

# RECLASSIFICATION OF PALAEARCTIC TEPHRITIDAE (DIPTERA). COMMUNICATION 3

**Рекласифікація палеарктичних Tephritidae (Diptera). Подіомлення 3. Корнеев В. О.** — Підродини Trypetinae приймається в об'ємі триб Gastrozonini, Ceratitini, Toxotrupanini, Carpotrypetini, stat. n., Trypetini, Rivelliomimini та Zaceratini. У такому складі підродина є парафілетичною, оскільки Dacinae та Tephritinae, дві інших найбільших підродини осетниць, є дериватами трипетин; триба Trypetini не має вагомих синапоморфій, що дозволяють зблизити її з іншими трибами підродини, і вужче визначення підродини мало б наслідком надзвичайне подрібнення класифікації. Виділено підтриби Notommatina subtrib. n. у складі Carpotrypetini, Nitrariomyiina subtrib. n. та Acidoxanthina subtrib. n. у складі Trypetini. Встановлюються такі нові комбінації та синоніми: *Pseudina armifrons* (Portschinsky), comb. n. (= *Spilographa armifrons* Portschinsky, 1892) = *Sinaida alini* Hering, 1940, syn. n., *Hemilea* Loew, 1862 = *Hyleurinus* Ito, 1984, syn. n., *Nemeurinus* Ito, 1984 = *Syusiroitoa* Kwon, 1985 syn. n., *Nemeurinus leucocelis* Ito, 1984 = *Syusiroitoa maculipennis* Kwon, 1985 syn. n. *Hemileoides continuus* (Ito), comb. n. (= *Dryadodacryma continuum* Ito), *Angelogelasinus amuricola* (Hendel) comb. n. (= *Myiolia (Acidiella) amuricola* Hendel), *Angelogelasinus obscuripennis* (Chen) comb. n. (= *Acidiella obscuripennis* Chen), *Flaviludia angustipennis* (Hering) comb. n. (= *Acidiella angustipennis* Hering), *Flaviludia echinopanacis* (Kandybina) comb. n. (= *Acidiella echinopanacis* Kandybina). *Pseudina rohdendorfi* (V. Richter), comb. n. (= *Vidalia rohdendorfi* V. Richter, 1963) = *Vidalia furialis* Ito, 1984, syn. n. може розглядатися у складі роду *Pseudina* Malloch лише за умови перегляду діагнозу роду; обговорюються її філогенетичні стосунки з іншими таксонами. Об'єм підродини Dacinae обмежено трибою Dacini.

**Ключові слова:** Diptera, Tephritidae, Палеарктика

**Рекласифікация палеарктических Tephritidae (Diptera). Сообщение 3. Корнеев В. А.** — Подсемейство Trypetinae принимается в объеме триб Gastrozonini, Ceratitini, Toxotrupanini, Carpotrypetini, stat. n., Trypetini, Rivelliomimini и Zaceratini. В таком составе подсемейство парафилетично, поскольку Dacinae и Tephritinae, два других крупнейших подсемейства пестрокрылок, являются дериватами трипетин; триба Trypetini не имеет весомых синапоморфий, позволяющих сблизить ее с другими трибами подсемейства, и попытки более узкого определения подсемейства приводят к чрезвычайно дробной классификации. Выделены подтрибы Notommatina subtrib. n. в составе Carpotrypetini, Nitrariomyiina subtrib. n. и Acidoxanthina subtrib. n. в составе Trypetini. Устанавливаются следующие новые комбинации и синонимы: *Pseudina armifrons* (Portschinsky), comb. n. (= *Spilographa armifrons* Portschinsky, 1892) = *Sinaida alini* Hering, 1940, syn. n., *Hemilea* Loew, 1862 = *Hyleurinus* Ito, 1984, syn. n., *Nemeurinus* Ito, 1984 = *Syusiroitoa* Kwon, 1985 syn. n., *Nemeurinus leucocelis* Ito, 1984 = *Syusiroitoa maculipennis* Kwon, 1985 syn. n. *Hemileoides continuus* (Ito), comb. n. (= *Dryadodacryma continuum* Ito), *Angelogelasinus amuricola* (Hendel) comb. n. (= *Myiolia (Acidiella) amuricola* Hendel), *Angelogelasinus obscuripennis* (Chen) comb. n. (= *Acidiella obscuripennis* Chen), *Flaviludia angustipennis* (Hering) comb. n. (= *Acidiella angustipennis* Hering), *Flaviludia echinopanacis* (Kandybina) comb. n. (= *Acidiella echinopanacis* Kandybina). *Pseudina rohdendorfi* (V. Richter), comb. n. (= *Vidalia rohdendorfi* V. Richter, 1963) = *Vidalia furialis* Ito, 1984, syn. n. может рассматриваться в составе рода *Pseudina* Malloch лишь с условием пересмотра диагноза рода; обсуждаются ее филогенетические отношения с другими таксонами. Объем подсемейства Dacinae ограничен трибой Dacini.

**Ключевые слова:** Diptera, Tephritidae, Палеарктика.

This communication concerns the taxa usually assigned to the subfamilies Trypetinae and Dacinae. Phylogenetic relationships of Dacinae, Trypetinae, Tephritinae and allied taxa are not well understood. At least, all species included here, have broadly separated vanes of fultella, a character of unresolved polarity, also known in Blepharoneurinae and Ortalotrypetinae, piercing aculei with the cerci always fused with the tergum 8 without distinct tracks of fusion, eversible membrane primarily covered with sclerotized scales (except some genera where they are lost secondarily), and larvae consuming living plant tissues. The piercing aculeus and the sclerotized scales are tightly associated with oviposition into living plant tissues, and thus considered as adaptive characters, strongly subjected to homoplasy. Outside Tephritidae, most of the known kinds of piercing ovipositor and the scales are known in Lonchaeidae, Ulidiidae (= Otitidae) and Platystomatidae, as well as within Phyltalmiinae (Tephritidae), those includes both saprophagous and phytophagous species.

I wish to express my sincere thanks to Dr. Yu. P. Nekrutenko (Institute of Zoology, Kiev), and to Dr. A. Freidberg (Tel-Aviv University) for reading early drafts of the manuscript and valuable critical notes.

### Subfamily Trypetinae

Loew, 1862 (Trypetina); Hendel, 1914b; 1927; Hering, 1941; 1947b; Hardy, 1973; 1974; 1977; 1986; 1987; 1988; Cogan, Munro, 1980; Ito, 1983; Hancock, 1985; 1986b; 1991; Hardy, Foote, 1989; White, Elson-Harris, 1992 (Trypetinae).

**D i a g n o s i s.** The species of Trypetinae can be distinguished by the following combination of characters: scapular setae developed (very rarely reduced), no white thickened setae, cell BM narrow, 3.5—4 time longer than wide; vanes of aedeagal apodeme broadly separated; eversible membrane of ovipositor predominantly with one-toothed scales, aculeus blunt or acute, but always with the cerci fused to tergum 8, spermathecae never smooth spherical or mushroom-like.

**D e s c r i p t i o n.** Orbital plates of frons of various length, 1st flagellomere of various length and shape; hairs of arista long (plesiomorphy) to very short (apomorphy); cell DM not broadened (plesiomorphy), CuP with the apical lobe of various length. Chaetotaxy: (1—) 2 orbital setae at posterior 1/2 (plesiomorphy) —

1/5 (apomorphy) of frons length; ocellar, postocellar, dorsocentral, presutural and katapisternal setae usually well developed (plesiomorphies); strong proepisternal setae always lacking; no extra supraalar and scutellar setae (polarity of characters not resolved); kataterga without erect fine hairs (plesiomorphy), at most short microtrichose. Male terminalia: aedeagal glans often with more or less sclerotized dorso-apical rod (plesiomorphy); praeglans of aedeagus with sack-like appendix bearing apical papillae or spines (apomorphy); vanes of aedeagal apodeme broadly separate (polarity of character not resolved), always connected apically to sclerotized strip (derivative of gonite) (plesiomorphy), but not to anterior portion of hypandrium; epandrium usually large, with surstyli conspicuously narrower in profile and bilobate apically (plesiomorphies), or drop-like, but not vertical bar-like. Female terminalia: eversible membrane of ovipositor is covered with tooth-like, always one-toothed scales at least at anterior portion (apomorphy), the largest tooth are at medial line on ventral surface, aculeus with cerci fused to tergum 8 without tracks of seam (apomorphy), spermathecae usually drop-like, covered with papillae or scales (apomorphy), but neither spherical, nor mushroom-like with smooth surface. Larvae breed in living plant tissues.

This subfamily includes five tribes, Gastrozonini, Ceratitini, Toxotrypanini, Carpomyini, Trypetini, Rivelliomimini, Acidoxanthini, trib. n. and Zaceratini.

**D i s c u s s i o n.** The only apomorphic character of Trypetinae and Dacinae hitherto not found elsewhere outside these subfamilies is the papillose lobe of praeglans; as far as known, it is well developed in some Gastrozonini, Ceratitini, Toxotrypanini, Carpomyini, Acidoxanthini and Dacinae, suggesting that they belong to the same monophyletic lineage. There are lobes of praeglans also in some Acanthonevrinae, Blepharoneurinae and Ortalotrypetinae, but they are neither sack-like, nor papillose. This character was never thoroughly examined in Adraminae.

The one-toothed scales herein hypothesized to be derived from dot-like sclerotized cuticular patches composing the taeniae, serve for fixation of female terminalia within a plant tissue during oviposition and therefore must be associated with the larval phytophagy. Indeed, similar structures are found also in some Ulidiidae: Euxestinae, some Platystomatidae, Tephritidae: Phytalmiinae, Phascinae, Blepharoneurinae, Xamutinae and Adraminae, those lay their eggs into living plants. The one toothed scales cover large area posteriorly of taeniae only in members of the two later subfamilies, and in Trypetinae, Dacinae and Tephritinae, are rare in Blepharoneurinae and probably not represented in other subfamilies. This character indicate close relationships among Adraminae, Xamutinae, Trypetinae, Dacinae and Tephritinae and may prove monophyly of this lineage. An arrangement of scales on the membrane may indicate further relationships among the genera. At least there is large medial area of more or less enlarged scales on the ventral surface in Trypetinae:

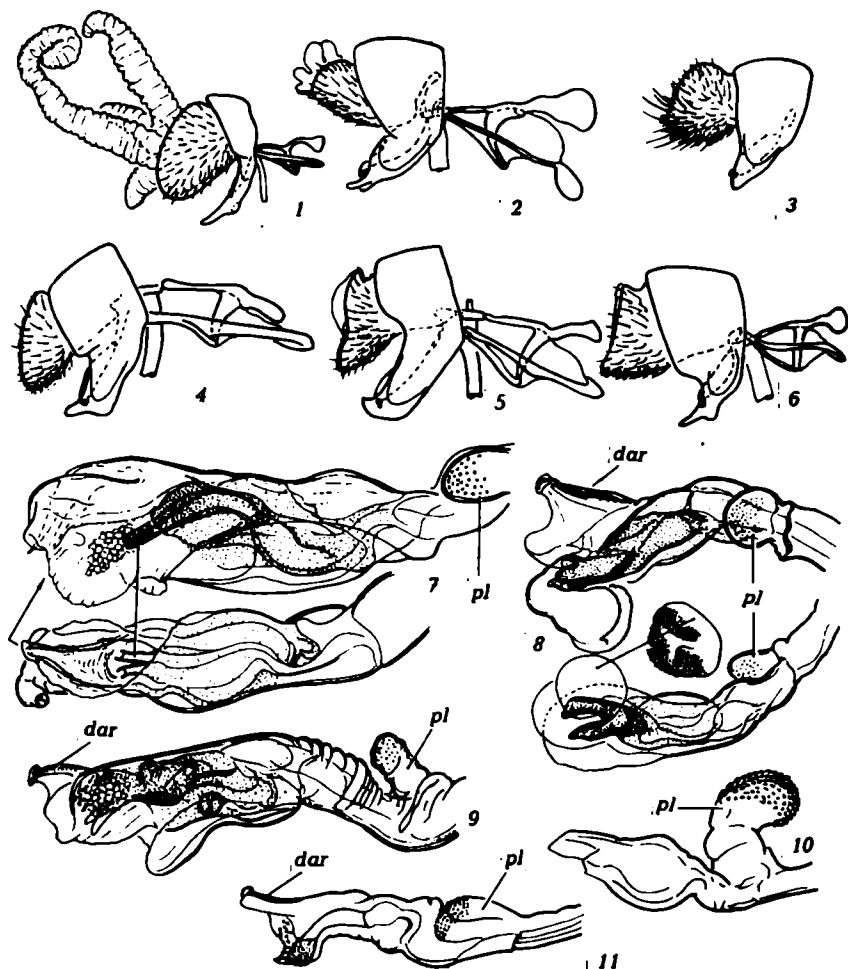


Fig. 1. Trypetinae and Dacinae, epandrium (3), epandrium and hypandrium (1-2, 4-6), glans of aedeagus (7-11): 1 - *Gastrozona fasciventris* Mcq.; 2 - *Paragastrozona japonicum* (Miyake); 3 - *Enicoptera cuneilinea* Hering; 4, 9 - *Dacus* (s. str.) *armatus* F.; 5 - *Bactrocera* (*Daculus*) *oleae* Gmelin; 6, 8 - *Ceratitis* (s. str.) *capitata* Wd.; 7 - *Acrotaeniostola* sp. aff. *spiralis* Munro; 10 - *Enicoptera spoliata* Hering; 11 - *Anastrepha bellicauda* Norrbom (1, 3, 10, 11 after Hardy, 1973, 1974, Norrbom and Kim, 1988); pl - papillose lobe of praeglanis.

