., inflatory pump.

Female genitalia (Fig. 38): First gonocoxae wide apart, posterior margin convex; posterior margin of fused 8th paratergites medially convex; 2nd gonocoxae medially notched; proctiger sinuate; 9th paratergites truncate at apices; spermatheca (Fig. 43) with pump region tube-like, narrow distally, bulb short, round with three finger-like processes of unequal length, distal spermathecal duct slightly longer than proximal one.

Material examined: 1 ♂, PAKISTAN: Baluchistan; Quetta, on *Malus pumila* MILL. (apple); leg. M. MOIZUDDIN, 27-7-1983; compared with type by I. AHMAD, deposited in NHMUK. Other specimens: 74 ♂♂, 79 ♀♀, PAKISTAN: Baluchistan; Quetta, Munzaky, Sariab, Fort Sandeman, Pishin, and NWFP: Abbottabad, on *Malus pumila* MILL. (apple), *Prunus americana* LINN. (apricot); leg. I. AHMAD, M. MOIZUDDIN, Q.A. ABBASI, M. ASLAM, M.A.H. QADRI and A.A. KHAN; 16-7-1966, 18-8-1967, 19-8-1967, 20-8-1967, 3-6-1969, 22-7-1971, 9-5-1974, 10-5-1974, 23-7-1983, 24-7-1983, 25-7-1983, 28-7-1983, 30-7-1983; deposited in NHMUK, BMNH, NHM and NIM.

Comparative note: This species is most closely related to *A. pallidus* in having paraclypei equal to clypeus; ostiolar complex with anterior margin of evaporating area large and narrowly produced anteriorly, but it can easily be distinguished from it by having labium with 2nd and 3rd segments equal and by other characters of genitalia as noted in the key and description.

Apodiphus jaglotensis sp.n.

(Fig. 4)

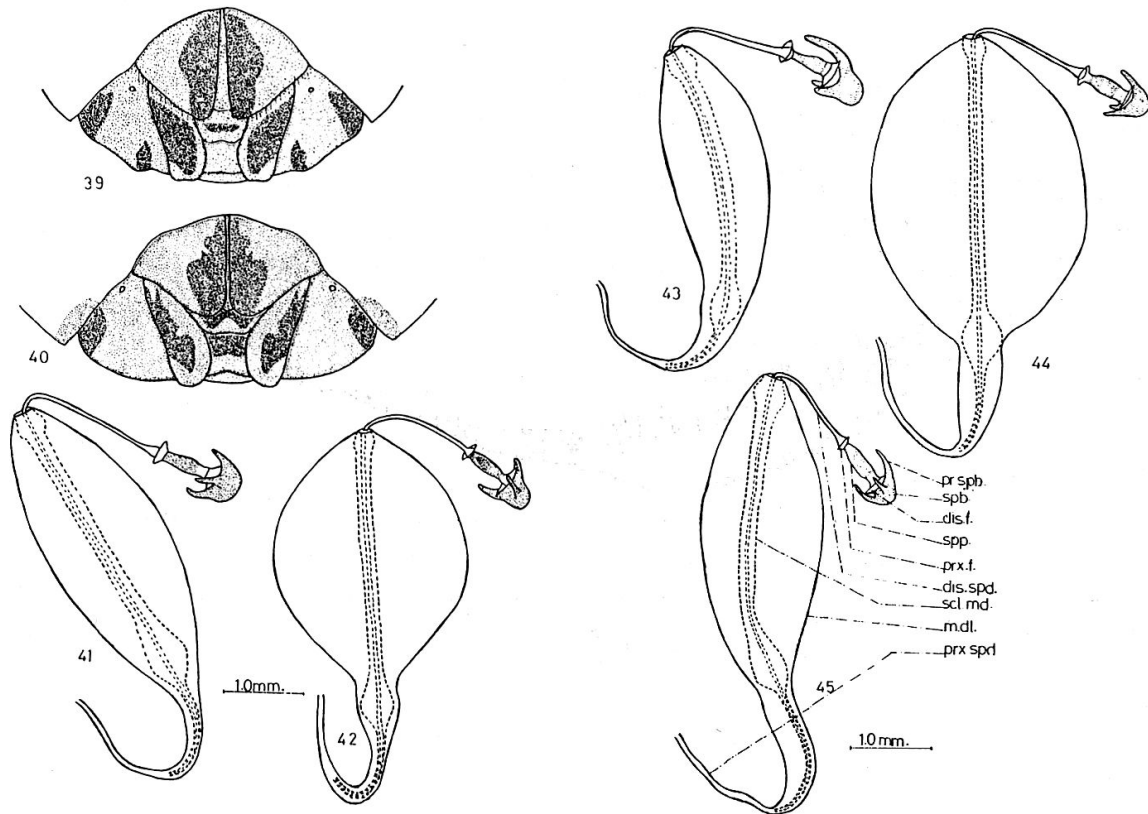
Colouration: Body ochraceous with thick black punctures except dark brown 2nd to 5th antennal segments and eyes; pinkish ocelli; small blackish spot on each basal angle of scutellum, connexival joints; slightly reddish clavus, embolium and membrane of hemelytra light brown.

