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A New Species of the Genus *Pibrocha* Kirkaldy (Homoptera, Fulgoridae) with Notes on the Systematics of the Subfamily Dichopterinae and with Description of a New Tribe

A. F. Emeljanov

Zoological Institute, Russian Academy of Sciences, St. Petersburg, 199034 Russia
e-mail: hemipt@zin.ru

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Abstract—The second species is described in the genus *Pibrocha* Kirk., *P. excelsa* sp. n. from Thailand. The limits of the subfamily Dichopterinae are discussed, a new tribe Protachilini trib. n. erected for the South American monotypical genus *Protachilus* Fenn. is added to the tribes Dichopterinii, Cladodipterini, and Dorysarthrini. The composition of the families Fulgoridae and Dictyopharidae is also discussed. The origin of the articulated cephalic process in adult Dorysarthrini is hypothesized.

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A new species is found in the genus *Pibrocha* Kirkaldy previously considered monotypical. *Pibrocha*, similarly to the other genera possessing a cross-vein on the clavus and resembling Dictyopharidae in appearance, had been traditionally attributed to this family. Melichar (1912) isolated these genera into the tribe Dichopterini of the subfamily Dictyopharinae; later, Metcalf divided this tribe into two subtribes. Much later, most part of Dichopterini (within the subtribe Dichopterina sensu Metc.) was transferred by me (Emeljanov, 1979) to the family Fulgoridae. At that time, I had at my disposal no material of the subtribe Cladodipterina, and the question of its position remained open. Subsequently, having examined the material, I concluded that Cladodipterini must remain in the Dichopterini as treated by Melichar, and, accordingly, the tribe Dichopterini sensu Melichar, 1912 is monophyletic. According to the recent data of Urban and Cryan (2009), Dichopterinae, as I previously wrote (Emeljanov, 2011), probably deserves the rank of a family along with Fulgoridae and Dictyopharidae.

If treated as a subfamily, Dichopterinae should include the tribes Dichopterini, Dorysarthrini, Cladodipterini, and Protachilini, trib. n. The genus *Protachilus* Fennah, 1944 (Fig. 12) was tentatively related by Fennah to *Cladodiptera* Spinola, 1839 (Fig. 13); however, *Protachilus* demonstrates a number of distinctive characters which require establishing a separate tribe for it.

SUBFAMILY DICHOPTERINAE MELICHAR, 1912

Tribe **PROTACHILINI** Emeljanov, trib. n.

Type genus *Protachilus* Fennah, 1944.

The tribe is characterized by the following features: metope rather narrow, elongate, with smoothened carinae; pronotum without lateral (posterodiscal) carinae on disc; fore wing with late media first branching (at nodal level), with only one postnodal row of cross-veins, and with reticulate venation of pterostigma. The first branching of the media at the nodal level occurs in none of the representatives of the families Dictyopharidae and Fulgoridae; being characteristic of the relatively basal family Cixiidae, this peculiarity allows me considering *Protachilus* the most primitive genus in the family.

The tribe includes only the monotypical genus *Protachilus* known from Brazil and Paraguay.

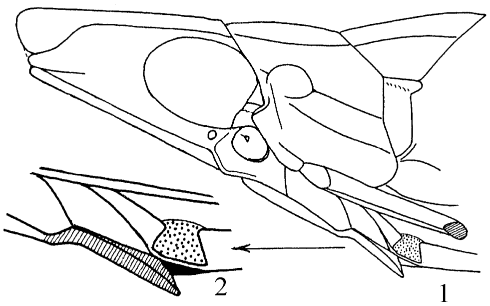
Tribe **DORYSARTHRINI** Emeljanov, 1979

The tribe includes two genera: *Dorysarthrus* Puton (Figs. 10, 11) and *Pibrocha* Kirkaldy (Figs. 1–9).

Genus ***PIBROCHA*** Kirkaldy, 1902

Pibrocha excelsa Emeljanov, sp. n. (Figs. 1, 2, 5–8).