Рис. 1. Trypetinae и Dacinae, эпандрий (3), эпандрий и гипандрий (1-2, 4-6), гланс эдеагуса (7-11): 1 - *Gastrozona fasciventris* Mcq.; 2 - *Paragastrozona japonicum* (Miyake); 3 - *Enicoptera cuneilinea* Hering; 4, 9 - *Dacus* (s. str.) *armatus* F.; 5 - *Bactrocera* (*Daculus*) *oleae* Gmelin; 6, 8 - *Ceratitis* (s. str.) *capitata* Wd.; 7 - *Acrotaeniostola* sp. aff. *spiralis* Munro; 10 - *Enicoptera spoliata* Hering; 11 - *Anastrepha bellicauda* Norrbom (1, 3, 10, 11 - по Hardy, 1973, 1974, Norrbom and Kim, 1988); pl - покрытая папиллами лопасть прегланса.

*Ceratitis*, *Toxotrypanini*, *Carpomyini*, some *Trypetini*, *Zaceratini*, *Dacinae* and *Tephritinae*, and probably in *Adraminae*, showing that they may form another monophyletic lineage, opposite to *Gastrozonini* (or to a part of the latter), where the arrangement of scales looks different (Figs 2, 10-11). This character needs more thorough study to be used in subsequent phylogenetic reconstruction.

The fusion of the cerci with the 8th tergum also may facilitate penetration of aculeus into a plant. Blunt cerci are known commonly in flies using natural seams of substrate (leaf vaginae of Poaceae, bracts and spaces between flowers in asteraceous plants), whereas acute or blade-like aculei occur usually in species piercing intact plant (or animal) tissues. Fusion of the cerci with the 8th tergum is found within some *Dasiops* and *Silba* (Lonchaeidae), *Poecilotrappera* (Platystomatidae), all *Pyrgotidae* and *Tachiniscidae*, *Matsumurania*, *Robertsonomyia* Hardy (Tephritidae: subfamily?), few genera of *Acanthoneurinae*, most *Phascinae*, *Blepharoneurinae*, *Ortalotrypetinae*, *Xarnutinae*, *Adraminae*, *Trypetinae* and *Tephritinae*, often showing development of this trait step-by-step in each

subfamily independently. Some Gastrozonini of Trypetinae, *Coelopacidia* of Adraminae, and Terelliini and Xyphosiini (Tephritinae) show rather basic level of this character, with the only advanced feature, that might be considered as their synapomorphy, namely the seam between the cerci and the tergum lacking.

The approximated to completely fused vanes of aedeagal apodeme, together with the bar-like vertical epandrium, may support monophyly of the Phytalmiinae + Acanthonevrinae + Phascinae lineage within Tephritinae, not been indicated by Korneyev (1994). On the contrary, there are broadly separated vanes in Blepharoneurinae, Ortalotrypetinae, Trypetinae, Dacinae and Tephritinae, that may be either synapomorphy or symplesiomorphy of these taxa. The outgroup comparison is not applicable for resolving of polarity because the character is poorly separable in the intermediate cases of Pyrgotidae and Platystomatidae. Furthermore, there are similarly approximated or fused vanes of apodeme in Xarnutinae and Adraminae, that contradicts their placing into the Trypetinae lineage, but this character might appear either inside the latter one due to homoplasy, or show their relationships to the Acanthonevrinae lineage.

The two characters used by Han (1992) to prove the monophyly of the tribe Trypetini and of the new subtribe (herein the *Anomoia*—*Chelostoma* complex of genera), are the presence of fusiform and hexagonal sculpture, respectively, on the inner surface of praeputium (apically of the acrophallus sclerites). The first character is known beyond Trypetini (in Acanthonevrinae, Blepharoneurinae, Dacinae, and some Gastrozonini) and actually may be plesiomorphic or homoplastic, whereas the second was found in Dacinae (see Munro, 1984: Fig. 11), showing strong similarity, apparently being subject to homoplasy.

Dacini, Gastrozonini and Ceratitini were placed into one subfamily by White and Elson-Harris (1992), because of the presence of two spermathecae with no scales or papillae in the most genera, narrowed basal portion of the CuP cell extension, and similar appearance of epandrium, surstyli and cerci. The sister-group of Dacinae, if detected, might belong either to the Gastrozonini, or to the Ceratitini. Nevertheless, such concept of the subfamily requires to define it with the characters being subject of homoplasy or reversal modification. For instance, it makes impossible to detect subfamilial placement of *Acidoxantha* Hendel and *Malica* V. Richter, *Hyphenidium* Loew and some other genera where there are 2 spermathecae.

There is the only one character considered hitherto as a synapomorphy of Tephritinae, namely the duct of spermatheca broadly extended (Norrbom, pers. comm.). In the current study such or similar trait was found to occur also in Ceratitini and Gastrozonini (Figs 2, 19, 20), showing that this character is a subject to homoplasy or/and reversal development, or, otherwise, that it supports the hypothesis of Hancock (1986a) suggesting close relationships of Tephritinae with Ceratitini and Gastrozonini from the presence of two spermathecae. Another hypothesized sister-group of the Tephritinae is the tribe Zaceratini. The two species of this tribe have epandrium of oval appearance (Figs 10, 1—2 and Figs 1, 1—2 in: Korneyev, 1987), and scapular setae just slightly longer than seta like in most Tephritinae. The facial "mask" of larvae in *Pliorecepta* Korneyev (Fig. 10, 7) strongly resembles such structures in larvae of Terelliini and Xyphosiini (Tephritinae), that also may support Zaceratini—Tephritinae sister-group relationships. The non-expanded ducts of *Pliorecepta* spermathecae is the character either of reversal state, or proving homoplastic origin of the duct expansion in Tephritinae and Gastrozonini/Ceratitini. In any case, the sister-group of Tephritinae fits the diagnosis of Trypetinae.

Thus the concept of the Trypetinae here accepted is based on a hypothesis that the taxa included in it, form a monophyletic lineage within Tephritidae together with Dacinae and Tephritinae (and possibly Adraminae + Xarnutinae). The Dacinae and the Tephritinae are considered to be derived taxa of Trypetinae, having numerous autapomorphies, whereas their possible sister-groups within Trypetinae cannot be satisfactory separated from the rest of Trypetinae to consider the latter clearly monophyletic.

Otherwise, the well established subfamilies those include more than 3/4 of Tephritidae species must be lumped, and the oldest subfamily names, Tephritinae, Trypetinae and Dacinae might become synonyms.

The consequent study might solve the problem, whether or not the Xarnutinae and Adraminae, as well as some genera incertae sedis (see Korneyev, 1994), are to be included into Trypetinae, too. Such task must be based extensively upon non-Palaearctic material and is out of scope of this work.

Concerning non-Palaearctic distribution of many genera not available for study, their tribal arrangement is considered to be putative, and no suprageneric taxa are formally established until further phylogenetic analysis is done.

## Tribe Gastrozonini

Hering, 1947b; Hardy, 1973; 1974; 1977 (Trypetinae: Gastrozonini); 1980; 1988; Hardy, Foote, 1989 (Trypetinae: Acanthonevrini: Gastrozonina); Hancock, 1985c; 1991 (Ceratitinae: Gastrozonini); White, Elson-Harris, 1992 (Dacinae: Ceratitini: Gastrozonina).

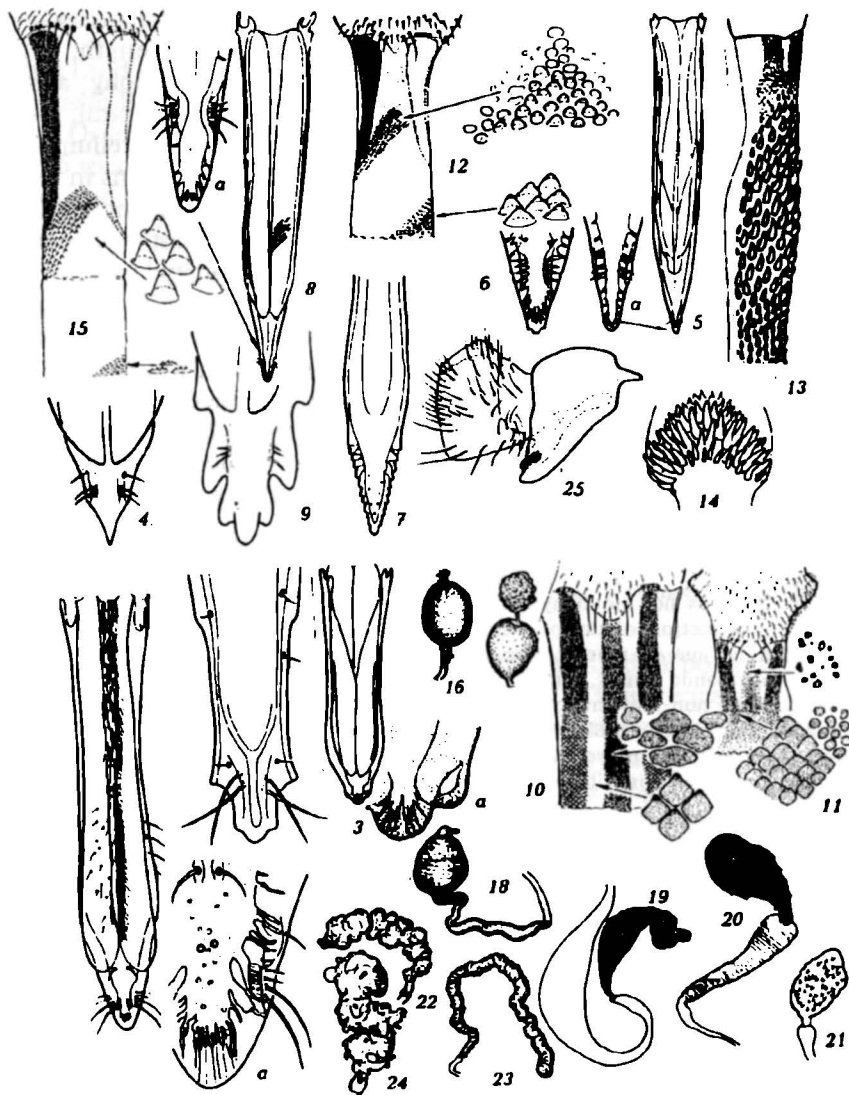


Fig. 2. Trypetinae and Dacinae, aculeus (1-9), apex of tergosternum 7 and eversible membrane, ventral aspect (10-12, 15), same, dorsal aspect (13, 14), spermathecae (7-11): 1 - *Phaespilodes torquata* Mcq.; 2 - *Gastrozona fasciventris* Mcq.; 3, 11, 16 - *Paragastrozona japonicum* (Miyake); 4, 17 - *Enicoptera prodiatrix* O. S.; 5, 12, 20 - *Ceratitis* (s. str.) *capitata* Wd.; 6 - *Ceratitis* (s. str.) *catoirii* Guerin-Meneville; 7 - *Anastrepha obliqua* Say; 8, 15 - *Bactrocera* (s. str.) sp.; 9 - *Bactrocera* (s. str.) *bidentata* May; 13, 25 - *A. bezzii* Stone; 14 - *Anastrepha serpentina* Wd.; 18 - *Carpophthorella nigrofascia* Walker; 19 - *Taenioskola limbata* Hendel; 21 - *Anastrepha fernandezi* Caraballo; 22 - *Dacus* (s. str.) *armatus* F.; 23 - *D.* (s. str.) *theophrastus* Hering; 24 - *D.* (*Didacus*) *ciliatus* Loew (2, 4, 6, 7, 9, 10, 18, 19, 21-25 after Hardy, 1973, 1974, 1988, Munro, 1984, Norrbom and Kim, 1988, Norrbom, 1990, Stone, 1942, White and Elson-Harris, 1992; a - same, enlarged)

Рис. 2. Тryptетинае и Дацинае, лезвие яйцеклада (1-9), вершина 7-го тергостернита и выворачиваемая мембрана, вентрально (10-12, 15), то же, дорсально (13, 14), сперматеки (7-11): 1 - *Phaespilodes torquata* Mcq.; 2 - *Gastrozona fasciventris* Mcq.; 3, 11, 16 - *Paragastrozona japonicum* (Miyake); 4, 17 - *Enicoptera prodiatrix* O. S.; 5, 12, 20 - *Ceratitis* (s. str.) *capitata* Wd.; 6 - *Ceratitis* (s. str.) *catoirii* Guerin-Meneville; 7 - *Anastrepha obliqua* Say; 8, 15 - *Bactrocera* (s. str.) sp.; 9 - *Bactrocera* (s. str.) *bidentata* May; 13, 25 - *A. bezzii* Stone; 14 - *Anastrepha serpentina* Wd.; 18 - *Carpophthorella nigrofascia* Walker; 19 - *Taenioskola limbata* Hendel; 21 - *Anastrepha fernandezi* Caraballo; 22 - *Dacus* (s. str.) *armatus* F.; 23 - *D.* (s. str.) *theophrastus* Hering; 24 - *D.* (*Didacus*) *ciliatus* Loew (2, 4, 6, 7, 9, 10, 18, 19, 21-25 - по Hardy, 1973, 1974, 1988, Munro, 1984, Norrbom and Kim, 1988, Norrbom, 1990, Stone, 1942, White and Elson-Harris, 1992; a - то же, увеличено)

**D i a g n o s i s.** Larvae not examined. Adults. Orbital plates of frons elongate, anterior orbital seta at posterior  $1/2-1/3$  of frons length; 2 (3–10) frontal setae in anterior  $1/2-3/4$  of frons; ocellar setae usually long; arista long plumose, rarely short microtrichose; scapular, postocellar, dorsocentral, presutural and katapisternal setae usually present; 2 pairs of scutellar setae; scutellum flattened to convex. Males: no sclerotized dorso-apical rod on aedeagal glans in examined species; praepitium sculptured or smooth; 2 lobes of acrophallus moderately long to short, semitubular; papillose lobe of praeglans developed (at least in *Acrotaeniostola* and *Enicoptera*); proctiger large to very large (Figs 1, 1–3); surstyli usually narrower than epandrium, with 2 finger-like apical lobes well-developed. Females: cerci completely fused to aculeus, blunt or narrowed, usually with long preapical setae (Figs 2, 1–3) 2 spermathecae, smooth, coiled or wrinkled, but neither covered with scales or papillae, subapical part of duct often enlarged (Figs 2, 16–19).

