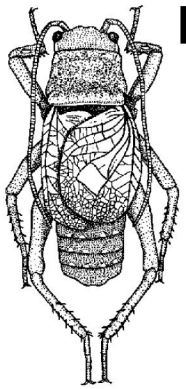

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REVIEW OF THE FAMILY CARPOSINIDAE (LEPIDOPTERA) FROM RUSSIAN FAR EAST

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Review of the moths of family Carposinidae from Far East of Russia is given. *Carposina maritima* **sp. n.** is described. Status of *C. viduana* Caradja is reinstated. New synonymy is proposed: *Meridarchis excisa* (Walsingham, 1900)=*M. crotalus* Diakonoff, 1989, **syn. n.**

KEY WORDS: Carposinidae, review, Far East, new species, new synonymy.

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Дан обзор молей семейства Carposinidae Дальнего Востока России. Описан новый вид *Carposina maritima* **sp. n.** Восстановлен статус *C. viduana* Caradja. Установлена новая синонимия: *Meridarchis excisa* (Walsingham, 1900) = *M. crotalus* Diakonoff, 1989, **syn. n.**

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INTRODUCTION

Four species of Carposinidae were recorded from Russian Far East (Diakonoff, 1989): *Carposina sasakii*, *C. askoldana*, *C. crotalus* and *Meridarchis excisa*. After

present investigation the composition of the Carposinidae distributed on Russian Far East is reconsidered. Results of that are stated below. Holotype and paratypes of described new species are kept in Institute of Biology and Pedology (Vladivostok).

FAMILY CARPOSINIDAE WALSINGHAM, 1897

Carposinae Walsingham, 1897, *Trans. ent. Soc. Lond.*: 60 (type genus: *Carposina* Herrich-Schäffer, 1853).

Carposinidae: Walsingham, in Sharp, 1907, *Fauna hawaii* 1(5): 654.

DIAGNOSIS. Moths small and moderate in size (12-30 mm), with tufts of raised scales on the forewings. Sexual dimorphism is shown in size and shape of labial palpi and antenna. Labial palpi in female often with longer and thickened second segment (Figs 1, 2). Male with antenna bearing long ventral ciliation. Male genitalia with wide and strong sclerotized tegumen, gnathos consists of two more or less long arms, valva with sclerotized harpa and more or less long dorso-basal process (transtilla), aedeagus with very narrow long caecum and dilated distal part bearing several groups of strong spine-like cornuti, saccus wide basally. Female genitalia with long ovipositor, very weak papillae anales, funel-like sclerotized antrum, membranous corpus bursae usually with two signa.

DISTRIBUTION. Almost world-wide with abundance of species on New Guinea, Pacific Is. and Australia. The family includes about 25 genera and 200 species, of them 8 genera, 45 species occur in Palaearctics and 2 genera, 4 species represented on the Russian Far East.

BIOLOGY. Moths developed in one or two generations (in tropics in three ones). Adult lays the eggs singly on the surface-fruits or leaves. Larvae are borers of berries, fruits, bark, twigs, stems, and galls, rarer they mine the leaves. Pupation usually takes place near larval gallery or in the ground in dense silken cocoon.

HOST PLANTS. Larvae of Palaearctic species are developed on woody plants from botanic families Rosaceae, Berberidaceae, Fagaceae, Cornaceae, Euphorbiaceae, Saxifragaceae (*Ribes*) in tropics on Anacardiaceae and Palmae.

REMARKS. Taxonomic position family Carposinidae in system of Lepidoptera is under discussion to present time, that is evidenced by replacing moths of this group from families Tineidae, Gelechiidae, Tortricidae to separate nominative superfamily or superfamilies Pterophoroidea, Pyraloidea and Copromorphoidea (see historical review in Diakonoff, 1989). Position of discussed group within the latter more widespread (Meyrick, 1928; Common, 1970, 1990; Brock, 1971; Heppner, 1977, 1982; Scoble, 1992; Kuznetzov & Stekolnikov, 1993; Robinson, Tuck & Shaffer, 1994). The studying of functional morphology of male genitalia (Kuznetzov & Stekolnikov, 1979a, 1979b) and thorax (Kuznetsova, 1981) of moths from Carposinidae shows the relationships of superfamiles Copromorphoidea and Pyraloidea.