The new species is closely related to the type species *Pibrocha egregia* (Kirby) (Figs. 3, 4, 9) known from Ceylon, but differs in a rounded apex of the ce-

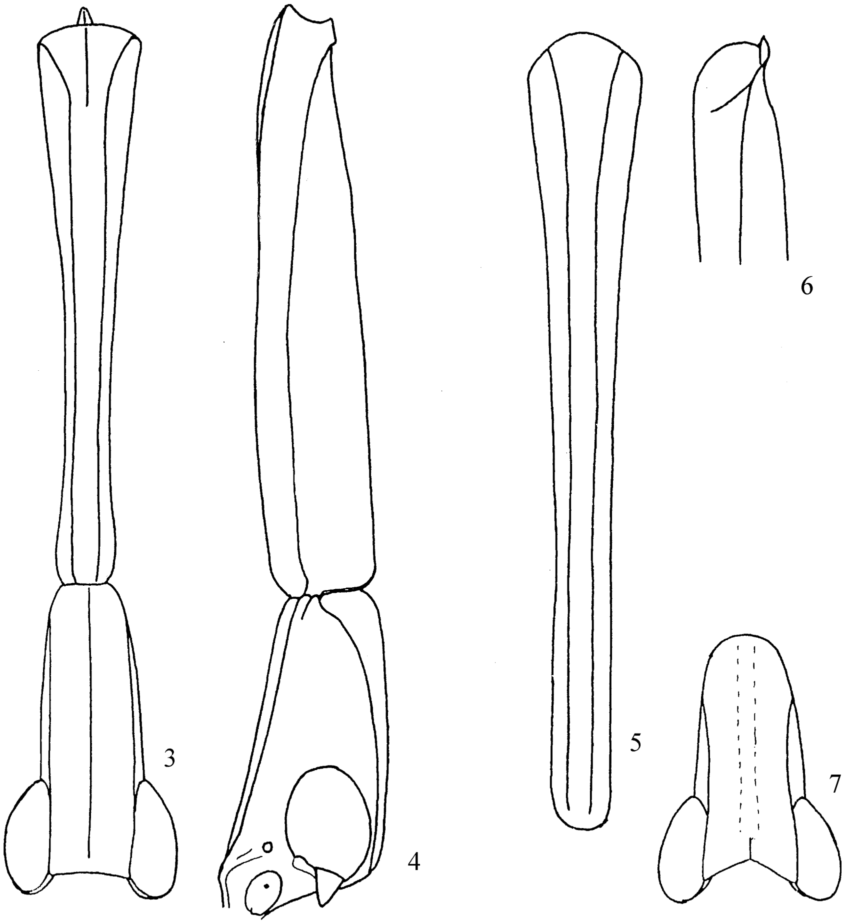


Figs. 1, 2. *Pibrocha excelsa* sp. n.: (1) head, lateral view, without (separated) distal part of cephalic process; (2) area of anteclypeus and labrum, magnified: (anteclypeus shaded, labrum blackened).