**B i o l o g y.** Species of *Acroceratitis*, *Acrotaeniostola*, *Chaetellipsis*, *Enicoptera*, *Gastrozona*, *Phaeospilodes* and *Taeniostola* breed in tissues of bamboo shoots, *Rhaibophleps* and *Bistrispinaria* were reared from other Poaceae grass (Hardy, 1973; 1974; 1988; Hancock and Drew, 1994).

**D i s c u s s i o n.** The following generic groups are placed to Gastrozonini only tentatively, as this taxon probably is not monophyletic. The only character might be a synapomorphy is the desclerotization or reduction of dorso-apical rod (=juxtostylus sensu Korneyev, 1985), but it is reduced very often in some Acanthonevrinae, Adraminae, Trypetinae and Tephritinae independently, and has no real taxonomic weight, and is not thoroughly examined in Gastrozonini. Many of the taxa discussed here are non-Palaearctic and were not available for study; the descriptions and figures made by Hardy (1973; 1974; 1988) were the main source of information. The associations with Poaceae are inappropriate to prove its monophyly, as this is one of the most primitive modes of phytophagy that occurs also in Ulidiidae: Euxestinae, Tephritidae: Acanthonevrinae and probably Phascinae.

### Group of genera allied to *Gastrozona*

**D i a g n o s i s.** Flagellomere 1 rounded or acute apically, not sharply pointed; spermathecae often with subglobose basal part, usually with small tuberculate apical portion.

**I n c l u d e d t a x a.** *Acrotaeniostola* H e n d e l, *Carpophthorella* H e n d e l, *Chaetellipsis* B e z z i (= *Podophysa* H e r i n g), *Chelyophora* R o n d a n i, *Dietheria* H a r d y, *Enicoptera* M a c q u a r t, *Galbifascia* H a r d y, *Gastrozona* B e z z i, *Paragastrozona* S h i r a k i, *Rhaibophleps* H a r d y, *Taeniostola* B e z z i, *Xanthorrhachis* B e z z i.

There are 8–10 species of *Acrotaeniostola*, *Gastrozona*, and *Paragastrozona* in Korea and Far East Russia, Palaearctic China and Japan, (Foote, 1984; Ito, 1983; 1984a; Kwon, 1985), and also about 40 species altogether in the mainland southern China, Taiwan, and Ryukyu Islands; many of them requires further revision.

**Discussion.** This group is composite and probably not monophyletic. Males of *Carpophthorella* and *Gastrozona* have large rectal glands (Fig. 1, 1), and some *Taeniostola* have very similar membranous area; it is considered as the synapomorphy of these genera; *Galbifascia* Hardy and *Xanthorrhachis* Bezzi share the shortened or reduced ocellar setae, longitudinally striate wing pattern, and enlarged male abdominal tergum 2; Hardy (1973: 282) reported the male of *X. annandalei* Bezzi having one rectal gland, but not figured male terminalia for these genera. The rest of genera included here do not form a monophyletic group. In some species of *Acrotaeniostola* the 1st flagellomere is sharply pointed (as in the following groups of genera), and in other species it is only long and moderately acute.

Group of genera allied to *Acroceratitis*

**Included taxa.** *Acroceratitis* Hendel; *Bistrispinaria* Speiser; *Leucotaeniella* Bezzi; *Paraxamuta* Hardy; *Phaeospilodes* Hering; *Spilocosmia* Bezzi. Oriental and Afrotropical distribution; no Palaearctic representatives; there are 5 species of *Acroceratitis*, *Phaeospilodes* and *Spilocosmia* occurring as far as Taiwan and Yunnan (southern mainland of China) in the North. According to Munro (1929), *Nippia* Munro also may belong here.

**Discussion.** Later Hancock (1991) reported *Bistrispinaria magniceps* (Bezzi) (as *Clinotaenia magniceps*) to be bred from the stems of *Panicum* (Gramineae), that supports its placement into Gastrozonini vs. Ceratitini. Recently, Hancock and Drew (1994) have placed *Bistrispinaria* to *Acroceratitis* group of Gastrozonini. *Nippia* agrees the group diagnosis well, differing in shorter plumosity of arista.

**Diagnosis.** Flagellomere 1 slightly to sharply pointed; spermathecae short drop-like, elongate tubular or conical, sometimes coiled (Fig. 2, 19).

## Tribe Ceratitini

Bezzi; 1910 (Ceratitinae); 1920; 1924b; Munro, 1925); 1926; 1956; Cogan, Munro; 1980; Hancock, 1984; 1985a; 1985c; 1986; 1987; 1991 (Ceratitinae); Hering; 1947b; Hardy, 1967; 1977; Hardy, Foote, 1989 (Trypetinae: Ceratitini); White, Elson-Harris, 1992 (Dacinae: Ceratitini: Ceratitina); Foote, 1967 (Oedaspinae: Ceratitini).

**Diagnosis. Larvae.** Accessory plates not developed; apical portion of mouthhooks long, curved ventrally, basal portion moderately massive, its height equal to the hypostomal sclerite; dental sclerites developed, small. Orbital plates of frons elongate, anterior orbital seta at posterior 1/3 of frons length, 2 frontal setae (very rarely 3) in anterior 1/2 of frons; ocellar setae very long to short, the 1st flagellomere long, rounded at apex; arista bare. Scapular setae always present, dorsocentral setae at level of anterior supraalar. Scutellum convex, shining at least partially. Epandrium produced posteriorly, surstyli narrow, bilobate apically, proctiger large, rounded in posterior aspect (Fig. 1, 6) Aedeagus of very similar shape, at least in *Capparimyia*, *Ceratitis*, *Neoceratitis* and *Trirhithrum*, with the dorso-apical rod sclerotized and rather long, acrophallus moderately long, with paired semitubular sclerites and large membranous sack-like structure associated with acrophallus, inner surface of praeputium not sculptured (Fig. 1, 8). Eversible membrane of ovipositor covered with sclerotized one-toothed scales, arranged into common oblique rows (Fig. 2, 12), aculeus tapered or with subapical steps (Figs 2, 5, 6); always 2 spermathecae, covered with scales or acute papillae (Fig. 2, 20).

**Biology.** Larvae breed in fruits and flower buds.

**Included taxa.** *Acropteromma* Bezzi; *Anoplomus* Bezzi; *Capparimyia* Bezzi; *Carpophthoromyia* Austen; *Ceratitella* Malloch; *Ceratitoides* Hendel; *Clinotaenia* Bezzi; *Eumictoxenus* Munro; *Neoceratitis* Hendel (= *Trirhithromyia* Hendel); *Paraceratitella* Hardy; *Paratrirhithrum* Shiraki; *Pardalaspinus* Hering (= *Notophysa* Zia, = *Ceratitisoma* Zia); *Perilampus* Bezzi; *Proanoplomus* Shiraki; *Sinanoplomus* Zia; *Trirhithrum* Bezzi; *Xanthorrhachista* Hendel. The genera are mostly of Afrotropical distribution, except an Australo-Asiatic group of *Paratrirhithrum*, *Ceratitella* and *Paraceratitella*, and 3 Palaearctic species of *Paratrirhithrum*, *Neoceratitis* and *Capparimyia* (Foote, 1984), and the Mediterranean fruit fly, *Ceratitis capitata* Wd., a widespread pest of subtropical and tropical fruits.

**Discussion.** Genera of Ceratitini differ mostly in some body and wing pattern peculiarities, and might represent really no more than 5–7 genera based upon non-intergrading genitalic or external characters. Recently, Hancock and Drew (1994) have transferred *Anoplomus*, *Sinanoplomus*, *Proanoplomus*, *Pardalaspinus* and *Clinotaenia* from Gastrozonini to Ceratitini; here I

follow this work. Reduction of the 3rd spermatheca is the character used as a synapomorphy to join Ceratitini with Dacini and Gastrozonini (White, Harris, 1992; Foote, Blanc, Norrbom, 1994) or to hypothesize close relationships between Ceratitini and Tephritinae (Hancock, 1986b); this character state is undoubtedly apomorphic, but even within Trypetinae the third spermatheca very often is non sclerotized (*Hemilea* spp.), or reduced with the duct present (*Carpomya* spp. and related species assigned to *Rhagoletis* Lw.), or completely absent (*Malica* V. Richter, *Acidoxantha* Hendel, *Plioreocepta* Korneyev, etc.).

Ceratitini and Dacini show rather strong similarity in larval morphology, and this also was a reason to place them into one subfamily. The elongated and bilobate head segment, very numerous oral ridges with serrate margins, long mouthhooks, developed dental sclerite are the characters belonging to the ground-plan of Tephritidae in all, and therefore are symplesiomorphies.

### Tribe Toxotrypanini

Munro, 1984 (Toxotrypaninae); Hancock, 1986b; White, Elson Harris, 1992 (Toxotrypanini). — Hancock, 1986b (Anastrephini).

**D i a g n o s i s.** Larvae. Accessory plates well-developed, slightly serrate or lobate; apical portion of mouthhooks long, curved ventrally, basal portion moderately massive, its height equal to the hypostomal sclerite; dental sclerites developed, small. Adults. Orbital plates of frons short, 2—0 orbital setae at posterior 1/4—1/5 of frons length, 4 (3—0) frontal setae in anterior 2/3 of frons; ocellar setae tiny or completely reduced; the 1st flagellomere long, rounded at apex; arista bare. Scapular setae well-developed, dorsocentral posteriorly of supraalar setae level. Vein M apically curved upwardly; cell CuP with the apical lobe very long. Epandrium drop-like in lateral aspect (Fig. 2, 25), surstyli short, broad, not bilobate apically, proctiger large, rounded in posterior aspect; the aedeagal glans with a dorso-apical rod, smooth small praeputium and simple tubular acrophallus. Eversible membrane of ovipositor dorsally with strong one-toothed scales or hook-like spines (Figs 2, 13—14); aculeus narrow, moderately or very long, serrate; 3 spermathecae, covered with acute scales (Fig. 2, 21).

**B i o l o g y.** All species of known biology feed in the flesh or seeds of fruits (Norrbom, Kim, 1988; White, Elson-Harris, 1992).

**I n c l u d e d t a x a.** 2 genera, *Anastrepha* S c h i n e r (184 species) and *Toxotrypana* S c h i n e r (7 species) (Hernández-Ortiz, Aluja, 1993; Foote, 1965; 1967) of Neotropical distribution, with some species as far north as southern USA. No Palearctic representatives. Several species of a quarantine pest status.

**D i s c u s s i o n.** Monophyly of Toxotrypanini is well supported by the shape of M vein and reduced ocellar setae. The genera *Anastrepha* and *Toxotrypana* were commonly considered within Trypetini and Dacini, respectively. Kitto (1983) has shown them to be very close in immunological tests; Carroll (1986) found strong affinities in larval morphology. Munro (1984) has established new subfamily to exclude *Toxotrypana* from his "Dacidae", and Hancock (1986b) was the first who added *Anastrepha* to it as a separate tribe.

Toxotrypanini differ from other Trypetinae, first of all, in the relatively primitive appearance of the larva, including mouthhooks only slightly curved and acute, dental sclerite present, oral ridges rather numerous and long, serrate, and accessory plates small and serrate (White, Elson-Harris, 1992).

### Tribe Carpomyini, stat. n.

Norrbom, 1989; White, Elson-Harris, 1992 (Trypetini: Carpomyina).

**D i a g n o s i s.** Adults. Orbital plates of frons short, (1—) 2 orbital setae at posterior 1/4—1/5 of frons length; ocellar setae usually of normal length, rarely hair-like; the 1st flagellomere normally shorter than face, rounded or pointed at apex. Vein M apically not curved; the apical lobe of cell CuP rather short or reduced; the aedeagal glans with or without dorso-apical rod; aculeus narrow, moderately long to short.