Key to genera

1. Male genitalia: uncus as wide plate; gnathos consists of two long, slender, strongly sclerotized arms, bearing sheaf of strong thorns at the apex and with tufts of setae in the place of curve; valva with strong sclerotized harpa. Female genitalia: antrum relatively narrow, goblet-like; VIII tergite without triangular plate on the anterior margin. Forewing with veins R_3 и R_4 arising from cell separately . . . . . ***Carposina***

– Male genitalia: uncus long, finger-like; gnathos consists of two curved dorsally sclerites without sheaf of strong thorns; valva without strong sclerotized harpa. Female genitalia: antrum wide, cup-like; VIII tergite with triangular plate on the anterior margin. Forewing with veins R_3 и R_4 shortly stalked . . . . ***Meridarchis***

Genus *Carposina* Herrich-Schäffer, 1853

Carposina Herrich-Schäffer, 1853, *Syst. Bear. Schmett. Eur.* 5(60): 10, 38 (type species: *Carposina berberidella* Herrich-Schäffer, 1853, by subsequent designation by Fernald, 1908, *Genera Tortricidae Types*: 34).

Enopa Walker, 1866, *List Specimens lepid. Insects Colln Br. Mus*. 35: 1738 (type species: *Enopa mediella* Walker, 1866, by monotypy).

Oistophora Meyrick, 1881, *Proc. Linn. Soc. N.S.W.* 6: 693, 699 (type species: *Oistophora pterocosmana* Meyrick, 1881, by monotypy).

Paramorpha Meyrick, 1881, *Proc. Linn. Soc. N.S.W.* 6: 693, 696 (type species: *Paramorpha aquilana* Meyrick, 1881, by subsequent designation by Fernald, 1908).

Heterocrossa Meyrick, 1882, *Proc. Linn. Soc. N.S.W.* 7: 178 (type species: *Gelechia adreptella* Walker, 1864, by subsequent designation by Meyrick, 1910, *Proc. Linn. Soc. N.S.W.* 35: 146).

Asiacarposina Yang, 1982, *Entomotaxonomia*, 4 (4): 253 (type species: *Asiacarposina cornusvora* Yang, 1982, by monotypy).

DIAGNOSIS. Forewing with 5 *R*, 3 *M*, 2 *Cu* separated basally; A_1 absent; A_2 and A_3 fused, basal bifurcation sometimes present (Fig. 7). Hindwing with M_1 reduced; M_3 fused with Cu_1; 3 *A*, sometimes 2, or 1. Male genitalia with uncus as small, wide, setaceous plate; gnathos consists of two arms curved caudally near base, every with setaceous knob in place of curving and with sheaf of strong thorns at the apex; tegumen very wide, with band-like sclerotization on anterior and posterior margins; valva with long cucullus, relatively short sacullus and strong sclerotized harpa; transtilla with narrow, digital processes; saccus more or less triangular. Female genitalia with VIII tergite lacking triangular plate on anterior margin, with long, relatively narrow, goblet-like antrum, lateral sides of which form deep folds attached with anterior angles of VIII sternite; ductus bursae with two punctinate bands dilated towards corpus bursae. The latter large, oval, membranous, with two large signa, every of which funnel-like basally and with two long processes.

DISTRIBUTION. Holarctics (exept North), SE Asia, Africa, S America, New Guinea, Australia.

Key to species

1. Forewing almost black in basal part, costal margin and distal third of wing, with large white trapezoidal spot at the middle, without fascia along termen (Fig. 4) . . . . . ***C. viduana***
– Forewing grey, or light-grey, with narrow grey fascia along termen 2
2. Forewing light-grey with dark-grey trapezoidal costal spot. Male genitalia: tegumen hollowed on posterior margin, valva with pointed at the apex cucullus and membranous digital basal process (transtilla); juxta as plate fused with valvae; saccus rounded on the apex; aedeagus with one bunch of spine-like cornuti at the right. Female genitalia: VIII sternite quite punctinate, its anterior margin almost on same level as posterior margin of antrum; ventral side of antrum with two folds almost parallel or diverged posteriorly . . . . . ***C. sasakii***
– Forewing grey with grey indistinct spot on the middle of distal part of wing. Male genitalia: tegumen almost straight on posterior margin, valva with rounded at apex cucullus and strong sclerotized basal process (transtilla); juxta with two asymmetrical processes; saccus pointed on the apex; aedeagus with two bunches of spine-like cornuti at the right. Female genitalia: VIII sternite punctinate in anterior part only, its anterior margin more distally than posterior margin of antrum; ventral side of antrum without folds . . . . . ***C. maritima* sp. n.**