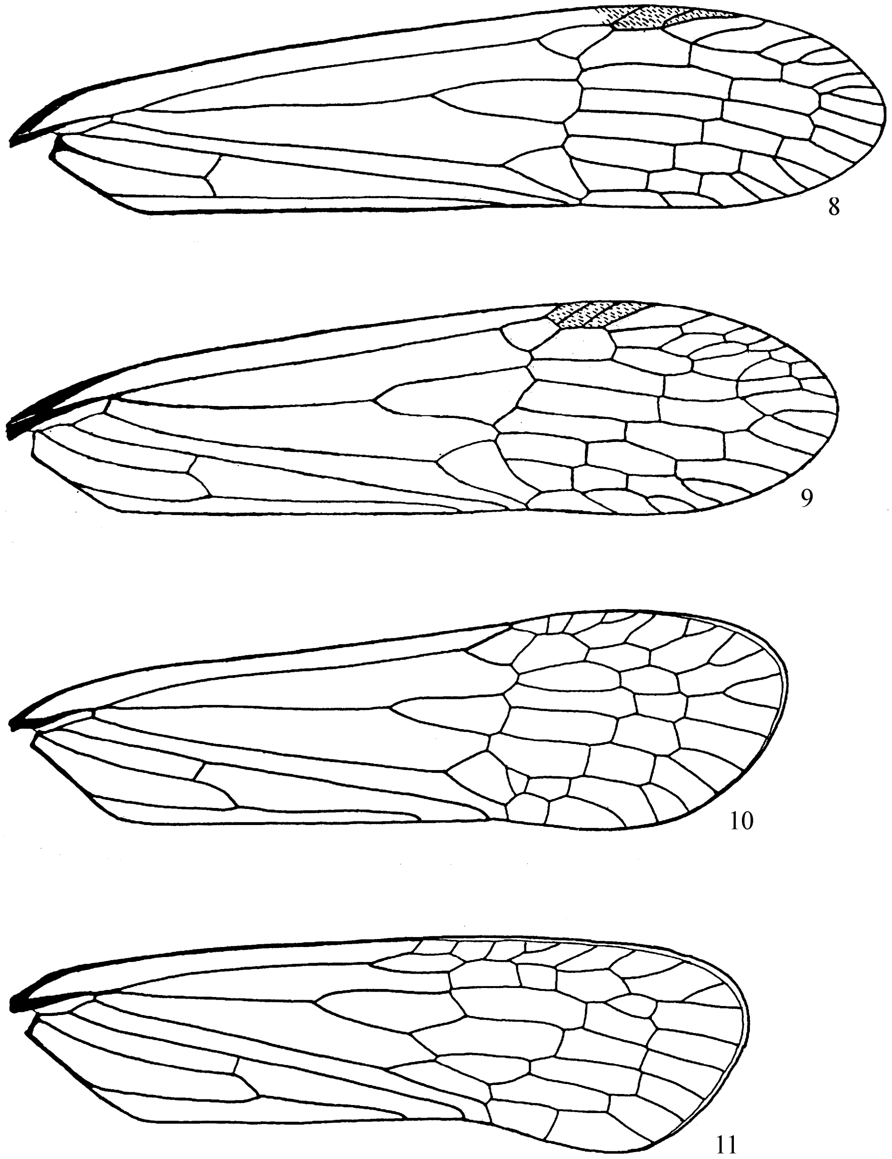
phalic process, in the coloration, and in some other less important characters (see below).

Description. Anterior margin of coryphe obtuse-angularly projecting; apical obtuse angle and angles at passage into lateral margins of coryphe rounded; in lateral view, apical margin of process also rounded.

Coloration on whole brown, formed by dark brown pattern consisting of irregularly shaped merging spots against pale brown background. Part of coryphe, from its posterior margin to joint, with pale longitudinal stripe and with speckled (marble) pattern turning to brown at sides of this stripe after joint; part of coryphe after joint bearing dark filiform longitudinal stripe and ragged uneven alternating dark and pale spots and areas; apex of cephalic process greenish white: this spot extending from coryphe onto apices of lateral (preocular) areas. Genae and preocular areas, as far as joint, with dark stripe beginning slightly behind metopal carina (separated from it by pale line) and extending in front of antennae and ocellus; before eye (before joint), this stripe also bordered dorsally with diffused wider pale stripe; most part of surface in front of eyes brown, darker in upper, middle, and lower parts, i.e., with 2 pale indistinct diffused longitudinal areas (stripes). In front of joint, preocular areas covered with ragged, partly merging, oblique dark stripes; preapical