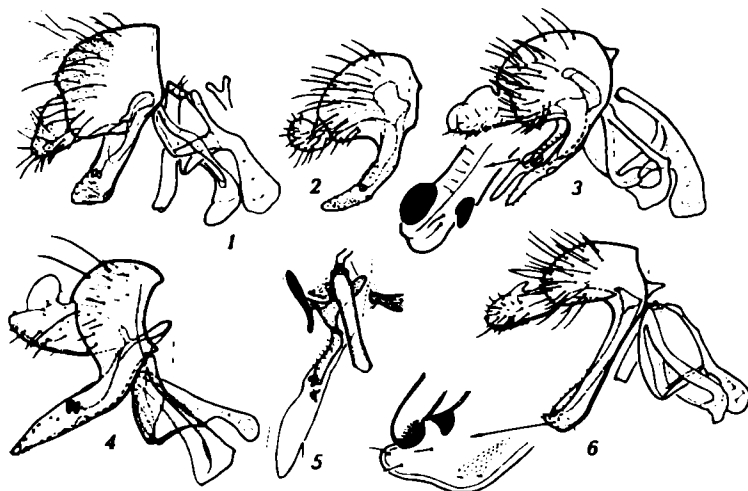


Fig. 3. Carpomyini, epandrium (2), epandrium and hypandrium, right aspect (1, 3, 4, 6), decasternum and basal part of aedeagus, anterior right aspect (5): 1 - *Notomma bioculatum* Bezzi; 2 - *Notomma* sp. aff. *mutilum* Bezzi; 3 - *Paraterellia immaculata* Blanc; 4, 5 - *Rhagoletis berberidis* Jerny; 6 - *Oedicarena tetanops* Lw. (a - same, enlarged)

Рис. 3. Карпомыини, эпандрий (2), эпандрий и гипандрий, справа (1, 3, 4, 6), десятый стернит и базальная часть эдеагуса, спереди и справа (5): 1 - *Notomma bioculatum* Bezzi; 2 - *Notomma* sp. cf. *mutilum* Bezzi; 3 - *Paraterellia immaculata* Blanc; 4, 5 - *Rhagoletis* sp.; 6 - *Oedicarena tetanops* Lw. (a - то же, увеличено)

**Included taxa.** The tribe includes 3 subtribes, Notommatina subtrib. n., Paraterelliina subtrib. n., and Carpomyina.

**Discussion.** Monophyly of Carpomyini is tentative, based on the hypothesis, that the long and broad shape of the surstylus posterior lobe (the "sword-shaped" lobe, like in *Paraterellia*, *Carpomya* and some *Notomma*), belongs to the ground-plan of this tribe. The genera included here share also the shape of the male proctiger which is subcylindrical, usually compressed dorso-ventrally and having rather long and narrow appearance in profile (except in *Malica*, and beyond this tribe also in *Rhacochlaena* Lw. (Adraminae), *Nitrariomyia* Rohd. (Trypetini), see discussion below).

#### Subtribe Notommatina, subtrib. n.

**Diagnosis.** The 1st flagellomere short, rounded at apex; cell  $C_1$  always brown; cell Sc is long, more than a half, or approximately as long as  $C_2$ ; cell BR lacking microtrichia and completely transparent at least distad of bm-cu vein level (apomorphies), surstyli narrower than epandrium in profile, directed postero-ventrally, long to short, with the postero-apical lobe subequal to basal portion of surstyli in *Notomma*, short in *Malica*; prensisetae tooth-like, subequal (Figs 3, 1-2), lobe of praeglans developed (only in *Notomma bioculatum* Bezzi group of species, see: Munro, 1952), covered with strong sclerotized spines, apparently absent in the rest; praeputium sculptured or smooth, acrophallus not examined; dorso-apical rod tale-like in *N. galbanum* group (not found in the rest); tergosternum 7 slightly compressed dorso-ventrally or conical, completely sclerotized, without ventro-apical pouch.

**Biology.** Larvae form twig galls on shrubs of the plant family Fabaceae: *Notomma galbanum* Munro was bred from *Dicrostachys glomerata* (see: Munro, 1952), and *N. jucundum* Lw. from *Acacia gerrardii* (see: Hancock, 1985). *Malica caraganae* V. Richter forms similar galls on *Halimodendron holodendron* (Korneyev, unpublished data); *Caragana turkestanica* is another possible host plant of the latter species, but original data of rearing from beans (Richter, 1974) were

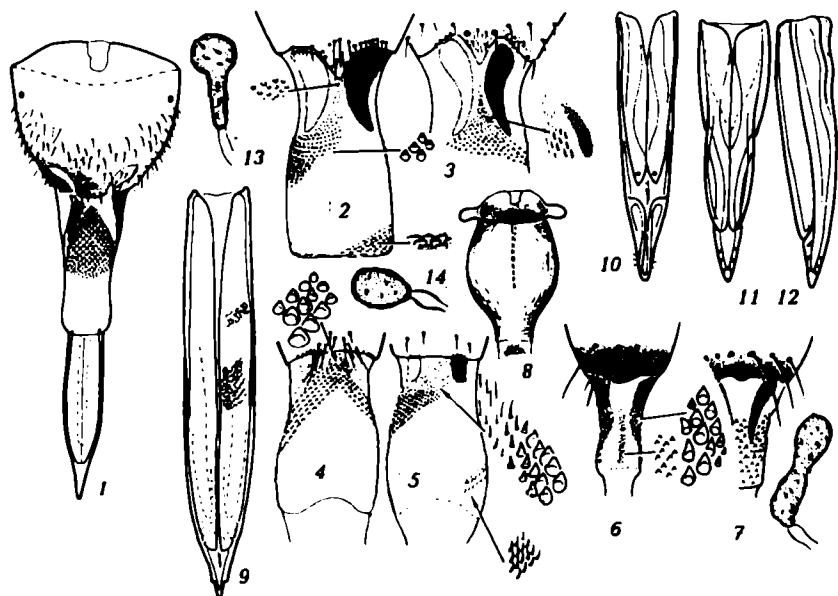


Fig. 4. Carpomiyini, female terminalia, ventral aspect (1), eversible membrane, ventral (2, 4, 6) and dorsal aspect (3, 5, 7), 7th tergosternum (8), aculeus, ventral (9-11) and lateral aspect (12), and spermatheca (13-15): 1 - *Carpomya schineri* Lw.; 2, 3, 9, 12 - *Paraterellia immaculata* Blanc; 4, 5, 8, 11, 12, 14 - *Malica caraganae* V. Richter; 6, 7, 10 - *Notomma* sp. cf. *mutillum* Bezzi; 15 - *N. bioculatum* Bezzi.

Рис. 4. Карпомиины, терминалии самок, вентрально (1), выворачиваемая мембрана, вентрально (2, 4, 6) и дорсально (3, 5, 7), 7-й тергостерит (8), лезвие яйцеклада, вентрально (9-11) и латерально (12), сперматеки (13-15): 1 - *Carpomya schineri* Lw.; 2, 3, 9, 12 - *Paraterellia immaculata* Blanc; 4, 5, 8, 11, 12, 14 - *Malica caraganae* V. Richter; 6, 7, 10 - *Notomma* sp. cf. *mutillum* Bezzi; 15 - *N. bioculatum* Bezzi.

not confirmed during field observations and probably were misgiven by collector of its type series.

**Included taxa.** *Notomma* Bezzi with 8 Afrotropical species spread as far as Israel to North and Madagascar to East. *Malica* V. Richter is monotypic genus known only from Kyrghyzian mountain lowlands.

**Discussion.** Monophyly of this subtribe is supported by larval biology and 3 synapomorphies above. Numerous non-genital differences of *Malica* from *Notomma* are of autapomorphic origin, except aculeus not compressed laterally, considered as a plesiomorphy. Despite of similar larval habits, ovipositors of *Malica* and *Notomma* represent different traits, those may be associated with two ways of oviposition into twigs: a robust tergosternum 7 with 2 strong lateral and medio-ventral apodemes plus rather broad and blunt aculeus (Figs 4, 8, 11-12) in the first, and a weak 7th tergosternum plus acute, ventrally serrate aculeus in the second case (Figs 4, 6-7, 10).

Teneral specimens of *Malica* have cell BR more or less completely microtrichose, showing that adults lack microtrichia after emerging.

#### Subtribe Paraterelliina subtrib. n.

**Diagnosis.** The 1st flagellomere short, rounded at apex; cell  $C_1$  always light yellow; cell Sc is shorter than  $C_2$ ; cell BR covered with microtrichia, surstyli long, narrower than epandrium in profile, directed postero-ventrally, postero-apical lobe subequal to basal portion of surstyli in *Paraterellia*, short in *Oedicarena*; medio-apical prensiseta long and low (apomorphy) (Figs 3, 3, 6), lobe of praegans well-developed (except *Oe. tetanops* Lw.), covered with papillae in *P. immaculata*, apparently smooth in the other three species of *Oedicarena*; praeputium smooth or sculptured, acrophallus usually paired, semitubular (see Norrbom et al., 1988,

Figs 4 and 5); tergostenum 7 slightly compressed dorso-ventrally, completely sclerotized, without ventro-apical tubercle (Figs 4, 2—3).

**Biology.** Species of known biology feed on fleshy fruits (Norrbom et al., 1988; White, Elson-Harris, 1992).

**Included taxa.** Two New World genera: *Paraterellia* Foote and *Oedicarena* Loew.

**Discussion.** Close relationships of the two genera were hypothesized by Norrbom et al. (1988) and Norrbom (1989), but all the characters these genera were found to share, are apparently symplesiomorphies. At least, the shape of epandrium, surstyli and cerci in general resembles that of Ceratitini and Dacini. The shape of the medio-apical prensisetae is unique among Tephritinae and here assumed to be the synapomorphy of the two genera supporting the monophyly of Paraterelliina. The postero-apical lobe of surstyli in *Oedicarena* is presumed to be secondarily shortened.

### Subtribe Carpomyina

Norrbom, 1989; White, Elson-Harris, 1992 (Trypetini: Carpomyina).

**Diagnosis.** Larvae. Accessory plates not expressed; apical portion of mouthhooks long, curved ventrally, basal portion moderately to very high and massive, its height equal or to 2 times exceeding length of the hypostomal sclerite; dental sclerites not expressed. Adults. The 1st flagellomere elongate, pointed, rarely rounded at apex; cell BR microtrichose, cell  $C_1$  usually yellowish to hyaline; epandrium only slightly elongated posteriorly, anterolateral processes of decasternum at least in *Carpomya* and Palearctic species of *Rhagoletis* strong anteriorly projected (Figs 3, 4—5); tergostenum 7 slightly compressed dorso-ventrally or conical, apico-ventrally with a pair of desclerotized areas and a “cape” between them seen in profile as a tubercle, bearing up to 8 setulae, approximately twice longer than the setulae anteriorly of it (Figs 4, 1).

**Biology.** Larvae in flesh or seeds of fruits (Kandybina, 1977; White, Elson-Harris, 1992).

**Included taxa.** *Carpomya* Costa, *Myiopardalis* Bezzi, *Goniglossum* Rondani (Palearctic), *Zonosemata* Benjamin, *Stoneola* Hering, *Haywardina* Aczel, *Cryptoplagia* Aczel, *Cryptodacus* Hendel, *Lezca* Foote (mostly Neotropical, with few species as far north as southern USA), *Rhagoletis* Loew (Norrbom, 1989) and *Zonosema* Loew. Afrotropical *Scleropithus* Munro might also belong here (Freidberg, pers. comm.).

**Discussion.** *Rhagoletis* probably is not a monophyletic genus (Jenkins, Carroll, personal communication), and its current concept is to be revised; species assigned to it are widespread in Holarctic and Neotropical regions. *Zonosema* was synonymized and resurrected from synonymy of *Rhagoletis* at least twice (e. g., Hendel, 1927; Rohdendorf, 1961; Bush, 1966; Foote, 1984; Ito, 1984). It might be considered as a good monophyletic genus well separated from the rest of the Carpomyina (Korneyev, Merz, in preparation).

### Tribe Trypetini

Loew, 1862 (Trypetina); Hendel, 1927; Hering, 1941; 1947b; Hardy, 1973; 1974; 1977; 1988; Cogan, Munro, 1980; Ito, 1983; Hancock, 1986b; 1991; Hardy, Foote, 1989 (Trypetini); White, Elson-Harris (Trypetini: Trypetina).

**Diagnosis.** Orbital plates of frons short, 2—1 orbital setae at posterior 1/4—1/5 of frons length; usually 3 (5-0) frontal setae, ocellar setae long to hair-like, postocellar setae well-developed; the 1st flagellomere shorter than face, rounded at apex, rarely acute, arista short pubescent to bare; dorsocentral setae behind, rarely at level of anterior supraalar setae; 2 (rarely 1) pairs of scutellar setae. Cell BM of normal width, CuP with short apical lobe; in males epandrium slightly projected posteriorly, decasternum not projected anteriorly beyond epandrium,

surstyli moderately to very long and narrow, usually 0.6—0.7 times of epandrium length, commonly without or, at most, with small finger-like posterior lobe, cerci large, long, usually compressed laterally; aedeagus normally with large sclerotized glans; acrophallus sclerites indistinct, praeputium usually with two areas sculptured inside; dorso-apical rod not sclerotized, developed or absent, praeglans with papillose lobe only in some Acidoxanthina; female tergum 6 somewhat shorter than 5th; tergosternum 7 short, compressed dorso-ventrally, rarely tubular or conical, long, with 1—2 pairs of very long subapical setae on ventral or on both ventral and dorsal side; eversible membrane characters variable; aculeus of various shape, usually broad and compressed, serrate at apex; 3—2 spermathecae.

**Included taxa.** Four subtribes, Trypetina, Acidoxanthina subtrib. n., Nitrariomyiina, subtrib. n., and an unnamed subtribe (a group of genera related to *Anomoia* Walker and *Chetostoma* Rondani).

**Discussion.** This tribe was a subject of phylogenetic analysis given by Han (1992, unpublished thesis). Until this material is not completely published, they can be discussed here only partially. Therefore, no new name for the group of genera related to *Anomoia* and *Chetostoma* (recognized by both of us independently) is proposed, and many of the characters he used are not discussed, except those not covered by scope of that paper, or found by us separately, or otherwise than with a reference to his work, if the characters are of extraordinary importance.