***Carposina sasakii* Matsumura, 1900**

Figs 1-3, 7-9, 19, 20

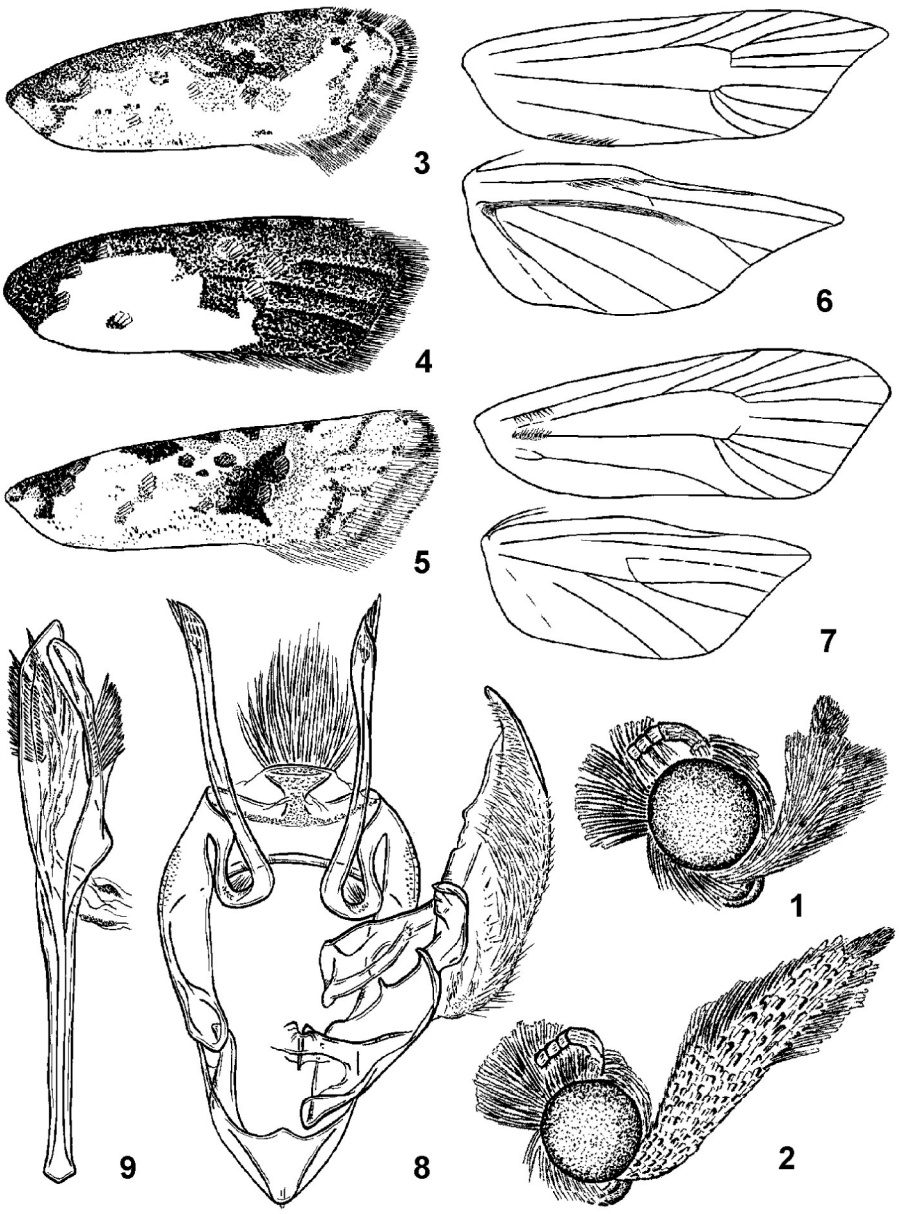
Carposina sasakii Matsumura, 1900, Ent. Nachrichten, 26: 198 (type locality: Japan); Danilevsky, 1955: 155,1958: 282, fig. 1; Cho & Park, 1990: 92, figs 2, 7, 11.