Head: Paraclypei slightly longer than clypeus, anterior margin truncated; anteocular distance longer than remainder of head, length equal to its width; antennae with basal segment nearly equal to head apex, 2nd segment slightly shorter than 3rd, and 2x length of 1st; bucculae reaching 0.25 of basal segments; labium reaching 3rd abdominal sternite, 2nd segment usually shorter than 3rd, basal segment nearly equal to 4th. For other quantitative data see Tab. 1.

Thorax: Pronotum slightly more than 1.25x length of head, width slightly less than 2.25x its length, lateral margins dentate, humeral angles subacute; mesosternum carinate; ostiolar peritreme (Fig. 9) small, lobe-like, anterior margin convex, posterior margin straight, antero-lateral lobe of evaporating area small, spoon-like; scutellum about 2x length of head, apex subacute. For other quantitative data see Tab. 1.

Abdomen: Connexiva well exposed at repose with joints acutely produced.

Male genitalia: Pygophore (Figs 14 & 19) with dorso-posterior margin medially narrowly produced, the latter inpushed, dorso-inner processes round, lateral lobes subacute, ventro-posterior margin sinuate, medially straight; paramere (Fig. 24) with stem large, blade large, apex acute, outer margin round, inner margin truncate; aedeagus (Figs 29 & 34) with distal lobe of theca uni-lobed and narrow with ventro-posterior margin deeply concave and V-shaped, pair of thumb-like lateral thecal appendages, dorsoposterior margin shallowly concave, dorsal membranous conjunctival appendage broad and trilobed, shorter than penial lobes, latter slightly longer than vesica.



Figs 39-45. – *Apodiphus bilobatus* sp.n. – 41: spermatheca (dorsal view). – *Apodiphus gilgitensis* sp.n. – 42: spermatheca (dorsal view). – *Apodiphus integriceps* Horvath – 43: spermatheca (dorsal view). – *Apodiphus jaglotensis* sp.n. – 39: terminalia (ventral view), 44: spermatheca (dorsal view). – *Apodiphus wahensis* sp.n. – 40: terminalia (ventral view), 45: spermatheca (dorsal view). – pr.spb., spermathecal process; spb., spermathecal bulb; dis.f., distal flange; spp., spermathecal pump; prx.f., proximal flange; dis.spd., distal spermathecal duct; scl.md., sclerotized median duct; m.d., median dilation; prx.spd., proximal spermathecal duct.

Female genitalia (Fig. 39): First gonocoxae wide apart, posterior margin sinuate; posterior margin of fused 8th paratergites medially slightly convex; 2nd gonocoxae medially inpushed, proctiger sinuate; 9th paratergites concave at apices; spermatheca (Fig. 44) with pump region tube-like, broad medially, bulb short, rounded with three finger-like processes of about equal length, distal spermathecal duct slightly shorter than proximal one.

Material examined: Holotype ♂, PAKISTAN: Northern Areas, Jaglot, on *Salix acomophila* G. (willow); leg. A.A. KHAN, 9-8-1975 deposited in NHMUK. Paratypes: 7 ♂♂, 5 ♀♀, Jaglot and Peshawar, on *Salix acomophila* G. (willow); leg. A.A. KHAN, N.A. RANA, I. AHMAD, 9-8-1975 and 28-6-1976; deposited in NHMUK and NHM.

Comparative note: This species is most closely related to *A. wahensis* in having ostiolar peritreme comparatively shorter with anterior margin concave, but it can easily be distinguished from it by having length of head equal to its width, basal labial segment shorter than 4th and by other characters of male and female genitalia as noted in the key and description.