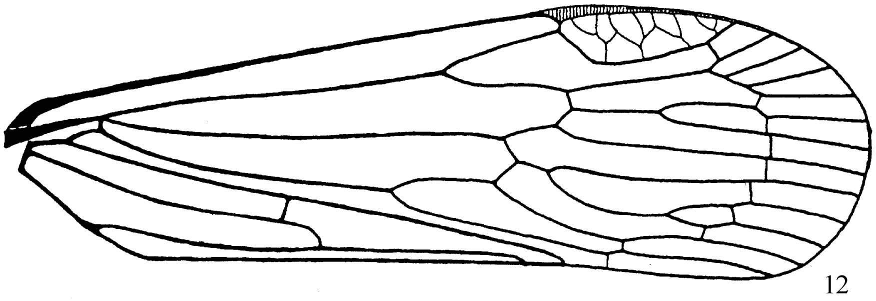


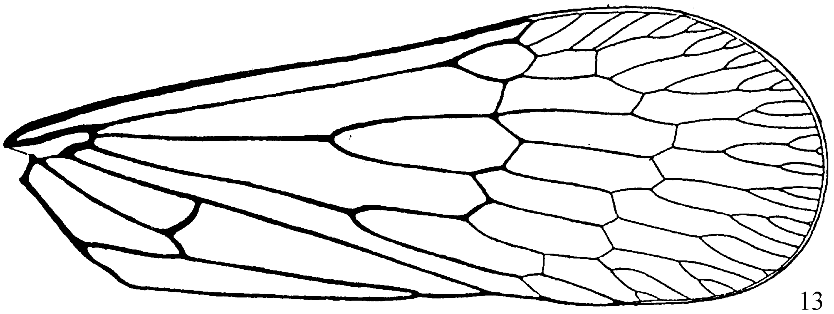
Figs. 3–7. *Pibrocha* spp.: (3, 4) *P. egregia* Kirby [(3) head, dorsal view; (4) head, left lateral view]; (5–7) *P. excelsa* sp. n. [(5) separated part of cephalic process, dorsal view; (6) its apex, lateral view; (7) basal part of head (without separated distal part of process), dorsal view].



Figs. 8–11. Fore wing: (8) *Pibrocha excelsa* sp. n., (9) *P. egregia* Kirby, (10) *Dorysarthrus mobilicornis* Puton, (11) *D. sumakovi* Oshanin.

area entirely blackened; apex, as already mentioned, greenish white. Lateral carinae of metope filiform blackened; intermedial carinae pale, shaded at sides by dark lines; median line of metope without distinct carina, with pale longitudinal stripe indistinctly bounded laterally. Lateral areas of metope along entire length covered with small black rounded spots marking places of larval sensory pits. Behind joint (where median carina nearly absent), medial areas pale, ochraceous-whitish; median line with broken dark filiform stripe. Clypeus brown, with pale carinae. Disc of pronotum and mesonotum colored similarly to coryphe; pronotum with pale lateral carinae, with more or less uniformly brown anterior half from temple to collateral carina, and with other parts brownish, with dark spots; paranotal lobes pale, with dark spots, with diffused brownish stripe beginning slightly before lower margin. Lateral parts of scutellum brown, with diffused pale spots. Fore wing cloudy; veins brown, with pale filiform ridges, in apical third of corium entirely pale; veins on membrane also pale but with dark sections behind line of nodal veins; pterostigma darkened, with apically widened brown stripe extending from nodal furca of media and pale dotted near





Figs. 12, 13. Fore wing: (12) *Protachilus rex* Fennah, (13) *Cladodiptera macrophthalma* Spinola.

chain of subapical cross-veins. Ventral side of thorax brownish, with pale carinae; antecoxale darkened to dark brown. Fore femur and tibia and middle and hind tibiae with pale carinae and linearly blackened intervals between them; middle and hind femora, in addition to dark longitudinal stripes, with dark oblique band. Abdomen covered with large dark spots against pale background. The specimen is mounted on a cardboard plate and, thus, many details of the ventral side of the body cannot be seen. The male genitalia (not dissected) are similar to those of *P. egregia* in appearance, their main difference being the posterior margin without a digitate process at its sides, with simple obtuse-angular rounded outlines.

Body length of male 25.5 mm.

Material. Holotype, male: **Thailand**, NW Thailand, Mae Hong Son, Nupe-ah, 7–9.V.1992, Strnad Jan lgt. (Collectio National Museum Praha, Czech Republic).

The species clearly differs from the type species *P. egregia* (Kirby) in the shape of the apex of the cephalic process (Figs. 6, 7), absence of the third row of cross-veins on the membrane (in its anterior half), in a mottled, more contrasting coloration of the body, and in the presence of a dark spot on the fore wing.