Carpcapsa (sic) *persicana* Sasaki, 1905, *Kaju Gaichu Hen* [Injurious Insects of Fruit Trees]: 32.

Carposina niponensis (nec Walsingham, 1900): Okano, 1959: 269, pl. 179, fig. 3; Yasuda, 1969: 85, fig. 165; Issiki, 1971: 36; Liu, 1981: 26, fig, 117; Kawabe, 1982, (I): 289, (II): 217, pl. 32, fig. 5; Kuznetzov, 1986: 22, figs 12; 16, 2; Tschistyakov, 1988: 129; 1995: 129; Shvydkaya & al., 1995: 199.

MATERIAL. Russia, Primorskii krai: 1 ♀, Vladivostok, De-Friz, 30.VII 1959 (Omelko); 1 ♀, Ussuriysk 18.V 1961 (Sytenko); 14 ♂, 10 ♀, 20 km SE Ussuriysk, Gornotaezhnoe, 29.VI, 1.VII 1990; 1-27.VII, 2-3.VIII 1994; 2 ♂, 7 ♀, Ryazanovka, 7-28.VII, 15.VIII 1997 (Ponomarenko).

DIAGNOSIS. Wingspread 13-17 mm. Forewing grey with 6 dark-grey costal strokes from near middle to apex and large concolorous trapezoidal costal spot (Fig. 3). Male genitalia (Figs 8, 9): tegumen hollowed on posterior margin; arms of gnathos slender, curved caudally near base, straight in distal part; valva with long pointed on apex cucullus, relatively short rouded sacullus and strong sclerotized, stretched harpa; transtilla with membranous, digital processes; juxta as plate fused with valvae; saccus rounded on the apex; aedeagus with one bunch of spine-like



Figs 1-9. Caprosinidae. 1-3, 7-9) *Carposina sasakii*: 1) male, labial palpi, 2) same, female, 3) forewing, 7) venation, 8) male genitalia, ventral aspect, 9) aedeagus; 4) *Carposina viduana*, forewing; 5, 6) *Meridarchis excisa*: 5) forewing, 6) venation.

cornuti at the right. Female genitalia (Figs 19, 20): lateral folds of antrum slightly stretched distally, their medial margins concave; ventral side of antrum with two folds almost parallel or diverged posteriorly.

DISTRIBUTION. Russia (Amurskaya oblast, Khabarovskii krai, Primorskii krai), Japan, Korea, China, SE of North America

HOST PLANTS. *Malus*, *Pyrus*, *Prunus*, *Crataegus*, *Sorbus*, *Armeniaca*, *Sorbus*, *Persica*, *Crataegus*.

***Carposina viduana* Caradja, 1916, stat. resurr.**

Figs 4, 17, 18

Carposina viduana Caradja, *Deutsch. Ent. Ztschr. Iris*, 1916: 15 (type locality: Raddé [Raddevka, Khabarovskii krai]); Kuznetzov, 1986, 4(3): 296.

Carposina sasakii f. *viduana* Diakonoff, 1989: 18, 70.

MATERIAL. Russia, Primorskii krai: 1 ♀, 20 km SE Ussuriysk, Gornotaezhnoe, 23.VI 1990; 5 ♀, Ryazanovka, 4-22.VII. 1997 (Ponomarenko).

DIAGNOSIS. Wingspread 15-19 mm. Forewing with almost black basal part, costal margin and distal third of wing, without fascia along termen; its pattern consists of 5 small concolorous costal spots from near middle to apex, large white trapezoidal spot almost at the middle and black dot on anal fold (Fig. 4). Female genitalia (Figs 17, 18): lateral folds of antrum relatively strong stretched distally, their medial margins convex or straight; ventral side of antrum with two folds diverged anteriorly.

DISTRIBUTION. Russia: Khabarovskii krai, Primorskii krai.