***Apodiphus montanus* HOBERLANDT**

Apodiphus montanus HOBERLANDT, 1984:81.

***Apodiphus murghzarus* GHAURI**

Apodiphus murghzarus GHAURI, 1977:104; AHMAD, 1979:55; AHMAD, 1980:137.

***Apodiphus pallidus* (HOBERLANDT)**

Neonevisanus pallidus (HOBERLANDT), 1959:499.

Apodiphus suazovi KIRITCHENKO, 1966:452.

***Apodiphus wahensis* sp.n.**

(Fig. 5)

Colouration: Body dark ochraceous with thick black punctures except dark brown 2nd to 5th antennal segments and eyes; reddish ocelli; small blackish spot on each basal angle of scutellum; hemelytra and connexival joints light ochraceous; with fine black punctures on each leg; membrane of hemelytra light brown.

Head: Paraclypei slightly longer than clypeus, anterior margin truncate, antecular distance distinctly longer than remainder of head, head longer than its width; antennae with basal segment shorter than apex, 2nd segment equal to 3rd and about 2x length of 1st; bucculae reaching 0.75 of basal labial segment; labium reaching 3rd abdominal sternite; 2nd segment slightly longer than 3rd, 1st equal to 4th. For other quantitative data see Tab. 1.

Thorax: Pronotum slightly less than 1.25x length of head, width slightly more than 2.25x its length, lateral margins dentate; humeral angles subacute; mesosternum carinate; ostiolar peritreme (Fig. 10) large, lobe-like, anterior margin convex, posterior margin straight, antero-lateral lobe of evaporating area small spine-like; scutellum slightly longer than 2x length of head; apex subround. For other quantitative data see Tab. 1.

Abdomen: Connexiva well exposed at repose with joints acutely produced.

Male genitalia: Pygophore (Figs 15 & 20) with dorso-posterior margin medially inpushed, dorso-inner processes round, lateral lobes subacute, ventro-posterior margin sinuate, medially concave; paramere (Fig. 25) with stem large, blade large, apex subacute, outer margin narrow, subround, inner margin truncate, posterior margin medially notched; aedeagus (Figs 30 & 35) with distal lobe of theca bi-lobed and broad with ventro-posterior margin concave and cup-shaped, pair of thumb-like lateral thecal appendages, dorso-posterior margin straight, dorsal membranous conjunctival appendage broad, somewhat trilobed, shorter than penial lobes, latter longer than vesica.

Female genitalia (Fig. 40): First gonocoxae wide apart, posterior margin sinuate; posterior margin of fused 8th paratergites medially slightly convex; 2nd gonocoxae medially sinuate; proctiger sinuate; 9th paratergites round at apices; spermatheca (Fig. 45) with pump region tube-like, broad medially, bulb short, round with three finger-like processes of about equal length, distal spermathecal duct slightly shorter than proximal one.

Material examined: Holotype ♂, PAKISTAN: Punjab; Wah Cantt., on *Juglans regia* L. (walnut); leg. I. AHMAD, 13-8-1976, deposited in NHMUK. Paratype 1 ♀,

PAKISTAN: Punjab; Wah Cantt., on *Juglans regia* L. (walnut); leg. M. MOIZUD-DIN, 18-8-1976, deposited in NHMUK.

Comparative note: This species is most closely related to *A. jaglotensis* in having labium reaching 3rd abdominal venter and scutellum always 2x length of head; but it can easily be distinguished from it by having basal labial segment equal to 4th, ostiolar peritreme large and by other characters of male and female genitalia as noted in the key and description.