Han (1992) suggested that monophyly of Trypetini may be supported by the presence of sculpture on inner surface of the praeputium distad of rudimentary acrophallus. Indeed, this structure has rather characteristic appearance in the Trypetini, but apparently exists elsewhere beyond the tribe, e. g., in *Acanthonevra* Mcq., *Notomma* Bezzi, *Paraterellia* Foote (see above).

### Subtribe Trypetina, stat. n.

**Diagnosis.** Larvae. The antennal sensory organ with the basal segment shorter than wide and the apical papilla as long, or longer than wide, spherical; an area between maxillary sensory organs with the "facial mask"; 2—7 poorly expressed oral ridges and accessory plates, as far as known, with smooth margins; apical portion of mouthhooks short, curved ventrally, basal portion moderately high and massive, its height less than length of the hypostomal sclerite, the latter as long or longer than the mouthhook; dental sclerites not developed. Adults. The 1st flagellomere rounded or acute apically; wing: cell BR microtrichose, cell  $C_1$  usually yellowish to hyaline; wing pattern various; vein  $r_{4+5}$  setulose at basal half or bare; extension of the cell CuP moderately long to very short; male proctiger very slightly compressed laterally and surstyli narrow and long, the posterior lobe very

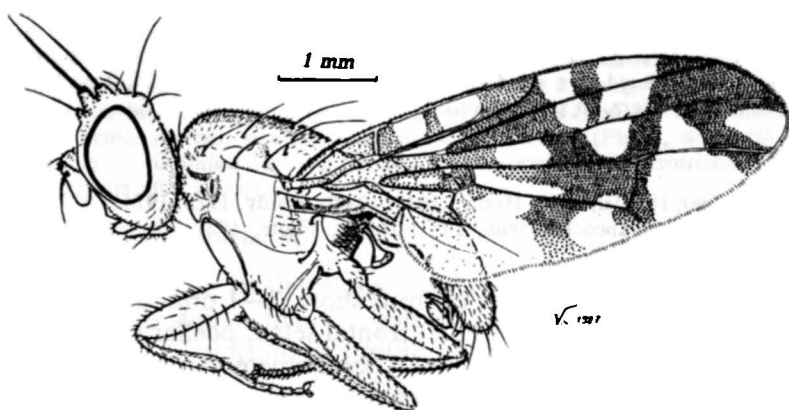


Fig. 5. *Spilograpta armifrons* Portsh., lectotype

Рис. 5. *Spilograpta armifrons* Portsh., лектотип

short, finger-like or lacking; hypandrium without membranous pouch; glans of aedeagus with 2, very rarely without any sculptured areas on praeputium; dorso-apical rod commonly well-developed; tergosternum 7 compressed dorso-ventrally; the taeniae long to vestigial; ventral surface of eversible membrane with sclerotized scales posteriorly of taeniae; apical portion of the aculeus shorter than 1/3 of the ventral lobes, usually serrate apico-laterally.

**Discussion.** No satisfactory revision of generic classification of the Trypetini was provided hitherto; therefore, only a putative review of the genera is given below.

#### Group of genera allied to *Trypeta*

**Diagnosis.** Larvae. Labial lobe with minute sclerotized teeth; the second opening of posterior spiracle laterally projecting. Adults. Male terminalia: medial pair of prensisetae larger than lateral pair, usually on an accessory projection of the inner surstylus. Female terminalia: tergosternum 7 ventro-apically with 2 long setae, no membranous pouch; eversible membrane with well-developed tooth-like scales and the taeniae short.

**Biology.** Larvae mine leaves of *Senecio*, *Tussilago*, *Petasites*, *Artemisia*, *Solidago*, *Aster* and probably some other asteraceous plants.

**Included taxa.** *Trypeta* Meigen, *Acidia* Robineau-Desvoidy, *Stemonocera* Rondani and *Cornutrypeta* Han and Wang.

**Discussion.** Han (e. g., Han et al., 1993) gave a much wider definition to this group. Only one larval synapomorphies supports monophyly of this group; the second opening of posterior spiracle is of normal position in examined larvae of *Strauzia*, *Euleia*, *Pseudina*, *Philophylla* and *Flavitudia* (see below). no larvae are described for any other genera of the Trypetina.

#### Group of genera allied to *Euleia*

**Diagnosis.** Larvae. Labial lobes with minute sclerotized teeth; the second opening of posterior spiracle not projecting laterally. Adults. Mesonotal scutum shining (apomorphy). Male terminalia: prensisetae of both medial and lateral pair subequal, the outer surstylus with finger-like posterior lobe; glans of aedeagus with the dorso-apical rod reduced, praeputium with the subapical sinus ("dorsal sclerite" sensu Han (1992)) shortened, without visible sculpture, at most "median granulate sclerite" with (or often without) papillae. Female terminalia: tergosternum 7 ventro-apically with 0–4 long setae; eversible membrane with the taeniae not long, usually joined on dorsal surface and with well-developed tooth-like scales; aculeus tapered at its distal 1/3 with the subapical serration restricted to short portion at the extreme apex (apomorphy); 3 spermathecae with the proximal portion enlarged and smooth and the apical portion covered with nipple-like structures or tuberculate (apomorphy).

**Biology.** Larvae mine leaves of plants of the families Apiaceae and Araliaceae.

**Included taxa.** *Euleia* Walker, *Cryptaciura* Hendel, *Pterochile* V. Richter et Kandybina, *Aciuroopsis* Hardy, *Odnosumyia* Korneyev.

**Discussion.** Monophyly of this group is supported by reduction of tomentosity on mesonotum, morphology of aedeagus and the aculeus serrated only at apex. Presence of sclerotized teeth on the labial lobe of the larva suggests that it might be the sister-group to the *Trypeta* group of genera, but this character is not examined thoroughly in most of genera of the subtribe. There are finger-like posterior lobes of surstyli and similarly serrated aculeus also in the genus *Yamanowatome* Ito (see below), that might be or belong to the sister-group to *Euleia*-group, differing in the tomentosity on mesoscutum well-developed, the subapical sinus of praeputium sculptured and the dorso-apical rod developed (plesiomorphies). *Calosphenisca* Hendel was referred to this group putatively, without examination of genitalic structures (Korneyev, 1991a); and must be considered as a genus incertae sedis of Trypetina.

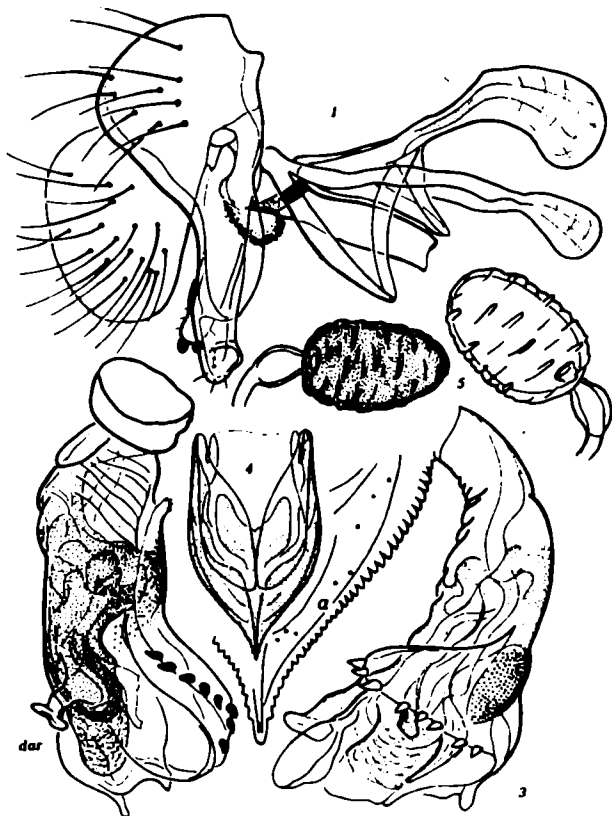


Fig. 6. *Acidiella longipennis* Hendel, male (1–3) and female (4–5) terminalia: 1 – epandrium and hypandrium, right aspect; 2, 3 – glans of aedeagus, right and anteroventral aspect; 4 – aculeus; 5 – spennathecae (2 of 3); (a – same, enlarged).

Рис. 6. *Acidiella longipennis* Hendel, Терминалии самца (1–3) и самки (4–5): 1 – эпандрий и гипандрий, справа; 2, 3 – гланс эдеагуса, справа и антеровентрально; 4 – лезвие яйцеклада; 5 – сперматеки (2 из 3); (а – то же, увеличено).

### Group of genera allied to *Vidalia*

**D i a g n o s i s.** Larvae. Labial lobes without sclerotized teeth; the second opening of posterior spiracle not projecting laterally. Adults. Mesonotal scutum sparsely tomentose. Male terminalia: prenisetae of the medial pair larger than lateral, the outer surstylus with finger-like posterior lobe; glans of the aedeagus with the dorso-apical rod usually present, praeputium with the subapical sinus with various or without any sculpture. Female terminalia: tergosternum 7 ventro-apically with 2–8 long setae, no membranous pouch; eversible membrane with the taeniae not long, with small spines in between of ventral taeniae and well-developed tooth-like scales; aculeus tapered in its distal 1/3–1/6 with the subapical serration covering convergent margins or restricted to short portion at the apex; 3–2 spermathecae with the proximal portion not enlarged, and distal portion papillose.

**B i o l o g y.** Larvae breed in fleshy fruits of *Sheflera* and *Acanthopanax* (Araliaceae) (Kandybina, 1977; Han et al., 1994b) or mine leaves of Rubiaceae (Hancock, 1985).

**Included taxa.** *Vidalia* Robineau - Desvoidy, n. dub., *Hoplandromyia* Bezzi, *Pseudina* Malloch, *Chenacidiella* Shiraki.

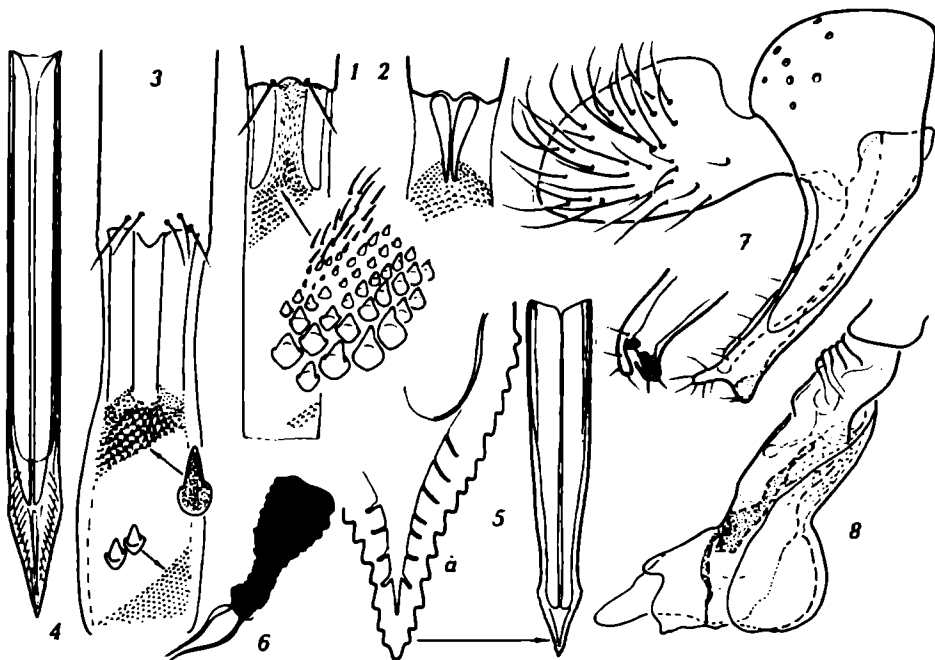


Fig. 7. *Pseudina rohdendorfi* V. Richter (1, 2, 5–8) and *Anastrephoides matsumurai* Shiraki (3, 4): eversible membrane, ventral (1, 3) and dorsal (2), aculeus (4, 5), spermatheca (6), epandrium (7) and glans of aedeagus (8) (a – same, posterior aspect)

Рис. 7. *Pseudina rohdendorfi* V. Richter (1, 2, 5–8) и *Anastrephoides matsumurai* Shiraki (3, 4): выворачиваемая мембрана, вентрально (1, 3) и дорсально (2), лезвие яйцеклада (4, 5), сперматека (6), эпандрий (7) и гланс эдеагуса (8) (a – то же, сзади)

**Discussion.** Monophyly of this group, use of the generic names *Pseudina* and *Hoplandromyia* instead of *Vidalia* Robineau-Desvoidy and synonymies were discussed by Han et al. (1994b).

Han (loc. cit.) considered the presence of 3 pairs of frontal setae and the wing pattern with narrow c-shaped band as plesiomorphies of both *Hoplandromyia* and *Pseudina*. In my opinion, *Pseudina* as accepted by Han is a paraphyletic group, with *Hoplandromyia* as a derived clade, not the sister-genus.