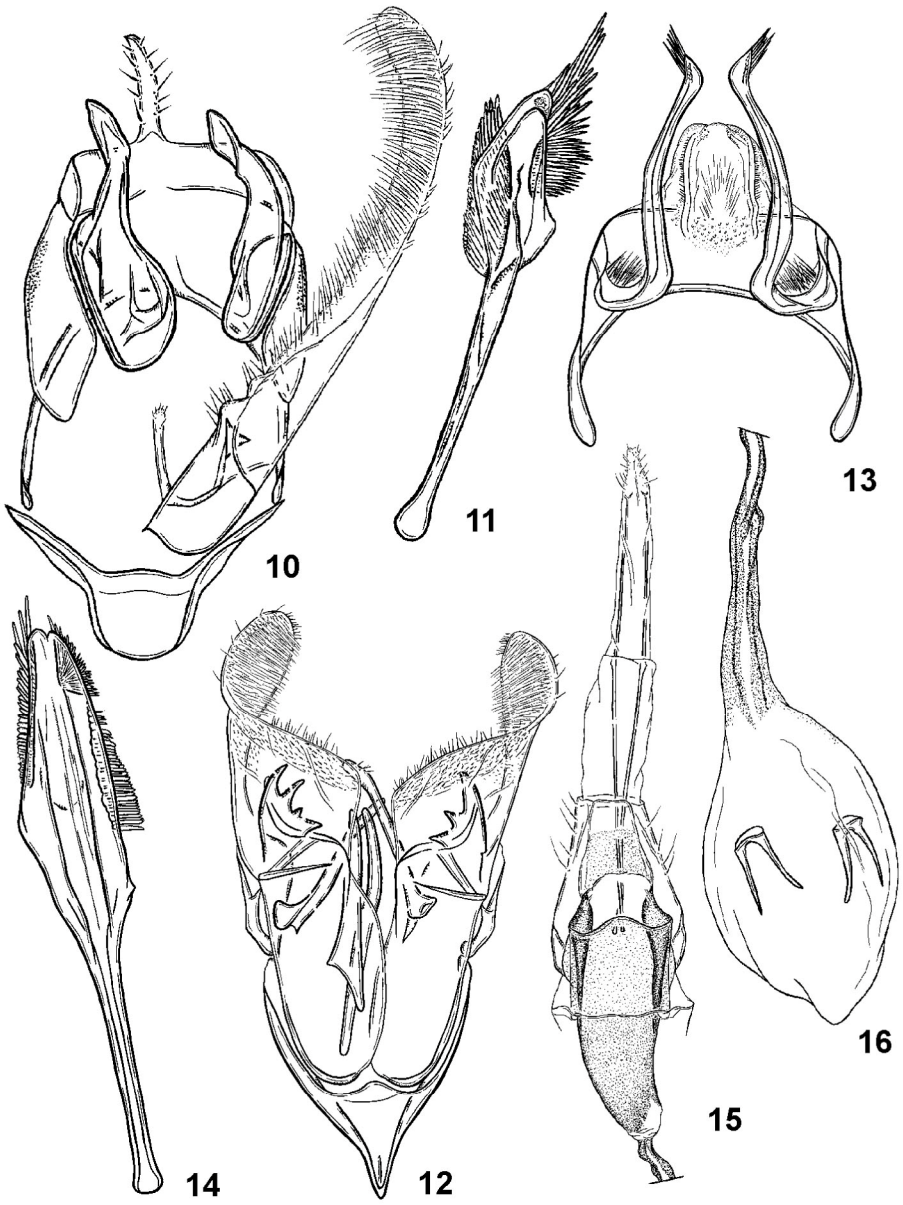
REMARKS. This species was considered as forma of *C. sasakii* Matsumura, 1900 by Diakonoff (1989). As result of comparison of both taxa the characters allowing to resurrecte specific status of *C. viduana* were found. Female genitalia of discussed species differ from those of *C. sasakii* by antrum with more stretched caudally lateral folds, which have convex or straight medial margins and apexes placed more distally then ventral margin of ostium (whereas lateral folds of antrum in *C. sasakii* with concave medial margins and apexes placed almost on same level as ventral margin of ostium). Besides that, moth of *C. viduana* larger in size and has different pattern of forewing.