KEY TO THE SPECIES

1. Outer angles of paraclypei protruded forward, metathoracic scent gland complex with posterior margin of evaporating area folded, in males posterolateral margin of paramere toothed, in females 2nd gonocoxae highly convex, 9th paratergites divided by a transverse suture, spermathecal bulb with longer tubule branched *amygdali* (GERMAR)
- Outer angles of paraclypei always shorter than the inner angles, metathoracic scent gland complex with posterior margin of evaporating area and paramere, 9th paratergites and spermatheca not as above 2
2. Metathoracic ostiolar peritreme very small with posterior margin of evaporating area round, lateral lobes of pygophore acute, paramere with inner margin of stem toothed, in females proctiger straight *pallidus* (HOBERLANDT)
- Metathoracic scent gland complex including evaporatorium, peritreme, ostiole, pygophore, paramere and spermatheca not as above 3
3. Labium with 2nd and 3rd segments equal, metathoracic scent gland complex with anterior margin of evaporating area narrowly produced laterad, dorso-inner process of pygophore sinuate, spermathecal bulb with a very large and two small processes..... *integriceps* HORVATH
- Labium with 2nd and 3rd segments unequal, metathoracic scent gland complex with anterior margin of evaporating area and pygophore and processes on spermathecal bulb not as above 4
4. Width of pronotum equal to or more than 3x length of head, apex of ostiolar peritreme truncate, posterior margin of proctiger straight, spermathecal bulb with 5 finger-like processes *murghzarus* GHAURI
- Width of pronotum less than 3x length of head, apex of ostiolar peritreme round, posterior margin of proctiger concave, spermathecal bulb with 3 finger-like processes 5
5. Length of head shorter than its width, ostiolar peritreme with convex anterior and posterior margins, ventroposterior margin of pygophore medially bilobed, paramere with a small tooth at apex of blade, 1st gonocoxae partially fused *bilobatus* sp.n.
- Length of head equal to or longer than its width, ostiolar peritreme, pygophore and paramere not as above, 1st gonocoxae wide apart 6
6. Ostiolar peritreme anteriorly with small acute tubercle, terminal margin of pygophore medially with a broad deep V-shaped excavation, aedeagus with dorsal membranous conjunctival appendage very small *montanus* HOBERLANDT
- Ostiolar peritreme without a tubercle, pygophore and aedeagus not as small as above 7

7. Labium reaching 4th abdominal sternite, scutellum more than 2x length of head, ostiolar peritreme very large with anterior margin sinuate, ventro-posterior margin of pygophore slightly convex, blade of paramere acute at apex, fused 8th paratergites medially sinuate, 9th paratergites truncate at apices, spermatheca with pump region medially convex *gilgitensis* sp.n.
- Labium reaching 3rd abdominal sternite, scutellum 2x length of head, ostiolar peritreme comparatively short, with anterior margin convex, pygophore, paramere and fused 8th and 9th not as above 8
8. Head longer than its width, 2nd antennal segment equal to 3rd, basal labial segment equal to 4th, apex of scutellum subround *wahensis* sp.n.
- Length of head equal to its width, 2nd antennal segment shorter than 3rd, basal labial segment shorter than 4th, apex of scutellum subacute *jaglotensis* sp.n.

RELATIONSHIPS

Apodiphus, recorded from Italy, the former Yugoslavia, Albania, Bulgaria, Syria, Iraq, Turkey, South Russia and Iran (STICHEL, 1960-1962), Afghanistan, North India, (Karakorum) and also in Central Asia, Italy, Upper Asia, Iran and Turkmania (PUCHKOV, 1965), appears to be split into two groups. The first group includes the species *A. integriceps* and *A. pallidus*, which have paraclypei equal to clypeus and ostiolar complex with anterior margin of evaporating area large and narrowly produced anteriorly. Among these *A. integriceps* shows spermathecal bulb with one highly developed and two small processes as its autapomorphy. Its wide distribution in the Palaearctic region probably shows it to be more adaptive and supports the above conclusion, whereas the latter appears restricted only to Iran.

The second group appears diverged with the following seven species: *A. amygdali*, *A. bilobatus*, *A. gilgitensis*, *A. jaglotensis*, *A. murghzarus*, *A. montanus* and *A. wahensis*, having paraclypei always longer than clypeus as their synapomorphy. Among these *A. murghzarus* with pronotum equal or more than 3x length of head and spermathecal bulb with five finger-like processes reflects its autapomorphies.

In the other species there appear to be two lines of evolution. The first line includes *A. amygdali* which has bizarre autapomorphy of paraclypei gradually rising laterally forming a V-shaped channel at apex. This species appears widely distributed in Europe.

The second line includes the following five species: *A. bilobatus*, *A. gilgitensis*, *A. jaglotensis*, *A. montanus* and *A. wahensis*, which share broad inner angles of paraclypei and spermathecal bulb with 3 finger-like processes. Among these *A. bilobatus* has shorter head, shorter than its width and in males ventroposterior margin of pygophore medially split into two small lobes which shows its autapomorphies.