The Hypothesis of the Origin of the Jointed Cephalic Process in Dorysarthrini

In some Dictyopharinae, the head forms a slender process (“nose”) flexibly connected to its rest part; this joint is clearly pronounced in *Raphiophora* Schaum and *Miasa* Dist. Such a “lean” process cannot fit a diverticle of the intestine, which is typical of fulgoroids (Fick, 1981). A similar condition of the cephalic process is also observed in the tribe Augilini of the family Caliscelidae, namely, in the genera *Cicimora* Emeljanov and *Augilodes* Fennah (best pronounced in the latter genus). Nevertheless, in larvae of the slim-nosed adults, the simple and thick process is not separated by a constriction. In Fulgoridae, a needle-shaped “lean nose” of the adults is flexible at the base, i.e., primitively jointed; it is the slimmest and longest in the genus *Kalidasa* Kirkaldy; Distant (1906) described it as follows: “Head emitting from the base of the face long, slender, mobile, reflexed process (in dried specimens easily and frequently mutilated) … ;” a similar, but non-joint process is also present in this family, for example, in species of the genus *Aphaena* Stål. In all the known larvae of the fulgoroid species with a lean nose, as well as in Dictyopharidae, the cephalic process is well developed. Therefore, in such representatives, the diverticle occupies the process at the larval stage and disappears (is absent in it) in the adult. In larvae of *Dorysarthrus*, the process does not form a joint. A small series of specimens of *Dorysarthrus* cf. *sumakovi* Osh., collected in the south of Israel (the collection of the Zoological Institute, Russian Academy of Sciences), includes two apparently abnormal individuals with a "lean" slender cephalic process. I assume that the head diverticle of the intestine is less important for the adult than for the larva, and therefore can be reduced.

The chain of the evolutionary events which resulted in formation of the jointed cephalic process in Dorysarthrinae may be as follows: (1) in connection with the reduction of the diverticle in the adults, a lean nose has developed; (2) the slender lean nose has become easily bending from side to side, as the result of formation of the constriction at its base which develops during molt to adult and hinders the diverticle from penetration to the cephalic process; (3) in the adult, the diverticle penetrated again into the lean nose, empty until then, the nose again became thick, but the ring thinning of the cuticle at its base remained in the shape of a primitive joint which (4) then improved for bending mainly in the sagittal plane.

An adaptive importance of the jointed cephalic process remains unclear, and the same can be said about the head diverticle of the intestine (Fick, 1981). My observations of living individuals of *D. sumakovi* show that when a moving insect strikes against an obstacle with its nose and continues the motion, the nose bends downward and sideways, and when the obstacle is left behind, the nose elastically returns to the straight position. The "lean-nosed" individuals of *D.* cf. *sumakovi* can be considered atavistic.

In their recent publication, Song and co-authors (2011) dispute my attribution of the genus *Dorysarthrus* Puton (and thereby also the subfamily Dorysarthrinae) to the family Fulgoridae without any serious arguments other than the statement that the individuals of Fulgoridae are large, and those of Dictyopharidae and *Dorysarthrus* are rather small. Even without taking into account the fact that the size of the body is a nonspecific quantitative character, I should note that rather large forms occur among Dictyopharidae, for example, in the genus *Lappida* Spinola, and rather small forms, among Fulgoridae, for example, in the genera *Stalubra* O'Brien or *Poblicia* Stål. Another character mentioned by Song et al., the presence of a cross-vein on the clavus, argues for the relationship of Dorysarthrinae and Cladodipterinae but does not conform to their belonging to Dictyopharidae. I have already expressed my opinion (Emeljanov, 2011) that Cladodipterinae also belongs to Fulgoridae, namely, to Dichopterini sensu Melichar, 1912. As early as in 1979, I pointed out to the affinity of Dorysarthrini and Zanninae. It is quite possible that Zanninae and Dichopterinae s. l. form a monophyletic branch. Synapomorphy in the structure of the anteclypeus projecting over the labrum (Figs. 1, 2) also counts in favor of the affinity of Zanninae and Dorysarthrinae.

The following characters were listed by me (Emeljanov, 1979) as the grounds for attribution of *Dorysarthrus* to the family Fulgoridae.

(1). The presence of a cross-vein *CuP–Pcu* on the clavus.

(2) The absence of a complemental bend of the folded anojugal lobe of the hind wing in repose.

(3) A straight posterior margin of the pronotum.

(4) The posteriorly-diverging postfurcal carinae of the mesosternum.

(5) The absence of specialized setae (platellae or acutellae) on the 1st and 2nd segments of the fore and middle tarsi.

(6) The presence of only 2 teeth in the anterior (initially ventral) group at the apices of the hind tibiae.

(7) Relatively short legs.

(8) The ovipositor without sensory appendages on the lower lobes of the 3rd valvulae.

(9) Styli without dorsal tooth.

(10) The presence of an exuvial suture on abdominal tergite I of the larva.

(11) Sensory pits with raised margins.

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