When trying to detect generic placement of *Vidalia rohdendorfi* V. Richter (Fig. 7, 1–2, 5–8) the author faced the problem that this species in fact forms the sister-group to *Hoplandromyia* (s. str.). Both taxa share the narrow c-shaped subapical pattern on a wing, reduced sculpture of the dorsal (subapical) sinus and general appearance of aedeagus. In *Hoplandromyia* the median granulate sclerite is broadly sculptured (plesiomorphy) and dorso-apical rod reduced (autapomorphy). *V. rohdendorfi* differs from the other species assigned to *Hoplandromyia* in having more than 3 frontal setae (symplesiomorphy with the species allied to *Pseudina bulloae* and *Spilograpa armifrons*), but the 4th and 5th setae are thick, equal to 2nd and 3rd (autapomorphy) and the spinules on ventral surface of the eversible membrane directed anteriorly (autapomorphy). Therefore, the presence of 3 enlarged frontal setae, the only character that Han (loc. cit.) suggested to be plesiomorphic in *Hoplandromyia* s. str., placing it as a branch opposite to *Pseudina*, might be equivocally its autapomorphy (reversal), derived from 4 frontal setae of *V. rohdendorfi* + *Hoplandromyia* hypothetical ancestor. This does not allow to define *Pseudina* as monophyletic genus and even to separate it well from *Hoplandromyia*. Therefore, the *Hoplandromyia* Bezzi, 1923 (type-species: *Hoplandromyia tetracera* Bezzi, 1923) is considered here to be the possible senior subjective synonym of the *Pseudina* Malloch, 1939 (type-species: *Pseudina bulloae* Malloch, 1939).

A status of two Palearctic species must be revised in addition to what was suggested by Han (Han et al., 1993). *Spilograpa armifrons* Portschinsky, 1892, described on males (Fig. 5), is the senior synonym of *Sinaita alini* Herin, 1940, syn. n. described on females (type series of both species and additional material from Far East Russia and China are examined); *Vidalia rohdendorfi* V. Richter, 1963, is the senior synonym of *Vidalia furialis* Ito, 1984, syn. n. (type series of all the species and additional material from Russian Far East and China are examined); Han (1992) noted

that they might be synonyms and has transferred the first two species to *Pseudina* (Han et al., 1993). The type specimens of *V. furialis* Ito are teneral and have indistinct wing pattern, with the crossbands pale and less expressed and do not differ from *V. rohdendorfi* V. Richter in the rest.

## Genera of Trypetina of uncertain position

**D i a g n o s i s.** Larvae. Labial lobes without sclerotized teeth; the second opening of posterior spiracle not projecting laterally. Adults. Mesonotal scutum usually tomentose. Male terminalia of various structure. Female terminalia: tergosternum 7 ventro-apically with 0–6 long setae, no membranous pouch; eversible membrane with the taeniae not long, with no spines in between of ventral taeniae and well-developed tooth-like scales; aculeus always parallel-sided, tapered in its distal 1/2–1/6 with the subapical serration covering all convergent margins; 3–2 spermathecae of various shape.

**B i o l o g y.** Larvae of *Flaviludia* and *Hendelina* spp. breed in fleshy fruits and seeds of Araliaceae and Verbenaceae. Some larvae mine leaves: *Hemilea* spp. — of Araliaceae and Asteraceae, *Parahypenidium* polyfasciatum (Miyake) — of *Clerodendron* (Verbenaceae), *Philophylla caesio* F. — of *Urtica* (Urticaceae); the stem-boring larvae are recorded for *Strauzia* (in some Asteraceae) and *Platyparea* (in Campanulaceae).

**Included taxa.** *Acidiella* Hendel, *Acidiostigma* Hendel, *Alsangelisca* Ito, *Anastrephoides* Hendel, *Angelogelasinus* Ito, *Breviculala* Ito, *Calosphenisca* Hendel, *Cephalophysa* Hering, *Cristobalia* Malloch, *Dryadodacryma* Ito, *Esacidia* Ito, *Feshyia* Ito, *Flaviludia* Ito, *Hemilea* Loew (= *Hyleurinus* Ito, syn. n.), *Hemileoides* Rohdendorf, *Hemileophila* Hering, *Hendelina* Hardy, *Ihekaze* Ito, *Itosigo* Ito, *Longisculala* Ito, *Machaomyia* Hendel, *Magnimyiolia* Shiraki, *Matsumuracidia* Ito, *Morinowotome* Ito, *Nemeurinus* Ito (= *Syusiroitoo* Kwon, syn. n.), *Nemoriludia* Ito, *Oreurinus* Ito, *Paracanthonevra* Hardy, *Paracristobalia* Hardy, *Parahypenidium* Shiraki, *Paratrypeta* Han et Wang, *Philophylla* Rondani, *Platyparea* Loew, *Pogonangelus* Ito, *Prospheniscus* Shiraki, *Pseudacidia* Shiraki, *Pseudhemilea* Chen, *Shiracidia* Ito, *Shunraia* Ito, *Sineuleia* Chen, *Strauzia* Robineau-Desvoidy, *Tetramyiolia* Shiraki, *Yamanowotome* Ito.

**D i s c u s s i o n.** The genera listed above do not form a monophyletic group. There are significant lacunas in descriptions of most of them that do not allow to trace their relationships; it is evident, that some of them are to be synonymized in the future, and some species are to be transferred to different genera.

Han (1992) referred *Hemilea*, *Acidiella*, *Acidiostigma*, *Aischrocrania*, *Angelogelasinus*, *Morinowotome*, and *Nemeurinus* to the *Trypeta* group. He took the genera *Hemilea* and *Acidiella* in somewhat broader sense than they are currently accepted. Therefore following generic names, neither formally synonymized, nor having sufficient justification for following synonymization, were out of his consideration: *Hemileophila*, *Pseudhemilea*, *Hemileoides*, *Yamanowotome*, *Dryadodacryma*, *Pseudacidia*, *Tetramyiolia*, *Sineuleia*, *Matsumuracidia*, *Pogonangelus*, *Ihekaze*, and *Longisculala*.

At least *Hyleurinus kalopanacis* Ito, *Hemilea pulchella* F. and *H. infusata* Hering have two important synapomorphies: a) frontal setae somewhat reclinate, b) spermathecae rhomboid, with a strong globose subapical swelling (Figs 8, 1–4). This, together with the similar wing and body pattern, allows to consider them congeneric. The type specimens of *Nemeurinus leucocelis* Ito, 1984 (Fig. 8, 6) and *Syusiroitoo maculipennis* Kwon, 1985 differ only in details of wing pattern, not exceeding its variability in large series, agreeing well in other characters; they, and therefore the genera *Nemeurinus* Ito, 1984 and *Syusiroitoo* Kwon, 1985, are considered to be synonyms.

*Hemileoides continuus* (Ito), comb. n., previously assigned to *Dryadodacryma*, shares with *H. theodori* Rohd. 4–5 inclinate frontal setae and wing pattern. It is to be noted that only females of both species are known hitherto. *Angelogelasinus amuricola* (Hendel) comb. n., and *Angelogelasinus obscuripennis* (Chen) comb. n., fit close *A. naganensis* Ito, whereas *Flaviludia angustipennis* (Hering) comb. n., and *Flaviludia echinopanax* (Kandybina) comb. n., are very closely related to *F. zephyria* Ito, the type species of *Flaviludia* Ito, differing in minute details of wing pattern and serration of aculeus. These genera might be synonymized in a subsequent revision of genera allied to *Acidiella*, so

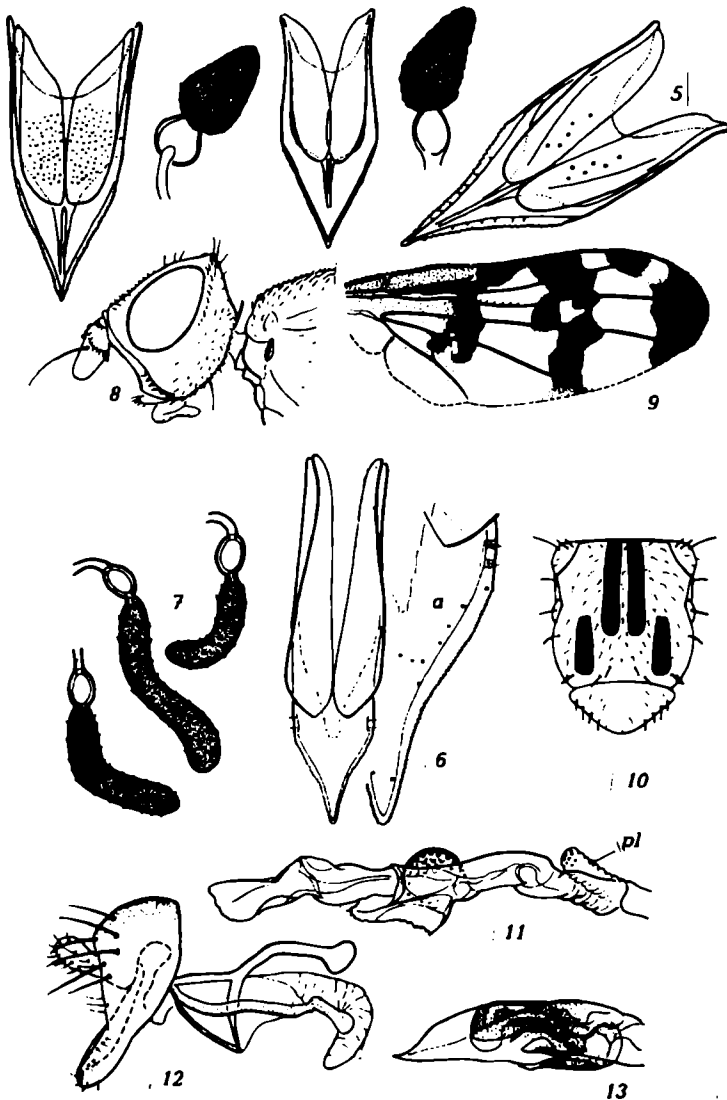


Fig. 8. Trypetini, head (8), wing (9), mesonotum (10), epandrium and hypandrium (12), glands of aedeagus (11, 13), leaves of eggcase (1, 3, 5, 6) and spermatheca (2, 4, 7): 1, 2 — *Hemilea infusata* Hering; 3, 4 — *Hemilea kalopanacis* Ito; 5 — *Nemeurinus leucocelus* Ito; 6, 7 — *Platyparea discoidea* F.; 8–10 — *Cephalophysa terebratula* Portsh.; 11 — *Acidrostigma* sp.; 12, 13 — *Nitrariomyia lukjanovitshi* Rohd. (pl — papillose lobe of praegans).

Рис. 8. Trypetini, голова (8), крыло (9), среднеспинка (10), эпандрий и гипандрий (12), гланды эдеагуса (11, 13), лезвие яйцеклада (1, 3, 5, 6) и сперматека (2, 4, 7): 1, 2 — *Hemilea infusata* Hering; 3, 4 — *Hemilea kalopanacis* Ito; 5 — *Nemeurinus leucocelus* Ito; 6, 7 — *Platyparea discoidea* F.; 8–10 — *Cephalophysa terebratula* Portsh.; 11 — *Acidrostigma* sp.; 12, 13 — *Nitrariomyia lukjanovitshi* Rohd. (pl — покрытая папиллами лопасть преганса).

the species are transferred here just to indicate close association with the species bearing generic names in the extremely splitted Ito's classification.

The genus *Anastrephoides* shows all the diagnostic characters of the subtribe Trypetina, except the aculeus very long. It has the eversible membrane covered with tooth-like scales and the aculeus serrate latero-apically (Figs 7, 3–4), and therefore belongs to the Trypetina, not to the *Anomoia-Chetostoma* complex of genera.

*Platyparea discoidea* (F.) has the shape of epandrium, surstyli and proctiger, as well as the arrangement of scales on eversible membrane and postero-laterally serrate aculeus those are common for Trypetina (Figs 8, 6). It shows relationships with Nearctic *Strauzia* R.-D. in the number of

frontal setae (4-6), head shape, subconical, non-compressed ovipositor, and stem-boring larvae, differing in frontal setae not enlarged in both sexes and glans of aedeagus lacking inner sculpture. *Platyparea dorsata* (Zia) apparently does belong to this genus. *Cephalophysa terebratula* (Pörsch.) has similar shape of female tergosternum 7 and male epandrium (examined, but not dissected) and may be close to them, differing in all the setae short and weak (Figs 8, 8-10).

### Group of subtribes allied to *Acidoxanthina*

The genera arranged into three following subtribes share having aculeus narrow, approximately rounded in transverse section or compressed laterally, rather than dorso-ventrally flattened and serrate latero-apically. This trait of ovipositor is apparently apomorphy associated with egg-laying into unripe fleshy fruits or flower buds, and might be either of synapomorphic, or of homoplastic origin. The 7th tergosternum is rather short, and the aculeus is somewhat projected beyond its anterior or posterior edge in the rest (not examined in *Acidoxantha* Hendel). The ventro-apical margin of tergosternum 7 is usually much shorter than the dorso-apical, and the aculeus may be disposed in oblique position, lying with its apex into a small membranous eversible structure medio-apically on the sternum 7. The apico-medial "cape" of 7th tergosternum separated laterally with desclerotized areas (see above) is another structure that apparently serves similar function. Further traits those obviously tightly associated with diameter decrease and elongation of ovipositor are size reduction and consequently reduction of praepitium sculpture and various processes of aedeagal glans. Thus, such structures may be subject of homoplasy and are to be used with precaution. There are ovipositor with taeniae very long and no scales in genera of both *Nitrariomyia* and *Anomoia*—*Chetostoma* complex, here presumed to be a synapomorphy showing their sister-group relationships.