The remaining three species appear diverged, having their first gonocoxae always wide apart as their synapomorphy. Among these *A. montanus* appears diverged, with scutellum broadly round at apex and ostiolar peritreme anteriorly with small acute tubercle as its autapomorphies, while *A. jaglotensis* with subacute apex of scutellum reflects its autapomorphy.

Among the remaining two species *A. gilgitensis* appears distinctly diverged with a much longer labium reaching to 4th abdominal sternite and ostiolar peritreme remarkably large and blade of paramere acute at apex as its autapomorphies while *A. wahensis* appears separated with blade of paramere subacute at apex and 9th paratergites round at apices.

REFERENCES

- ABBASI, Q.A. 1986. Morpho-taxonomic studies of the family Pentatomidae LEACH, 1815 (Heteroptera: Pentatomomorpha) of South Asia (Pakistan, Azad Kashmir and Bangladesh) with reference to phylogeny of the group. *Pakistan J. ent. Suppl.* 5: 1-279.
- AHMAD, I. 1979. A revision of the superfamily Coreoidea and Pentatomoidea (Heteroptera: Pentatomomorpha) from Pakistan with phylogenetic considerations. *Karachi ent. Soc. Suppl.* 4(1): 1-113.
- AHMAD, I. 1980. *Insect fauna of Pakistan and Azad Kashmir – some groups within the order Hemiptera*. Proc. 1st Pakistan Congr. Zool. Ser. A, pp. 115-155.
- AHMAD, I. 1986. A foot-proof-technique for inflation of male genitalia in Hemiptera (insecta). *Heteroptera News Letter*, 4(1985): 2-3, and *Pakistan J. ent.* 1(2): 111-112.
- AHMAD, I. & ABBASI, Q.A. 1974. A new genus and a new species of Halyini STÅL (Heteroptera) from Pakistan with phylogenetic considerations. *J. Sci. Univ. Karachi* 3(1-2): 60-65.
- AHMAD, I., ABBASI, Q.A. & KHAN, A.A. 1974. Generic and supergeneric keys with reference to a check list of pentatomid fauna of Pakistan (Heteroptera: Pentatomidae) with notes on their distribution and food plants. *Karachi ent. Soc. Suppl.* 1: 1-103.
- DALLAS, W.S. 1851. *List of specimens of hemipterous insects in the collection of the British Museum*. Brit. Mus. Publ., London. 368 pp.
- DISTANT, W.L. 1902. *The fauna of British India including Ceylon and Burma, Rhynchota (Heteroptera)*. Taylor & Francis, London. 438 pp.
- GERMAR, E.F. 1817. *Reise nach Dalmatien and in das Gebiet von Ragusa*, pp. 1-323.
- GHAURI, M.S.K. 1977. A revision of *Apodiphus* SPINOLA (Heteroptera: Pentatomidae). *Bull. ent. Res.* 67: 97-106.
- HOBERLANDT, L. 1959. Hemiptera: Heteroptera from Iran. II. *Sb. ent. Odd. nar Mus. Praze.* 33: 497-523.
- HOBERLANDT, L. 1984. Heteroptera of Afghanistan. Acanthosomatidae, Cyndnidae, Scutelleridae and Pentatomidae. *Acta ent. Mus. Nat. Pragae*, 17: 69-121.
- HORVATH, G. 1888. Heteroptera Anatolico in regione Brussae collecta. *Termesz. Fuzetek*, 7: 21-30.
- KIRITCHENKO, A.N. 1966. Hemiptera-Heteroptera collected by D.M. Steinberg in Iran in 1955. *Ent. obozr.* 45: 798-805.
- PUCHKOV, V.G. 1965. *Shield-bugs of Central Asia (Hemiptera: Pentatomoidea)*. Acad. Sci. Kirgiskoi, S.S.R. Inst. Biol. Frunze (In Russian).
- SPINOLA, M. 1837. *Essai sur les genres d'Insectes appartenants à l'ordre des Hémiptères, LIN., ou Rhynchotes, FABR., et la section des Hétéroptères*. Fab. Y. Gravier. 383 pp.
- STICHEL, W. 1960-62. *Illustrierte Bestimmungstabellen der Wanzen. II. Europa (Hemiptera: Heteroptera Europae)*. Vol. 4 (17): 513-544.

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