***Carposina maritima* Ponomarenko, sp. n.**

Figs 12-16

MATERIAL. Holotype: ♂, Russia, Primorskii krai, 20 km SE Ussuriysk, Gornotaezhnoe, 27.VII 1994 (Ponomarenko). Paratypes: 3 ♀, same locality, 4, 14, 21.VII 1994 (Ponomarenko).

DESCRIPTION. Wingspread 13-15.5 mm. Male. Head with white front and greyish-brown vertex. Antenna with long, ciliations on the ventral margin. Labial palpi white on the inner side and greyish-brown on the external side; third segment



Figs 10-16. Male and female genitalia. 10, 11) *Meridarchis excisa*: 10) ventral aspect, 11) aedeagus. 12-16) *Carposina. maritima* sp. n.: 12-14) male genitalia: 12) ventral aspect, tegumen removed, 13) tegumen, gnathos, ventral aspect; 14) aedeagus; 15, 16) female genitalia: 15) ovipositor, ostial area, antrum, 16) ductus, corpus bursae.

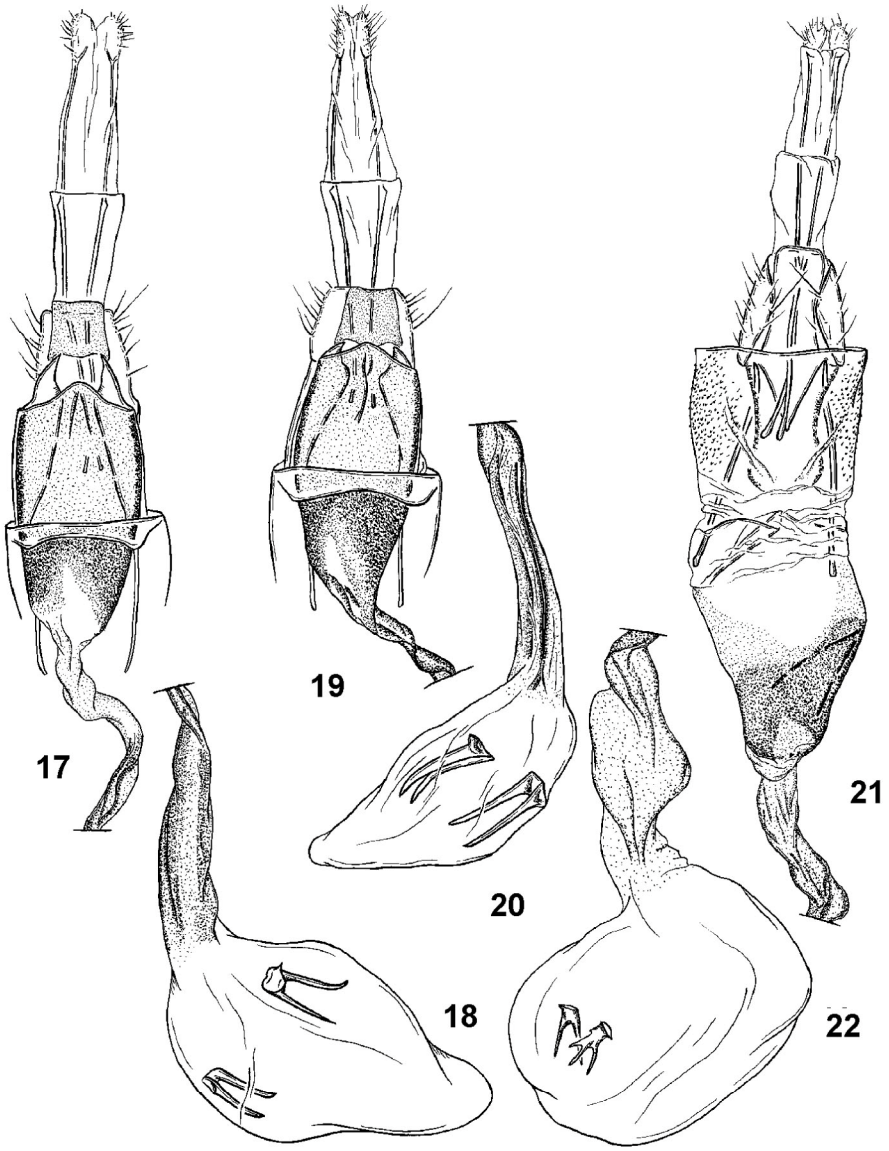
with white apex. Tegula and thorax greyish-brown. Forewing with 5 tufts of raised scales: one near base of wing, two on the *Cu*, one near end of the cell and one on the A_{2+3}. Pattern of the forewing consist of 7 indistinct grey strokes on the costal margin, 5 concolorous small spots at the end of veins on the termen and grey spot at the end of the cell; fringe grey. Hindwing and fringe grey. Forelegs and midlegs grey on the external side, only tops of tibia and every segment of tarsus white; hindlegs white. Female. Head white, vertex with small number of disseminated light-grey scales. Antenna filiform. Labial palpi with second segment thickened by scales. Tegula, thorax and groundcolour of forewing white. Pattern of forewing same as in male, but more light; fringe light-grey. Hindwing and fringe light-grey.