### Subtribe *Acidoxanthina*, subtrib. n.

**D i a g n o s i s.** Orbital plates of frons moderately long, 2 orbital setae at posterior 1/4 of frons length; ocellar setae hair-like or absent, postocellar setae well-developed; the 1st flagellomere shorter than face, rounded at apex; arista bare or very short pubescent; dorsocentral setae behind level of anterior supraalar setae; 2 pairs of scutellar setae. Cell DM of normal width, CuP with distinctive apical lobe; in males surstyli very short and broad, cerci very long, large, compressed laterally, like in most Trypetina; aedeagus long, slender, with papillose lobe of praeglans, glans poorly sclerotized and consisting of a subglobose extension, homologous to the "median granulate sclerite" (sensu Han, 1992) covered with papillae and long apical membranous portion, no dorso-apical rod and tubular acrophallus developed (Figs 8, 11); female tergum 6 longer than 5th; tergosternum 7 shorter than aculeus, cylindrical; eversible membrane not examined, according to Hardy (1973, 1974), with long taeniae; aculeus needle-like, apparently somewhat compressed laterally, not serrate at apex, sometimes slightly expanded subapically; 2 poorly sclerotized spermathecae with no distinctive papillae.

**B i o l o g y.** *Acidoxantha bombacis* de Meijere was reared from flowers of *Bombax* (Bombacaceae); larvae of *A. hibisci* Hardy feed in flower buds of *Hibiscus* (Malvaceae), and *Bauhinia* (Fabaceae) (Hardy, 1974); reference to "*Tiliceus*" (loc. cit.) belong to a misinterpreted label "*Hibiscus tiliceus*" (Hancock, pers. comm.).

**I n c l u d e d t a x a.** *Acidoxantha* Hendel with 10 Oriental (one species in Taiwan) and 1 species from Madagascar, and *Craspedoxanthitea* Hardy with 2 species from New Guinea belong here; the third, monotypic genus *Acidoxanthopsis* Hering from Tanzania, requires further study. No Palaearctic representatives.

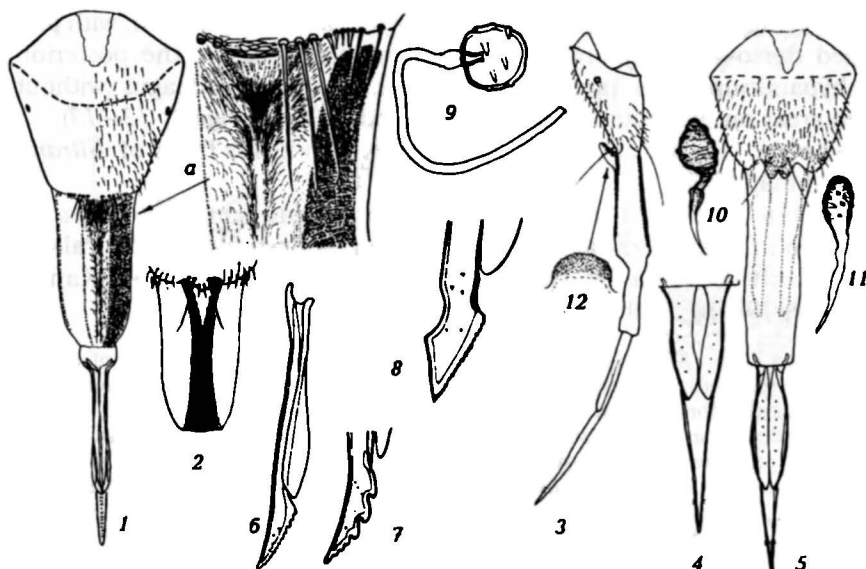


Fig. 9. Trypetini, female terminalia, ventral (1, 5) and left aspect (3), eversible membrane, dorsal aspect (2), aculeus (4, 6–8), spermatheca (9–11), and ventral pouch of membrane, ventral aspect (12): 1, 2, 6, 10 – *Anomoia purmunda* Harris; 3, 4, 10, 12 – *Nitrariomyia lukjanovitshi* Rohd.; 5, 11 – *Kerzhnerella mongolica* V. Richter; 7 – *Myoleja sinica* Zia; 8 – *Chetostoma melliculum* V. Richter (a – same, enlarged).

Рис. 9. Trypetini, терминалии самок, вентрально (1, 5) и слева (3), выворачиваемая мембрана, дорсально (2), лезвие яйцеклада (4, 6–8), сперматека (9–11), и вентральное выпячивание мембраны, вентрально (12): 1, 2, 6, 10 – *Anomoia purmunda* Harris; 3, 4, 10, 12 – *Nitrariomyia lukjanovitshi* Rohd.; 5, 11 – *Kerzhnerella mongolica* V. Richter; 7 – *Myoleja sinica* Zia; 8 – *Chetostoma melliculum* V. Richter (a – то же, увеличено).

**Discussion.** These genera were removed from Trypetinae to Ceratitinae (Hancock, 1991); presence of 2 frontal setae, 2 spermathecae and breeding in flower buds may support this decision. On the other hand, the two first characters are greatly subject to homoplasy. Moreover, the general appearance of *Acidoxantha*, including the posterior position of dorsocentral setae, long tergum 6 (vestigial in Ceratitini), shape of male cerci and tergum 9 (except surstyli extremely short) and presence of the “medial granulate sclerite” show that they rather belong to Trypetini than to Ceratitini. The aculeus longer than tergosternum 7, and the taeniae very long might be the synapomorphies with the two following subtribes. Their relationships might be resolved more precisely after further study of eversible membrane in females.

#### Subtribe Nitrariomyiina, subtrib. n.

**Diagnosis.** Larvae. The antennal sensory organ with the basal segment shorter than wide and the apical papilla as long or longer than wide, cone-shaped; an area between maxillary sensory organs with the placoid or tuberculate structures; oral ridges (7–9) and well expressed accessory plates with serrate margins; apical portion of mouthhooks long, curved ventrally, basal portion moderately to very high and massive, its height equal to length of the hypostomal sclerite; dental sclerites not developed. Adults. The 1st flagellomere always rounded apically; wing: cell BR microtrichose, cell  $C_1$  always yellowish to hyaline; wing pattern with 2 hyaline wedges on anterior margin and more or less expressed posterior apical crossband; vein  $r_{4+5}$  bare; cell CuP with very short or indistinct extension; tergosternum 7 compressed dorso-ventrally, apico-ventrally with a pouch between ventral taeniae seen in profile as a tubercle; one pair of setae, ca. 2.5–3 times longer than surrounding setulae on each ventral and dorsal sides; the taeniae long and narrow; no sclerotized scales in between; apical portion of the aculeus longer than 2/3 of the ventral lobes

(apomorphy) (Figs 9, 1, 3—5); male of *Nitrariomyia lukjanovitshi* Rohd. with proctiger compressed dorso-ventrally and surstyli moderately elongate, the posterior lobe lacking; hypandrium with membranous pouch; glans of aedeagus without any sculptured areas on praeputium; dorso-apical rod lacking (Figs 8, 12—13).

**Biology.** Larvae of *N. lukjanovitshi* feed on fleshy fruits of *Nitraria* spp. (see: Kandybina, 1977).

**Included taxa.** Two monotypic genera, *Nitrariomyia* Rohdendorf and *Kerzhnerella* V. Richter, widespread in arid Palaearctics from Gobi desert in the East to Israel in the West (Rohdendorf, 1949; Kandybina, 1972; Richter, 1975; Freidberg, unpublished data).

**Discussion.** Monophyly is supported by 2 apomorphies: the presence of membranous pouch at ventro-apical edge of tergosternum 7 and the long apical portion of aculeus in females. Cephalopharyngeal skeleton of larvae and the ventro-apical pouch of 7th tergosternum, as well as the male cerci compressed dorso-ventrally somewhat resemble these structures of *Carpomyia*. Nevertheless, fine morphology of these structures well differ in both taxa. Indeed, there are characters the *Nitrariomyia* and the *Anomoia-Chetostoma* complex share: a) oral ridges serrate in larvae (synplesiomorphy), b) non-scaled eversible membrane (synapomorphy), c) long non-modified taeniae (synplesiomorphy). The *Nitrariomyia* are considered here as the sister-group of the following subtribe.

#### Unnamed subtribe (*Anomoia-Chetostoma* complex of genera)

**Diagnosis.** Larvae. The antennal sensory organ with the basal segment shorter than wide and the apical papilla as long as wide, spherical; an area between maxillary sensory organs with the facial mask; 4—7 oral ridges and the accessory plates with serrate or smooth margins; apical portion of mouthhooks not long, curved ventrally, basal portion moderately high, its height 0.7—0.8 of length of the hypostomal sclerite; dental sclerites not expressed (Phillips, 1946; Kandybina, 1977; Belcari, 1986). Adults. The 1st flagellomere always rounded apically; wing: cell BR microtrichose, cell  $C_1$  always yellowish to hyaline; wing pattern with 2 hyaline wedges on anterior margin and more or less expressed posterior apical crossband; vein  $r_{4+5}$  bare; cell CuP with very short or indistinct extension; tergosternum 7 compressed dorso-ventrally, apico-ventrally with no distinct pouch between taeniae, the latter long and narrow; no sclerotized scales in between (Figs 9, 1); aculeus sharply narrowed after the base and compressed laterally (apomorphy) (Figs 9, 6—8), its apical portion shorter than 1/2—1/3 of the ventral lobes; males with cerci compressed laterally and surstyli moderately elongate, the posterior lobe lacking; hypandrium without membranous pouch; glans of aedeagus with 2, 1, or no sculptured areas on inner side of praeputium; dorso-apical rod usually well-developed (Korneyev, 1984; Belcari, 1986).

**Biology.** Larvae of *Anomoia* spp., *Myoleja* spp. and *Chetostoma* continuans Zia breed in fleshy fruits of *Cotoneaster*, *Crataegus*, *Sorbus* (Rosaceae) and *Lonicera* (Caprifoliaceae); at least *Ch. stackelbergi* Rohd. are inquillines in sawfly galls on *Lonicera* spp. (A. Zinovjev, pers. comm.) Similarly, 2 Neotropical species of *Parastenopa* are inquillines in galls (psyllid and probably cecidomyiid) on *Ilex* spp. (Aquifoliaceae) (Aczél, 1955); the New World species assigned to *Anomoia* might belong here; some of them breed in fruits of *Ilex* spp. (Benjamin, 1934; Phillips, 1946; Han, unpublished data).

**Included taxa.** *Anomoia* Walker, *Myoleja* Rondani, *Chetostoma* Rondani, *Parastenopa* Hendel, *Paramyiolia* Shiraki, *Euchaetostoma* Chen.

**Discussion.** Detailed taxonomic revision of this subtribe is the subject of forthcoming papers of Dr. H.-Y. Han (pers. comm.). Only the taxa where aculeus is strongly narrowed and compressed laterally rather than dorso-ventrally are being placed here. Both the *Anomoia-Chetostoma* complex and *Nitrariomyia* have some different characters of plesiomorphic state and, therefore, could not be treated as derivative groups of each other.

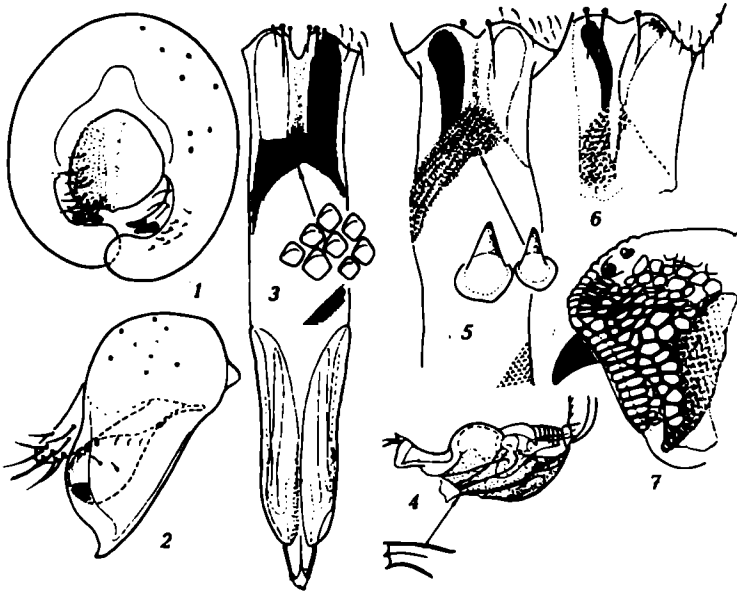


Fig. 10. Zaceratini, epandrium (1, 2), female terminalia (3), eversible membrane (5, 6), glands of aedeagus (4) and head segment of larva (7): 1–4 – *Zacerata asparagi* Coq.; 5–7 – *Pliorecepta poeciloptera* Schrank.

Рис. 10. Zaceratini, эпандрий (1, 2), терминалии самки (3), выворачиваемая мембрана (5, 6), глансы эдеагуса (4) и головной сегмент личинки (7): 1–4 – *Zacerata asparagi* Coq.; 5–7 – *Pliorecepta poeciloptera* Schrank.

### Tribe Rivelliomimini

Hancock, 1986b; 1991; White, Elson-Harris, 1992.

**D i a g n o s i s.** Orbital plates of frons short, 2 orbital setae at posterior 1/4 of frons length; ocellar setae hair-like or absent, postocellar setae well-developed; the 1st flagellomere somewhat shorter than face, rounded at apex; arista short pubescent; 2 pairs of scutellar setae. Cell DM of normal width, CuP without apical lobe, closed by straight, somewhat oblique vein (apomorphy); tergum 5 in both sexes with a pair of shining black, bulged spots (apomorphy); in males surstyli short and broad, proctiger comparatively poorly developed, narrow; vanes of aedeagal apodeme broadly separated (Hardy, 1987); the aedeagus not examined; female tergum 6 vestigial, completely hidden (apomorphy); tergosternum 7 moderately short; eversible membrane not examined; aculeus 4–5 times longer than wide, serrate at apex; 3–2 oval spermathecae with rather long, somewhat extended necks.