MALE GENITALIA (Figs 12-14). Tegumen wide and short, narrow band-like latterally, with almost straight posterior margin. Arms of gnathos narrow, slightly dilated towards base and before apex, near base curved caudally, with setaceous knob in place of curving and sheaf of strong thorns at the apex. Valva long and gutter-like, hollowed on the ventral margin and with large strong sclerotized harpa, bearing 3-4 denticles. Cucullus long, densely setaceous, narrow and with rounded apex. Sacculus as rectangular lobe, with short numerous setae along caudal margin. Transtilla with two digital, strong sclerotized processes, directed latero-caudally and slightly curved ventrally before apex; right of them longer then left one. Two processes of juxta similar to those of transtilla in size and shape, but almost straight. Vinculum semioval, narrow laterally and with small knob on the posterior margin. Saccus triangular, relatively short. Aedeagus moderate in length, with caecum shorter then dilated distal part, the latter with three bunches of cornuti as strong spines: one of them on the left side of aedeagus as dense longitudinal row, completed by spines more longer towards apex; two others on the right side - fan-shaped with long spines and longitudinal dense row with shorter ones.

FEMALE GENITALIA (Figs 15, 16). Ovipositor long, membrane between IX and VIII segments about 6 times as longer as papillae anales length. Papillae anales small, membranous, bearing short and thin setae. VIII sternite trapezoidal, punctinate in anterior part, narrower then VIII tergite. Ostium broad, with sinuate ventral margin. Antrum sclerotized, goblet-like, before ductus bursae curved to the right, almost completelly punctinate, excepting small anterior part. Ductus bursae and corpus bursae characteristic for *Carposina*: first of them with two punctinate bands dilated towards corpus bursae, the latter oval and with two typical signa.

DISTRIBUTION. Russia: Primorskii krai.

REMARKS. In male genitalia new species is close related to *C. nipponensis* Diakonoff, 1900 by shape of valva, presence of two long digital processes in transtilla and juxta. *C. maritima* sp. n. differs from related species by harpa bearing 3-4 denticles, by transtilla with processes almost straight basally and slightly curved ventrally before apex, by relatively short saccus and aedeagus with dilated distal part longer then caecum (whereas in *C. nipponensis* harpa bearing 5-6 denticles, transtilla with arched processes not curved ventrally before apex, long saccus and aedeagus with dilated part considerably shorter then caecum).



Figs 17-22. Female genitalia. 17, 18) *Carposina viduana*: 17) ovipositor, ostial area, antrum, 18) ductus, corpus bursae; 19, 20) *C. sasakii*: 19) ovipositor, ostial area, antrum, 20) ductus, corpus bursae; 21, 22) *Meridarchis excisa*: 21) ovipositor, ostial area, antrum, 22) ductus, corpus bursae.

***Carposina askoldana* Diakonoff, 1989**

Carposina askoldana Diakonoff, 1989, *Zool. verh.* 251: 71, figs 28D, 43E (type locality: Askold I., Russia).

REMARKS. From photo of moth and female genitalia of holotype this species has pattern of forewing identical with *Meridarchis exsisa* (Wlsm.) and genitalia extremely similar with *Carposina sasakii* Matsumura. Species was described on the base of old specimen from collection of Grand Duke Nikolai Mikhailovich Romanov, and it is possible the moth and abdomen were associated wrongly. Unfortunately type specimens is not examined by author, therefore the specific name isn't synonymized here.

Genus *Meridarchis* Zeller, 1867

Meridarchis Zeller, 1867, Stett. Ent. Ztng., 28: 407 (type species: *Meridarchis trapeziella* Zeller, 1867, by monotypy).

Autogriphus Walsingham, 1897, Trans. ent. Soc. Lond. 1897: 59 (type species: *Autogriphus luteus* Walsingham, 1897, by original designation).

Pexinola Hampson, 1900, *Cat. Lepid. Phalaenae Br. Mus.* 2: 4 (key), 79 (type species: *Pexinola longirostris* Hampson, 1900, by original designation).

Propedesis Walsingham, 1900, *Ann. Mag. nat. Hist.* (7) 6: 122 (type species: *Propedesis excisa* Walsingham, 1900, by original designation).

Tribonica Meyrick, 1905, *J. Bombay nat. Hist. Soc.* 16: 589 (type species: *Tribonica eremitis* Meyrick, 1905, by monotypy).

DIAGNOSIS. Forewing with R_3 и R_4 fused basally and arising from cell by short stalk; hindwing of male with reduced M_1; position of rest veins similar to those in *Carposina* (Fig. 6). The cell on the hindwing modified in gutter-like fold with long androconial hair-pencil. Male genitalia: uncus with wide base and long, digital process pointed at apex; gnathos consists of two strong sclerotized, asymmetrical, curved caudally sclerites, lacking strong thorns on the apex; valva with small plate-like harpa; transtilla narrow digital. Female genitalia: antrum wide, cup-like, VIII tergite with triangular plate on the anterior margin.

DISTRIBUTION. Russia: South of Far East, E and S Asia, S Africa, India, Australia, New Guinea.

***Meridarchis excisa* (Walsingham, 1900)**

Figs 5, 6, 10, 11, 21, 22

Propedesis excisa Walsingham, 1900, *Ann. Mag. nat. Hist.* (7) 6: 123 (type locality: Japan); Okano, 1959: 269, pl. 179, fig. 4; Kawabe, 1982, (I): 289, (II): 217, pl. 32, fig. 10; Kuznetzov, 1986: 22, figs 11, 4; 17, 1-3; Cho & Park, 1990: 97, figs 4, 9, 13.

Meridarchis crotalus: Diakonoff, 1989, *Zool. verh.* 251: 91 (type locality: environs of Ussuriisk, Russia), **syn. n.**

MATERIAL. Russia, Primorskii krai: 9 ♂, 3 ♀, preserve "Kedrovaya pad", 6-11. VI 1974; 12-30.VI 1975 (Ermolaev); 1 ♂, same locality, 17.VI 1974 (Kononenko);

3♂, Ryazanovka, 10.VI 1992; 1 ♂, 7 km NW Ryazanovka, 2.VII 1997; 8 ♂, 17♀, 20 km SE Ussuriysk, Gornotaezhnoe, 29-31.V, 1-16.VI 1990; 11-16.VI, 5-8.VII 1995 (Ponomarenko).

DIAGNOSIS. Wingspread 16-21 mm. Forewing white with triangular dark-grey spot, underlined by black arch, on the distal half of wing and with 4 black costal spots (Fig. 5). Male genitalia (Figs 10, 11): Uncus wide basally and digital distally; gnathos asymmetrical, consists of two strong sclerotized arms curved caudally, lacking thorns at the apex; valva narrow, with rounded apex, harpa small, plate-like; aedeagus with two lateral bunches of spine-like cornuti. Female genitalia (Figs 21, 22): VIII tergite with triangular plate on the anterior margin; antrum wide, with more sclerotized anterior part; ductus bursae dilated before corpus bursae; corpus bursae rounded with two signa.

DISTRIBUTION. Russia: Primorskii krai, Japan.

REMARKS. The studying of the male and female genitalia of the moths from Russian Far East and comparison with photo of holotypes of *M. exsisa* and *M. crotalus* in Diakonoff (1989: 133, figs 8, 20C-D, 28B-C, 29A-B, 43D, 44A-B) allow to conclude that the latter is conspecific with the former.

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