**B i o l o g y.** Malloch (1942) reported *Cycasia oculata* Malloch to be bred from sago palm, *Cycas circinalis* (Gymnospermae: Cycadaceae), with no data on the parts affected. It is possible that this is just a capture rather than breeding record.

**I n c l u d e d t a x a.** 3 genera, *Ornitoschema* de Meijere (= *Cycasia* Malloch) with 3 Australo-Asian species, and monotypic *Rivelliomima* Bezzi and *Xanthanomoea* Bezzi from South Africa (Hancock, 1986b; 1991). no Palaearctic representatives.

**D i s c u s s i o n.** Small, clearly monophyletic group. *Ornitoschema oculatum* de Meijere, 1914 is possibly a senior synonym and a secondary homonym of *Cycasia oculata* Malloch, 1942. Phylogenetic relationships within Trypetinae are unclear. The vestigial female tergum 6 and weak ocellar setae might indicate their relationships with Toxotrypanini and Dacinae, but this is rather a result of homoplasy.

## Tribe Zaceratini

Hancock, 1986b (Trypetinae: Zaceratini); White, Elson-Harris, 1992 (Trypetini: Zaceratina). — Trypetinae: Plioreceptini Korneyev, 1987.

**D i a g n o s i s.** Larvae. Facial mask with placoid, smooth-edged structures (Fig. 10, 7). Last segment with a sclerotized projection, bifurcate apically (synapomorphy). Adults. Arista rather short, indistinctly pubescent. Orbital plates not elongate, anterior orbital seta at posterior  $1/4-1/5$  of frons length, 3 frontal setae in anterior  $2/3-3/4$  of frons; ocellar setae normal, thoracal chaetotaxy complete, no extra setae; scapular setae at most 1.5 times longer than setulae on mesoscutum; 2 pairs of scutellar setae; vein m between bm-cu and r-m downcurved (synapomorphy); caudal part of aedeagal apodeme (joined to basiphallus) paired at apex; glans of aedeagus with praeputium small and non-sculptured, epandrium oval, with short surstyli and proctiger; in females aculeus slightly compressed dorso-ventrally, moderately long and broad; 2 or 3 spermathecae with papillae.

**B i o l o g y.** Larvae mine stems of *Asparagus* spp. (Liliaceae s. l.)

**D i s c u s s i o n.** Close relationships of *Zacerata* to *Pliorecepta* were hypothesized by A. Freidberg and A. Norrbom. White (White, Elson-Harris, 1992) has synonymized the tribal names Zaceratini and Plioreceptini. Both genera are very different, showing extreme diversity in development of many characters and thus are to be retained as separate suprageneric taxa.

Zaceratini share with Tephritinae (at least with Terelliini) the following characters: a) larvae: an area postero-laterad of oral sensilla is covered with placoid structures (two rows of the smooth-edged accessory plates?); b) adults: scapular setae not distinctive; c) epandrium oval. This indicates their possible sister-group relationships.

Relationships of Zaceratini + Tephritinae to other Tephritidae are not clear. The presence of placoid structures on facial mask between antennae may be an apomorphy indicating their sister-group relationships with Trypetini, comprising stem- and bud-miners. The absence of extension at the subapical portion of spermathecae ducts in *Pliorecepta poeciloptera* S c h r a n k suggests that either such extension appears in Gastrozonini/Ceratitini and in Tephritinae independently, or that the ducts in Zaceratini are secondarily narrowed. In the latter case, the larval characters (the placoid facial mask) is a result of homoplasy both in Zaceratini and Tephritinae.

## Subtribe Zaceratina

Hancock, 1986b (Trypetinae: Zaceratini); White, Elson Harris, 1992: 50 (Trypetini: Zaceratina).

**D i a g n o s i s.** Pedicellum and flagellomere I very long, the latter rounded apically. Cell Sc shortened; CuP closed without extension. Glans of aedeagus with dorso-apical rod large, having vesica-like structure at base (Figs 10, 4); female terminalia as on Fig. 10, 3. According to Hancock (1986b), 3 smooth weakly sclerotized spermathecae.

**I n c l u d e d t a x a.** *Zacerata* C o q u i l l e t t, a monotypic Afrotropical genus.

**D i s c u s s i o n.** No spermathecae were found in the only available female specimen in USNM collection dissected by A. Norrbom and later examined by the author. Hancock (pers. comm.) has informed me that his previous data might be an artifact or misinterpretation of other structures; further re-examination of this character is required.

## Subtribe Plioreceptina

Korneyev, 1987 (Trypetinae: Plioreceptini).

**D i a g n o s i s.** Pedicellum and flagellomere I of normal length, the latter acute apically. Cell Sc normal; CuP closed with a postero-apical extension. Glans of aedeagus with microtrichose, flap-like dorso-apical structure instead of the rod, with no vesica-like structure at base; female terminalia figured by Korneyev (1987), eversible membrane as on Figs 10, 5, 6. Two papillose spermathecae with non-extended ducts.

**I n c l u d e d t a x a.** *Pliorecepta* K o r n e y e v, a monotypic Palaearctic genus.

## Subfamily Dacinae

Loew, 1862 (Dacina); Rondani, 1871 (Dacoidi); Becker, 1905; Bezzi, 1910; 1915; 1916; 1919; 1920; 1924a; 1924b; Hendel, 1914b; 1927; Hering, 1941; 1947b; Hardy, 1955; 1973; 1974; 1977; 1982b; 1983a; Drew, 1972; 1973; 1989; Cogan, Munro, 1980; Ito, 1983; Hardy, Foote, 1989 (Dacinae); Munro, 1984 (Dacidae). — Callantrinae Munro, 1984. — Strumetini Munro, 1984. — Gymnodacini Munro, 1984. — Afrodacini Munro, 1984. — Daculini Munro, 1984. — Metidacini Munro, 1984. — Didacini Munro, 1984. — Psilodacini Munro, 1984. — Athlodacini Munro, 1984. — Pionodacini Munro, 1984. — Monacrostichini Munro, 1984.

**D i a g n o s i s.** The species of Dacinae can be distinguished by the following combination of characters: ocellar, presutural, dorsocentral and katepisternal setae lacking, scapular setae developed, no white thickened setae and setae, cell BM broadened, 2—3 time longer than wide; vanes of aedeagal apodeme broadly separated; eversible membrane of ovipositor predominantly with one-toothed scales, aculeus acute, 2 long wrinkled or coiled spermathecae.

**D e s c r i p t i o n.** Chaetotaxy: ocellar, presutural, dorsocentral and katepisternal setae always lacking (apomorphy); no proepisternal, extra supraalar and scutellar setae (polarity not resolved); kataterga without erect fine hairs (plesiomorphy), at most short microtrichose. Male terminalia: praegans of aedeagus with sack-like appendix bearing apical papillae or spines (Fig. 1, 9) (apomorphy); vanes of aedeagal apodeme broadly separate (polarity of character not resolved), always connected apically to sclerotized strip (derivative of gonite) (plesiomorphy), but not to anterior portion of hypandrium; epandrium usually large, with surstyli conspicuously narrower in profile and bilobate apically (plesiomorphy), but not vertical bar-like (Figs 1, 5, 6). Female terminalia: eversible membrane of ovipositor is covered with tooth-like, always one-toothed scales at least at anterior portion (apomorphy), the largest tooth are at medial line on ventral surface (Fig. 2, 15), aculeus with cerci fused to tergum 8 without tracks of seam (apomorphy) (Figs 2, 8, 9), spermathecae tubular, usually coiled with papillae or scales (apomorphy) (Figs 2, 22—24). Larvae breed in fleshy fruits.

**B i o l o g y.** Larvae breed in fruits.

**I n c l u d e d t a x a.** 3 genera, predominantly of Palaeotropical and Australian distribution; of them, *Monacrostichus* B e z z i includes two species; two largest genera are *Bactrocera* M c q. with over 475 nominal species and subspecies arranged into 27 subgenera (*Afrodacus* B e z z i; *Agladodus* M u n r o; *Asiadacus* P e r k i n s; *Austrodacus* P e r k i n s; *Bactrocera* s. str. M c q.; *Bulladacus* D r e w and H a n c o c k; *Diplodacus* M a y; *Gymnodacus* M u n r o; *Hemigymnodacus* H a r d y; *Heminotodacus* D r e w; *Hemiparatridacus* D r e w; *Hemisurstylus* D r e w; *Hemizeugodacus* H a r d y; *Javadacus* H a r d y; *Mauritidacus* M u n r o; *Melanodacus* P e r k i n s; *Niuginidacus* D r e w; *Notodacus* P e r k i n s; *Papuodacus* D r e w; *Paradacus* P e r k i n s; *Paratridacus* S h i r a k i; *Parazeugodacus* S h i r a k i; *Polistomimetes* E n d e r l e i n; *Queenslandacus* D r e w; *Sinodacus* Z i a; *Trypetidacus* D r e w; *Zeugodacus* H e n d e l), and *Dacus* F. with more than 250 species and subspecies of 42 hitherto established subgenera (*Abebaiodacus* M u n r o; *Acanodacus* M u n r o; *Ambitidacus* M u n r o; *Ancylodacus* M u n r o; *Andriadacus* M u n r o; *Anomoiodacus* M u n r o; *Aoptodacus* M u n r o; *Athlodacus* M u n r o; *Acanodacus* M u n r o; *Baucidacus* M u n r o; *Blaxodacus* M u n r o; *Callantra* W a l k e r; *Coccinodacus* M u n r o; *Dacus* F a b r i c i u s; *Desmodacus* M u n r o; *Didacus* C o l l a r t; *Dixodacus* M u n r o; *Dorylodacus* M u n r o; *Ectopodacus* M u n r o; *Fusodacus* M u n r o; *Guyodacus* M u n r o; *Janseidacus* M u n r o; *Karphodacus* M u n r o; *Lactodacus* M u n r o; *Leptoxyda* M c q.; *Lophodacus* C o l l a r t; *Metidacus* M u n r o; *Mictodacus* M u n r o; *Myrmecodacus* M u n r o; *Nebroductus* M u n r o; *Nesodacus* P e r k i n s; *Oligodacus* M u n r o; *Pionodacus* M u n r o;

*Psilodacus* Collart; *Pycnodacus* Munro; *Rhamphodacus* Munro; *Saccodacus* Munro; *Semicallantra* Drew; *Tetradacus* Miyake; *Timiodacus* Munro; *Tythocalama* Munro and *Xylenodacus* Munro). There are 13 species of 6 subgenera of *Bactrocera* and 8 species of 5 subgenera of *Dacus* in Palaearctic subtropical areas (Ito, 1983, Foote, 1984). *Paracallantra* Hendel is possibly a synonym of *Bactrocera* (Drew, 1989). Hancock (1986b), and Drew and Hancock (1994) suggested that *Ichneumonopsis* Hardy also belongs here; in my opinion, it might belong elsewhere, because this placement is not supported by any synapomorphies.

**Discussion.** The classification of Dacini (commonly as Dacinae) until now is rather unsettled and requires further improvements. It is convenient today that the subdivisions of the Dacini based mostly upon secondary sexual characters and chaetotaxy worth rather subgeneric than generic rank. The most comprehensive classification, covering mostly South Pacific species was proposed by Drew (1972, 1989) and Hardy (1973); Munro's (1984) monograph of the Afrotropical Dacinae (raised to family rank, as Dacidae) has caused several problems, because approximately 50 genera correspond to Drew's classification only partially, and require further revision and synonymization.

Monophyly of Dacini is well supported by numerous autapomorphies. It is possible that Dacini are derived from or are the sister-group of some Gastrozonini; they share the long extension of CuP with *Acrotaenistola*, but differ from them by rounded apex of the 1st flagellomere and well-sclerotized rod of the aedeagal glans, the plesiomorphic states of the characters. Numerous characters, such as reduced setae of several groups, bare arista, light medial vitta on mesonotum, lacking microtrichiae in cell BM, long extension of CuP cell, etc. are known also for Toxotrypanini, but apparently appear parallel, and do not show close relationships.

The bare spermathecae is a character here presumed to be the only valuable synapomorphy of Gastrozonini and Dacinae. Other characters were discussed above, for Ceratitini.

Institute of Zoology, National Academy of Sciences of Ukraine  
(252030 Kiev)

Accepted 12.10.93

## ЗАМЕТКИ

**Новые пестрянки (Lepidoptera, Zygaenidae) для фауны России.** — *Iliberis* (*Iliberis*) *assimilis* Jordan, 1907 — ♂, "Sidemi" (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn); ♂, "Sidemi" (Zoologische Staatssammlung, Мюнхен); ♂, "Amur, M. Korb" (Зоологический музей Киевского университета); ранее был известен из Китая и Кореи. *Artona* (*Balataea*) *funeralis* (Butler, 1879) — ♀, "О. Сахалин, 8 км СЗ Анивы, 6.07.1983, Синев С. Ю." (Зоологический институт РАН, С.-Петербург); ранее был известен из Китая, Тайваня, Кореи и Японии. По территории России проходит северо-восточная граница ареалов обоих видов. — К. А. Ефетов (Крымский медицинский институт, Симферополь).